LOUISIANA POWER & LIGHT COMPANY

WATERFORD SES, UNIT NO. 3

PRE LICENSING ISSUES

FINAL REPORT

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PRE-LICENSING ISSUES FINAL REPORT

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LIST OF APPENDICES

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LIST OF REFERENCES

Reference 1 - NRC Letter - D.G. Eisenhut to J.M. Cain Dated June 13, 1984

Reference 2 - NRC Letter - D.G. Eisenhut to J.M. Cain Dated September 19, 1984

Reference 3 - LP&L Letter W3B84-0449 Dated June 28, 1984

I

PURPOSE AND SUMMARY

PURPOSE

On June 13, 1984, NRC issued a request for additional information (Reference 1), principally relating to the area characterized as "resolution of allegations." On September 19, 1984 NRC issued a supplemental request (Reference 2). Responses to the 23 numbered issues raised in the NRC requests have been submitted individually to the NRC as they were completed by LP&L. This Pre-Licensing Issues Final Report provides the complete Louisiana Power & Light Company (LP&L) response to the referenced NRC requests for additional information.

Individual responses to the 23 issues were submitted by LP&L as follows:

Issue	LP&L Transmittal Letter
2,3,8,16 & 19	W3B84-0467 Dated August 10, 1984
5,7 & 21	W3B84-0475 Dated August 27, 1984
12,13 & 14	W3B84-0480A Dated September 4, 1984
15 & 22	W3B84-0481 Dated September 14, 1984
11 & 18	W3B84-0485 Dated September 18, 1984
17, 23 & S-5*	W3B84-0491 Dated September 28, 1984
S-2*	W3B84-0496 Dated October 15, 1984
4 & 9	W3B84-0801 Dated October 19, 1984
1,6,10,20 & S-13*	W3B84-0807 Dated October 31, 1984
6,7,19 & 20(Revisions 1)	W3B84-0817 Dated November 21, 1984
1 & 10 (Revisions 1)	W3B84-0818 Dated December 6, 1984

In addition to responses to the individual issues, the NRC requested that LP&L assess the collective significance of the issues. The assessment of collective significance was submitted on October 31, 1984 (W3B84-0807). Revision 1 to the assessment of collective significance was submitted on November 21, 1984 (W3B84-0817).

* In some cases supplements to previously submitted responses were also submitted. Supplements to Issues 2, 5 & 13 were submitted as indicated by the asterisks.

SUMMARY

The large effort expended in responding to the Pre-Licensing Assessment Issues has resulted in the following:

1. Increased confidence in the ability of Waterford 3 structures systems and components to perform satisfactorily in service has been confirmed.

2. Increased confidence in the ability of the Waterford 3 operations organization and support staff to maintain acceptable quality levels during plant operations has been confirmed. Focus has been directed toward further implementing construction lessons learned in operational programs.

3. LP&L has implemented an enhanced program for identifying quality and safety concerns through personnel exit interviews. This program improves LP&L management ability to assure the awareness of the quality concerns of employees.

4. Development of the responses has led to improvement in the filing and retrievability of Waterford 3 QA documentation and has caused LP&L to perform a diagnostic re-evaluation of the Waterford 3 Records Management System.

DEVELOPMENT OF RESPONSES

This Section outlines the methods by which the 23 individual issues have been resolved by LP&L. Upon receipt of the June 13, 1984 NRC request for additional information, LP&L developed a preliminary program for addressing the issues, including the LP&L organization to be established for responding to the issues and plans for each individual issue. These plans were updated periodically as appropriate.

The program included a separate review of the resolutions by a Waterford 3 Safety Review Committee (SRC) Subcommittee and the establishment of an independent Pre-Licensing Issues Assessment Task Force (Task Force) to advise LP&L and evaluate LP&L's resolution of the issues. The approach which was used to resolve the issues is described below.

PROGRAM MANAGEMENT

The LP&L Project Manager - Nuclear was assigned responsibility for management of the overall program and actions outlined below. He performed these tasks in a normal line management role and had access to and the support of requisite LP&L and contractor managers and staffs on a priority basis. He assured effective interfaces with external groups including the SRC and the Task Force.

The Project Manager - Nuclear reports directly to the Senior Vice President - Nuclear, who in turn reports directly to the President and Chief Executive Officer (CEO) of LP&L. Both the Senior Vice President - Nuclear Operations and the CEO were directly and actively involved in the management of the Program.

RESOLUTION OF ISSUES

Each issue was analyzed to determine:

- The facts and the specific problems, if any
- The cause
- The generic implications
- The actions and schedules to correct both the specific problem and related generic concerns
- The safety significance with respect to fuel load and low power operation, and to operation above 5% power

The process for preparation and review of responses was as follows:

(1) Initially, an approach to resolution was prepared by gathering information on each issue from knowledgeable individuals. The approach was reviewed by a combination of an LP&L Response Review Team* and the SRC Subcommittee. The independent Task Force reviewed the plan for logic of the approach and adequacy of the scope of the resolution.

(2) Draft responses were prepared by the organization most appropriate, dependent upon the issue. Where Ebasco QA and/or Engineering were involved in the response development, LP&L QA and/or Engineering reviewed the process, evaluations and conclusions as necessary.

(3) The LP&L Response Review Team reviewed draft responses and directed efforts of the authors/evaluators as necessary to assure adequacy of evaluations and acceptability of responses. Final determinations on generic implication, cause, safety significance and corrective actions were accomplished through the Response Review Team.

(4) Following approval of draft responses by the Response Review Team, a formal LP&L validation process was initiated to provide assurance that the responses were accurate and are supported by proper documentation.

(5) Upon completion of the specified reviews, the final response was presented to the LP&L President and CEO for his concurrence and transmittal to the NRC. The Task Force and SRC Subcommittee reviewed the logic of each response and provided statements indicating agreement with the logic. Section IV of this report includes final responses to the issues.

Upon completion of the overall Task Force review, a final Task Force report was prepared and transmitted simultaneously to the LP&L CEO and the NRC on December 7, 1984.

COLLECTIVE SIGNIFICANCE AND PROGRAMMATIC CHANGES

In parallel with the process of formulating the information described above, LP&L:

(1) Assessed the collective significance of the individual issues, and

(2) Recommended institutional or programmatic changes deemed appropriate to avoid recurrence of the types of problems underlying the issues being addressed.

The assessment of Collective Significance of the issues is included herein as Section III.

* The LP&L Response Review Team consisted of the LP&L Project Manager-Nuclear, the LP&L Engineering and Nuclear Safety Manager, the LP&L Nuclear Support and Licensing Manager, a representative of the LP&L Plant Manager, the LP&L Corporate QA Manager and senior contract personnel who are particularly knowledgeable of the specific issues.

SAFETY REVIEW COMMITTEE

The Waterford 3 Safety Review Committee (SRC) designated an SRC subcommittee to review the plans, responses and the assessment of collective significance. The SRC Subcommittee consisted of the LP&L Nuclear Support and Licensing Manager (Chairman), Mr. Joseph M. Hendrie-Consulting Engineer, Mr. Robert M. Douglass, Manager of Quality Assurance for Baltimore Gas and Electric Company, and the LP&L Engineering and Nuclear Safety Manager.

INDEPENDENT ASSESSMENT

An assessment of the resolutions and determination of safety significance for each of the 23 Issues and the Assessment of Collective Significance has been provided by the Pre-Licensing Issues Assessment Task Force (Task Force). The Task Force reported directly to the CEO of LP&L and provided its final report on December 7, 1984. The Task Force consisted of officials of UNC Nuclear Industries, Inc., Richland, Washington, and NUS Corporation, Gaithersburg, Maryland, who were assisted by UNC and NUS staff members, as required. The Task Force assessed LP&L's resolution of the issues, including the cause, generic implications and collective significance of the issues. The Task Force also provided an assessment of the safety significance of the issues with respect to fuel loading and low power testing, and operation above 5% power. It assessed the adequacy of LP&L QA/QC program in light of the NRC's issues, and provided recommendations, as it appropriate.

The Task Force charter, identification of principals and in tial functions were formalized in Reference 3. The Task Force . nitially consisted of three members. On October 18, 1984, one of the Task Force members passed away and it was decided not to designate a replacement.

Specific recommendations in the Task Force report and LP&L responses thereto are addressed in Appendix A.

III

COLLECTIVE SIGNIFICANCE
(FINAL)

PURPOSE:

In response to the twenty-three issues identified in the NRC letter of June 13, 1984, LP&L has provided the NRC with a program plan describing the ongoing activities to resolve the NRC's concerns. The twenty-three responses developed in accordance with that program plan have addressed the specific NRC concerns. As part of that effort, the findings of each issue were evaluated to determine the "cause" and "generic implications". That evaluation process was conducted in a manner that allowed commonalities between the various issues to be considered and factored into the generic implications of one or more issues, where appropriate.

The purpose of this assessment of collective significance is to evaluate the overall significance of the findings from the twenty-three evaluations to achieve the following objectives:

- Identify and assess the significance to safety and to the construction program of the findings from the evaluations of the twenty-three issues.

- Identify actions that could have prevented occurrence of the twenty-three issues and thereby identify the lessons learned which, if implemented, would provide reasonable assurance that such deficiencies would be precluded from occurring in the future.

- Review the LP&L operational phase Quality Assurance Program to determine whether the lessons learned are reflected in the Program or whether additional modifications to the Program are warranted.

The conclusions that have been reached in this assessment of collective significance are discussed in the following sections. The principal conclusions are as follows:

- In response to Issue 23, "QA Program Breakdown Between Ebasco and Mercury", LP&L committed to further address areas needing improvement in the QA program in this assessment of the collective significance of the 23 issues. Having completed the assessment, and in consideration of problems related to Mercury in many of the other issues, it is apparent that programmatically the corrective action was not sufficiently thorough. Thus the partial breakdown acknowledged in 1982 with respect to Mercury was not totally corrected. However, overall site performance improved, particularly with respect to the quality of installed hardware, and there was no escalation into an overall breakdown of the QA program.

- The 23 issues have been thoroughly analyzed. The process has involved more than 1000 man-months of effort, exclusive of over 100 man-months expended by the NUS Task Force Support Group. The results, reflecting the general quality of the QA program and of the construction work itself, provide a high degree of confidence that the structures, systems and components as constructed are adequate to protect the public health and safety during operation. Only very limited hardware rework has been undertaken as a result of the twenty-three concerns, and in several cases this rework has been discretionary.

- The lessons learned from the twenty-three concerns provide a reasonable basis to determine whether the operational phase of the Quality Assurance Program adequately addresses the problems which occurred during construction.

- The assessment of the operational phase Quality Assurance Program has provided reasonable assurance that the program is adequate to preclude similar problems.

This process, though extensive, clearly has been valuable to LP&L. The process has identified areas for improvement in the LP&L QA program and has reconfirmed the safety of the as-built plant.

This discussion of collective significance is divided into the following three parts:

1. Assessment of Construction Program and Safety Significance
2. Identification of Lessons Learned
3. Operational Phase QA Program Assessment

ASSESSMENT OF CONSTRUCTION PROGRAM AND SAFETY SIGNIFICANCE

To assess the safety significance of the 23 issues to the as-built plant, the issues have been categorized according to the effort needed to resolve the concern (See Table 1). Four categories have been created as follows:

- Mercury: Those issues involving resolution of work within the scope of Mercury's effort. With the exception of Issue 23, all are also discussed in the following three categories.

- Software: Those issues involving records reviews or limited action such as clarification/correlation of records, engineering evaluation, record analysis, or procedural changes.

- Inspection/Evaluation: Those issues involving reinspections and engineering evaluations for resolution.

- Hardware: Those issues involving physical rework to address the findings.

The significance to the construction program in terms of whether weaknesses have been corrected and the nature of the weakness is treated on a case by case basis.

1. Mercury Work:

Ten of the 23 issues dealt in varying degrees of specificity with the Mercury program. Issue 23 "QA Program Breakdown between Ebasco and Mercury" dealt expressly with the effectiveness of the corrective action program undertaken by LP&L as a result of the problems identified in the Mercury program in 1982. Additional questions as to the effectiveness of the QA review of Mercury work are included in the following NRC concerns:

Issue	Title
1	Inspection Personnel Issues
2	Missing N1 Instrument Line Documentation
3	Instrumentation Expansion Loop Separation
4	Lower Tier Corrective Actions
6	Dispositioning of Nonconformance & Discrepancy Reports
13	Missing NCRs
14	J.A. Jones Speed Letters and EIRs
17	QC Verification of Expansion Anchor Characteristics
22	Welder Qualifications (Mercury) & Filler Material Control (Site Wide)

Analysis of these concerns shows (a) improvement in, but continuing problems with, the control of Mercury efforts during construction, and (b) ultimate success in assuring the adequacy of the work within the Mercury scope.

Improvements in the control of Mercury work are detailed in response to Issue 23. These include a June 1982 LP&L order for Mercury to cease safety related installations until there had been extensive Mercury organizational changes, additional staffing to address quality inspections/reviews, training to provide the guidance/direction needed for quality results, and the establishment of an Ebasco Management team to provide support and management oversight of the Mercury program. Subsequent improvements in control over Mercury included both ongoing administrative and quality program changes, and gradual reductions in the Mercury scope until a full demobilization by November 1983. A review of the post June 1982 work demonstrated a significant improvement in both the quality of installations and the quality of documentation.

Notwithstanding improvements in the Mercury program, problems continued. Most importantly, generic implications of identified problems were not sufficiently addressed. Had they been, many of the problems identified by the NRC would have been identified by LP&L. For example, a significant number of QC inspectors hired by Mercury as part of the 1982 corrective action were apparently not sufficiently qualified to ANSI N45.2.6-1973, and this was not discovered in the QA process. As an indication of the ongoing problem, Mercury did not process NCR-888 to address concerns that QC personnel were not properly qualified. This action could have then resulted in a more effective corrective action to address the Mercury concerns as well as early identification of the issues found in Issues 1, 10 and 20.

While there were continuing problems with control of Mercury, the as-built condition of Mercury work, as determined by LP&L, is adequate to assure the public health and safety. This is demonstrated by reverification and testing activities both as a part of the Mercury corrective action program established in 1982 and as a part of the responses to the twenty three issues. The reverification activities encompass all types of Mercury safety-related work. (See Responses to Issue 1 and Issue 23) As shown in the response to Issue 1, an extensive reinspection of all N1 instrument lines resulted in a small amount of rework, most of which was elective and none of which was significant to safety.

2. Software:

The resolution of six of the twenty-three identified issues was achieved through actions limited to such tasks as reconciliation/ correlation of records, records analysis, records reviews, statistical analysis, engineering analyses, e[illegible] Collectively, the evaluations of these concerns indicate that the past [illegible]tions to address weaknesses in plant records had shortcomings but that these did not result in problems implying inadequacies in plant hardware.

In responding to Issue 5 "Vendor Documentation - Conditional Releases", a review was performed of the material receiving and control systems as well as other areas with a potential for a similar situation (i.e. concerns noted on Release for Shipment Forms, Ebasco Home Office controlled NCR's, and material received under manufacture, deliver and erect type contracts). It was determined that the problems were limited to the absence of the formal tracking required by existing procedures for conditional certifications in Combustion Engineering documentation packages. There was an undetected violation of procedures but based on a review of CE purchase orders, it was concluded that there would have been no safety consequences if the deficiency had remained uncorrected.

Issues 7 "Backfill Soil Densities" and 11 "Cadwelding" involved analyses of records. For Issue 7, records correlation had not been completed because some were in the Ebasco vaults and some had not yet been obtained from the contractor who, it should be noted, was still onsite and active. The correlation, review and analysis demonstrated that there was good work control, that specification requirements were generally exceeded, and that the backfill was adequate to perform its design function. In Issue 11, the quantity of data did not allow ready analysis to demonstrate the attributes desired. Therefore, LP&L transcribed cadweld data onto computer storage to demonstrate compliance with Regulatory Guide 1.10 and specification sampling frequencies. The review identified three minor discrepancies not identified in the prior NCR and these were evaluated and found to be acceptable.

Issue 8 "Visual Examination of Shop Welds During Hydrostatic Testing", was the result of a checklist that only identified field welds. This concern had been previously identified in June 1983 and dispositioned to demonstrate the adequacy of the visual examination of shop welds and the lack of any safety impact. The review gives no indication of deficiencies.

The records reviews for Issue 13 "Missing NCR's" included site NCR's, Ebasco Home Office NCR's, and Mercury NCR's and demonstrates that, although documentation was not readily available to answer some of the concerns, there was no loss of control over NCR's that would currently imply open questions about the acceptability of installed safety systems. The cause of most of the concerns related to Ebasco NCR's was identified as a change in record keeping in 1979, a temporary practice that allowed NCR numbers to be issued prior to the NCR being written, and the use of a preassigned block of NCR numbers. The review of Mercury NCR's concluded that there was one missing NCR which did not represent an unresolved condition, one superceeded NCR, and three NCR's which had not been processed by Mercury. These three NCR's, one of which is covered by Issue 1, have now been resolved. The cause was Mercury's improper application of their own procedures.

Issue 16 "Surveys and Exit Interviews of QA Personnel" involved an LP&L initiative for obtaining employee feedback on potential safety concerns. The shortcomings of the initial program have been addressed. The exit interview program has been completely restructured and is providing a very useful service in obtaining feedback on individual's concerns. Feedback received prior to the restructuring is being reanalyzed and concerns are being closed through an orderly closure process.

3. <u>Inspection/Evaluation</u>:

Nine of the twenty three issues were resolved by reinspections, engineering evaluation, statistical sampling, or similar efforts but required no changes to the plant hardware. An evaluation of these concerns leads to a conclusion there were weaknesses in plant records but these weaknesses have now been addressed and do not represent a potential hardware deficiency.

Three of the Issues, 1 "Inspection Personnel Issues", 10 "Inspector Qualification - J.A. Jones & Fegles", and 20 "Construction Material Testing (CMT) Personnel Qualification Records" involved a review of professional credential and education/employment checks on 100% of the site QA/QC personnel involved in safety related activities. In this review, QA/QC personnel have been classified using conservative and standardized acceptance criteria as "qualified" and "unqualified". These classifications were reviewed and finalized by an LP&L Review Board of senior QA personnel with the assistance of contractor and consultant support. For "unqualified" inspector personnel, Corrective Action Requests were written to formally track and disposition potential deficiencies. For Mercury, substantial reinspection was initiated, particularly for the N1 tubing installation, and rework is covered in the next section. For most contractors reviewed under Issues 1 and 10, the disposition of deficiencies has not required reinspection. In the case of Issue 20, an engineering evaluation of the work of CMT personnel has established that questions about personnel qualifications have not rendered the work indeterminate. There have been many other methods (e.g. ANI, NDE, prerequisite preoperations/ integrated testing, overinspections, etc.) which provide assurance that quality has been built into the plant. There have been no safety significant hardware changes found and this provides positive evidence as to the adequacy of the overall construction program.

Issue 4, "Lower Tier Corrective Actions Are Not Being Upgraded to NCR's" required an extensive effort to review document packages, based on a statistical sample, to ascertain whether they had been properly upgraded to NCRs, whether the disposition was adequate, and whether proper reporting per 10CFR50.55(e) and 10CFR21 had occurred. The review identified minor weaknesses in the construction program in following procedural criteria for lower tier documents with regard to voiding and upgrading to NCR's. While it does indicate a deficiency in the construction program, it does not indicate that there was a loss of control over non-conforming materials, parts, or components. This conclusion is supported by the results of a statistically justified sampling program.

The resolution of Issue 9 "Welder Certification" identified adequate welder certification but found that the records for seven instrument cabinets were incomplete or missing. The adequacy of the welding performed by J.A. Jones has been reviewed. In cases where welding deficiencies were identified, the welds were dispositioned to be acceptable as is. The missing or incomplete documentation identifies a loss of control in records management but the acceptable dispositioning of the welds and the results of the complete review of the J.A. Jones welding scope demonstrates the overall adequacy of the J.A. Jones welding.

A sampling program of the information request documentation used by contractors was undertaken in order to resolve Issue 14 "J.A. Jones Speed Letters and EIRs". In the case of approximately one third of the contractors, instances were identified where design changes were made by information requests without appropriate documentation. This was determined by taking a minimum 10% random sample of each contractors information requests (for fifty or less such documents, there was a total review) and expanding that sample by 10% increments wherever there was a violation of design control. Approximately 5% of the total IR's evaluated (approximately 6000) involved design control but no rework was required except for that being conducted within the scope of SCD-78 (American Bridge Welding Deficiencies). It was concluded that the lack of control exercised over these contractors was a deficiency in controlling records in accordance with the construction program procedures. There are no remaining open issues.

The response to Issue 17 "QC Verification of Expansion Anchor Characteristics" recognizes a shortcoming in not specifically delineating all characteristics on an inspection checklist although the necessary characteristics were listed elsewhere. The expansion anchors were the subject of several different corrective action programs as part of the overall effort to verify the adequacy of Mercury's work. These corrective actions previously addressed the NRC concern except for several technical questions which have been resolved. A 100% reinspection of Mercury N1 instrument installations has been completed and provides further evidence of expansion anchor adequacy. The shortcomings in the original inspection checklist are considered a procedural deficiency in the construction program, but a current lack of safety significance was demonstrated.

Issue 18 "Documentation of Walkdowns of Non-Safety Related Equipment" resulted from the documentation by exception practices used during previous plant "two over one" walkdowns. To resolve this concern, a detailed reinspection under a formal engineering procedure was performed of the instrument air system and two plant areas to provide additional confidence in the original design and walkdowns. This reinspection found no deficiencies and supported a conclusion that the construction program was adequate and there are no unresolved safety deficiencies.

The resolution of Issue 21 "LP&L QA Construction System Status and Transfer Reviews" involved demonstrating adequate control of comments and open items in the system transfer and testing process. As a result of extensive efforts on this matter, including confirmatory field verification of three items, it was determined that no significant comments or open items were untracked and that there was no impact on testing or system operation.

There were two separate issues in Issue 22 "Welder Qualification (Mercury) and Filler Material Control (Site wide)". The first, welder qualifications, was resolved by a thorough review of welder documentation and welder qualification. No significant deficiencies were identified and those minor deficiencies identified were properly dispositioned. Concerns over weld filler metal controls were addressed by a review which showed site practices to be unclear with regard to ambiguities between various code requirements. Further, justification of several past corrective actions was provided where there had been deviations from the site procedure. In both cases, the evaluation demonstrated that, although there were deficiencies in procedural clarity and the control of site practices, no unresolved safety issues exist.

4. Hardware:

Seven of the twenty-three issues involved hardware changes in addition to inspections, evaluations or other software activities to resolve the concerns. A review of these concerns has shown that, if left uncorrected, two of the reworked items presented a potential safety concern. Of these two, one was related to rework on a three foot section of tubing and the second represented a case where the safety significance was not determined. It has been concluded that while construction program deficiencies existed these did not warrant an implication that the corrective action system as currently implemented was inadequate to provide assurance that the plant is safely constructed.

The NI instrumentation walkdown initiated in response to Issue 1, "Inspection Personnel Issues" has identified deficiencies that, if left uncorrected, would not have effected the safety of plant operations. The conclusions on Mercury correction actions were discussed earlier.

A lack of documentation consistent with 10CFR50 Appendix B requirements for local mounted instruments installed to ANSI B31.1 was evaluated in Issue 2 "Missing N1 Instrument Line Documentation". In responding to the concern, 18 installations were identified as having documentation insufficient to meet the objective requirements of Appendix B. Based on documentation reviewed, the as-built installations were considered capable of performing their intended functions. Nevertheless, a decision was made to rework the installations to standardize compliance with ASME code requirements. This records deficiency in the construction program was found to have resulted in no safety significant deficiencies. The rework was performed as part of a conservative corrective action.

Issue 3 "Instrumentation Expansion Loop Separation" identified a procedural implementation deficiency in the construction program occurring when insufficient attention was given by Mercury personnel to specified installation separation criteria. Reinspections of those installations identified by the NRC as well as installations where tubing lines were run in proximity to each other resulted in the identification of additional deviations to the separation criteria. With the exception of one-three foot section of tube track all were found acceptable "as-is". The necessary rework has been completed. It was concluded that this was a deficiency in the Mercury corrective action but was of limited safety significance because of the isolated nature of the rework.

Issue 6 "Dispositioning of Nonconformance and Discrepancy Reports" identified specific Ebasco and Mercury NCRs and Ebasco DRs in which the NRC had concerns relative to dispositioning, lack of supporting documentation, accomplishment of related rework and sufficiency of engineering justification of dispositions. A review of these Waterford 3 records was conducted and no condition was found which, were it to have remained uncorrected would have adversely affected the safety of operations of Waterford 3. LP&L had previously initiated a program in February 1984 to address Ebasco NCRs. This program was expanded to encompass the NRC request and is nearly complete. While some discrepancies were noted and several reinspections performed, rework was performed in only a few cases.

The most significant amount of rework occurred as a result of the findings in Issue 12 "Main Steamline Framing Restraints". In this case it was found that additional rework was identified from the review of American Bridge information requests and the incomplete scoping for open Significant Construction Deficiency 78. Rework was required to replace the framing bolts where documentation was not available and bolt identification could not be readily verified. Upon identification of the concern a conservative management decision was made to replace the bolts in lieu of attempting to test or sample test the bolts in question to determine their usability. Thus no determination was made regarding the safety significance of the existing condition. A rescoping of other significant open SCD's has been conducted to address potential concerns related to scoping practices. Deficiencies were corrected and no further safety concerns remain in this area.

Issue 15 "Welding of "D" Level Material Inside Conta nment" resulted in a reinspection of the most significant "D" level welds. The findings identify a deficiency in the construction program because no record keeping requirements were specified in the CB&I QA program for these type welds. The reinspection of welds identified weld deficiencies that were evaluated to be acceptable "as is" and a number of arc strikes that required rework (grinding) to demonstrate that no damage to base metal had occurred. It was concluded that the construction program weakness created no significant safety concerns and raised no unresolved implications with regard to the adequacy of the "as-built" plant.

Issue 19 "Water In Basemat Instrumentation Conduit" was evaluated by a walkdown to identify areas of seepage and potential direct paths for ground water. As a result of this walkdown a piezometer standpipe has been pressure grouted to limit further seepage. This rework was performed even though the evaluation showed that there was no potential for flooding the auxiliary basemat. It was concluded that no construction program deficiencies or safety concerns exist.

4. Conclusions:

The twenty three issues have been assessed and corrective actions have been or are being taken to correct deficiencies found. The safety significance of ongoing activities and completed activities is being assessed for each of the plant systems required by technical specifications to be operable during the various operational modes. Those safety evaluations needed to support any phase of operation will be a prerequisite to LP&L requests for a license to operate in that phase.

The responses to the 23 issues, when assessed together, lead to two generic conclusions: (a) The QA program during the construction phase continued to have shortcomings, but with current corrective action the objectives and criteria of the construction program have now been met. The deficiencies fell primarily into the categories of records management and control of corrective actions. (b) The overall adequacy of the plant in the areas of the 23 issues is confirmed by the extensive re-evaluations and reinspections conducted in response to the 23 issues and by the minimal rework required as a result of the concerns. The plant as-built can be operated without undue risk to public health and safety.

IDENTIFICATION OF LESSONS LEARNED

Lessons learned were developed from the twenty-three issues for the purpose of evaluating the ability of the operational phase Quality Assurance Program to preclude the mistakes made during construction. These lessons learned are intended to define the types of actions which could have been taken to avoid the safety impacts that were identified. Table 2 presents the lessons learned as well as a brief description of the manner in which the operational phase Quality Assurance Program addresses the lessons learned. This approach allows definition of the actions needed to anticipate problems. The need to identify emerging QC problems in a timely manner and to take effective and timely corrective actions is also recognized. The next section provides a more complete description of the operational phase QA program to supplement the lessons learned table and to describe the management oversight, trending and corrective action programs that allow for prompt identification and action on problems.

TABLE 1

ACTIVITIES REQUIRED TO RESOLVE THE TWENTY THREE ISSUES

Concern	Software	Inspection/ Evaluation	Hardware (1)
1			D
2			D
3			L
4		X	
5	X		
6			D
7	X		
8	X		
9		X	
10		X	
11	X		
12			PS
13	X		
14		X	
15			D
16	X		
17		X	
18		X	
19			D
20		X	
21		X	
22		X	

NOTES:

(1) The safety significance of the hardware impacts has been indicated by a "D" where hardware changes were discretionary or in accordance with good practices, a "PS" where the safety significance was not fully evaluated, and an "L" where there was safety significance if left uncorrected but the significance was limited because of the isolated nature or limited extent of the deficiency.

TABLE 2
OPERATIONAL READINESS ASSESSMENT

Issue	PAST Actions Which Could Have Prevented Occurrence (Lessons Learned)	FUTURE Reflection in Operational QA Program
1	This concern could have been avoided if a uniform and conservative standard had been imposed for judging QA/QC personnel qualifications and for documentation of those qualifications.	During the operations phase, LP&L and contractor inspection personnel will be certified to ANSI N45.2.6-1978 and Regulatory Guide 1.58 Rev. 1. Prior to certification a background investigation must be satisfactorily completed documenting a candidate's education and employment experience as described in Section II.D.
2	Recognize that quality records required by 10CFR50 Appendix B sometimes exceed the record keeping requirements of industry codes. The concern could have been avoided if the contractors had been required to supply the proper documentation.	Documentation (objective evidence of acceptance) requirements during normal operations are defined in drawings, specifications, and procedures. Review of specified documentation requirements associated with station modifications is an integral part of the operations phase design process. This review assures the appropriateness and completeness of required documentation. The Station Modification process is described in Section II.H.
3	This concern, which dealt with field run installations, could have been avoided by increased training of design/installation/inspection personnel in order to increase their understanding of generic criteria and their ability to recognize deficiencies.	Under the operations phase QA Program field run items will be minimized and controlled by procedure. The Station Modification Package (SMP) process includes a checklist of generic criteria to be addressed. Additionally, the Detailed Construction Package will contain necessary acceptance criteria to direct the installer and inspector (see Section II.H).
4	The basic causes of this concern (which are not felt to be unique to Waterford 3) relate to the large number of specialty type quality contractors employed during the construction phase, coupled with inherent design/construction interface problems associated with parallel design and construction. The problems in this issue accruing from the above situation could have been avoided had a more definitive and standardized quality deficiency program been developed and implemented.	During the operations phase a uniform program for quality deficiency identification and resolution will be employed. The Condition Identification and Work Authorization (CIWA) will be the primary means of identification and implementation of corrective action at Waterford 3. The quality deficiency mechanisms utilized by LP&L are described in detail in Sections II.B.1.a-e.

TA [illegible]

OPERATIONAL READINESS ASSESSMENT

	PAST	FUTURE
Issue	Actions Which Could Have Prevented Occurrence (Lessons Learned)	Reflection in Operational QA Program
5	The concern could have been avoided if it had been recognized that while CE handled certifications differently than other vendors that did not eliminate the requirement to track conditional certifications in order to ensure closure.	Any quality related material received on site with conditional certification is tracked in accordance with the procedures for Discrepancy Notices as described in Section II.B.1.b.
6	a. Some of the concerns could have been avoided by recognizing the need to have a more uniform process (LP&L, Ebasco, and contractors) for the disposition and resolution of deficiencies.	a. Under the operations phase QA Program, in order to provide standardization, hardware deficiencies will be identified through use of the LP&L CIWA (plant identified) or DN (receipt inspection identified) as noted in Section II.G.3.
	b. Some of the concerns could have been avoided by establishment of a routine process for additional verification (including field verification) of the resolution to assess the adequacy of dispositions and corrective actions. More emphasis should have been placed on a QA management overview designed to distinguish generic trends and root causes of deficiencies from isolated significant occurrences or repetitious occurrences of less significance.	b. All quality related deficiencies identified during the operations phase undergo verification review of the corrective action and disposition prior to closing out the deficiency. The deficiency identification and resolution mechanisms are described in detail in Sections II.B.1.a-f. As part of the semi-annual audit of the corrective action process, the QA Program will include a field verification audit of the CIWA closure process. In addition, Operations QA utilizes a QA Trending Programs to identify adverse quality trends and generic quality problems as described in Section II.B.1.a.
	c. Given the need for more consistent engineering judgement, some concerns could have been avoided by the use in training of specific disposition of past problems.	c. During the operations phase, the Quality Assurance Section holds monthly training sessions. Lessons learned or corrective actions as a result of quality deficiencies or undesirable programmatic trends identified at Waterford 3 will be reviewed during these sessions as described in Section II.E.2. Additionally, the QA Section will prepare, for distribution to plant staff performing quality related work, similar briefing material as a feedback mechanism for current quality concerns.

OPERATIONAL READINESS ASSESSMENT

Issue	PAST Actions Which Could Have Prevented Occurrence (Lessons Learned)	FUTURE Reflection in Operational QA Program
	d. Recognize the need for ready retrieval/control of records. This would be assisted by processing records as the work is completed through all required reviews, resolutions of comments, and necessary verification and then vaulting the records. This approach would have avoided some of the concerns that arose because of records retrievability.	d. Records are processed upon completion of the activity and verified complete by cognizant superv'sory personnel. All Quality records during the operatio... phase are maintained by LP&L's Project Files. Documents are stored and cross-indexed to facilitate timely retrieval. Records management is further described in Section II.I. The current programs of record management at Waterford 3 are under review by LP&L management to ensure proper discipline and optimum utility exists. This review is expected to be complete, and any necessary programmatic changes will be initiated by November 30, 1984.
7	This concern could have been avoided if, as work was completed, records were retrieved from the contractor, processed through the required reviews, any necessary verification completed and then vaulted.	Records are processed upon completion of the activity and verified complete by cognizant supervisory personnel. Quality records during the operations phase are maintained by LP&L's Project Files. Records management is further described in Section II.I.
8	Shop welds, the subject of this concern, were hydrostatically tested and inspected and, therefore, no deficiency exists.	N/A
9	This concern could have been avoided if, as work was completed, records were verified as complete against the scope of work.	During the operations phase, any change in scope of the contractor's responsibilities would initiate an LP&L review of the applicable portions of the contractor's QA program similarly to what is required for a new contract. Such review would include document generation requirements. Section II.G further discusses the review of contractor QA programs.
10	This concern could have been avoided if a uniform and conservative standard had been imposed for judging QA/QC personnel qualifications and for documentation of those qualifications.	During the operations pha[illegible], LP&L and contractor inspection personnel will be certified to ANSI N45.2.6-1978 and Regulatory Guide 1.58 Rev. 1. Prior to certification a background investigation must be satisfactorily completed documenting a candidate's education and employment experience as described in Section II.D.

TABLE 2
OPERATIONAL READINESS ASSESSMENT

Issue	PAST Actions Which Could Have Prevented Occurrence (Lessons Learned)	FUTURE Reflection in Operational QA Program
11	This concern could have been avoided if, in addition to in-process analysis conducted, a means to track the completion and correlation of data/records needed to verify compliance with specifications had been implemented.	This concern relates to bulk construction and is not applicable to the operations phase.
12	This concern could have been avoided if it had been recognized that scoping of complex corrective actions (e.g. multiple contractors, complex drawings, and construction interferences) required commensurate care in assuring that the scoping of the corrective action is accurate and tracked to assure completion.	Multiple levels of pre- and post- implementation review of corrective actions occur during the operations phase. Corrective action must be implemented and tracked through one of the deficiency identification mechanisms described in Sections II.B.1.a-e. Broad scope and complex corrective actions will be cause for development of a Special Procedure as described in QP-005-001, "Instructions, Procedures and Drawings", in order to control scoping and interfaces, and to establish a tracking mechanism to ensure completion and closure.
13	Some concerns could have been avoided through the use of a rigidly controlled tracking system to control special purpose hardware deficiency documents that have characteristics such as: multiple interfaces; require tracking during processing; and/or are needed to control quality related questions in a timely manner.	The operations phase QA Program provides for different means from the construction phase to identify, track, and resolve quality problems. The quality deficiency identification mechanisms, all of which provide for a controlled tracking system, are discussed in Sections II.B.1.a-e.
14	This concern could have been avoided if procedures regarding information requests had been standardized and controlled. The procedures should have been the subject of training to ensure a proper understanding and awareness of the procedure and limitations of the IR instrument. Audits could have been more comprehensive to assure that the program and procedures were being properly followed.	Plant modifications during the operations phase are accomplished through the Station Modification Program (SMP) described in Section II.H. Work is directed by the Detailed Construction Package (DCP) assembled under the Program. For cases where work cannot be done in accordance with the DCP, changes may be allowed only upon approval of a change to the Station Modification Package or, for minor changes, through approval of a Detailed Construction Package Change (DCPC). All work documentation, including DCPCs, is included in the CIWA post implementation review described in Section II.B.1.a, as well as the SMP closure review described in Section II.H.

OPERATIONAL READINESS ASSESSMENT

Issue	PAST Actions Which Could Have Prevented Occurrence (Lessons Learned)	FUTURE Reflection in Operational QA Program
15	The concern could have been avoided if contractors had been required to ensure adequate inspection documentation for Seismic Category I work outside the ASME Code jurisdictional boundaries.	Documentation (objective evidence of acceptance) requirements during normal operations are well defined in drawings, specifications and procedures. Review of specified documentation requirements associated with station modifications is an integral part of the operations phase design process. This review assures the appropriateness and completeness of required documentation. The Station Modification process is described in Section II.H.
16	This concern could have been avoided if the program had been auditable, if more formal training had been provided to the interviewers, and if more detailed followup had occurred.	The LP&L Quality Team has been constituted to allow any individual to express quality concerns on a confidential basis, and be assured of: (1) investigation of the concern, (2) substantiation of the concerns and (3) correction of the concern. The Quality Team program is described in detail in Section II.A.11.
17	The concern might have been avoided if, during the preparation of construction/inspection procedures, more care was taken to explicitly list the characteristics necessary to ensure proper verification of installation in the inspection sections and checklists.	The FSAR and the LP&L QA Manual require that inspection procedures, instructions and checklists contain acceptance and rejection criteria. Prior to implementation, there is an appropriate review to assure that necessary acceptance criteria are adequately transposed from the design disclosure documents to the inspection procedures, instructions and checklists.
18	The two-over-one problems uncovered in the previous inspections were documented on an exception basis. The concern over the adequacy of those inspections could have been avoided by a requirement to ensure adequate and more auditable documentation of the inspections.	Under the operations phase QA Program the Station Modification Package process includes a checklist of all generic criteria to be addressed during the design and verification stage. This process is described in Section II.H.
19	There is no path for groundwater to flow in sufficient quantity to flood the auxiliary building basement and, therefore, no deficiency exists.	N/A

TABLE 2

OPERATIONAL READINESS ASSESSMENT

Issue	PAST Actions Which Could Have Prevented Occurrence (Lessons Learned)	FUTURE Reflection in Operational QA Program
20	This concern could have been avoided if a uniform and conservative standard had been imposed for judging QA/QC personnel qualifications and for documentation of those qualifications.	During the operations phase, LP&L and contractor inspection personnel will be certified to ANSI N45.2.6-1978 and Regulatory Guide 1.58 Rev. 1. Prior to certification a background investigation must be satisfactorily completed documenting a candidate's education and employment experience as described in Section II.D.
21	During the system transfer and testing process, Waterford 3 had several groups with generally discrete responsibilities for identifying and resolving quality related issues. This resulted in the achievement of optimum hardware quality however full understanding of the day-to-day coordination between those groups of the open items and their status could have been enhanced by better documentation and training on that process.	During the operations phase LP&L will retain control and responsibility for new and existing systems. No system transfer outside of LP&L will occur.
22	a. Concerns could have been avoided if records had readily allowed the hierarchy of welder position and process qualifications to be demonstrated for audits and verification of compliance with requirements.	a. As a result of this issue, LP&L is evaluating the Waterford 3 welding program to identify areas of potential improvement. As part of this evaluation, welder records will be configured to readily allow the hierarchy of welder position and process qualifications to be demonstrated.
	b. Recognizing the need to provide clear justification when there are apparent conflicts with code requirements could have avoided this concern.	b. Deviations from applicable codes and standards may not be taken under the operations phase QA Program unless evaluated in accordance with 10CFR50.59.

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OPERATIONAL READINESS ASSESSMENT

	PAST	FUTURE
Issue	Actions Which Could Have Prevented Occurrence (Lessons Learned)	Reflection in Operational QA Program
23	a. This concern could have been avoided by recognizing that delegation to Ebasco of the routine QA auditing overview of Mercury without adequate LP&L involvement inhibited the timely recognition by LP&L of quality problems.	a. LP&L retains and exercises responsibility for the operational phase QA Program. The QA Program of contractors/vendors performing work for Waterford 3 during the operations phase must meet all applicable requirements of the LP&L QA Program (see Section II.G). The Engineering and Systems Development QA Group conducts audits and surveys of off-site contractors, vendors, and quality related suppliers. The Operations QA and Plant Quality Groups conduct on-site audits and surveillances of quality related activities as described in Sections II.F.1 and II.F.2.
	b. More emphasis should have been placed on a QA management overview designed to distinguish generic problem trends and root causes of audit findings from isolated occurrences.	b. Operations QA utilizes a QA Trending Program to identify adverse quality trends and generic quality problems. This is discussed in detail in Section II.B.2.a. The yearly audits schedule is approved by the full Safety Review Committee (SRC). Operations QA audits are reviewed by an SRC Subcommittee and results reported to the full SRC as described in Section II.A.1.
	c. Staffing levels should have been higher.	c. During the operations phase LP&L retains direct control of its QA Program. This resulted in a significant increase in staffing over that employed by LP&L Construction QA. The current staffing levels of selected Waterford 3 groups including the operations phase QA organization is described in Section II.C.

OPERATIONAL PHASE QA PROGRAM ASSESSMENT

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OPERATIONAL PHASE QA PROGRAM ASSESSMENT

The individual responses and the prior discussions in this analysis of "collective significance" establish that, with respect to the 23 issues, the plant as-built is adequate to assure public health and safety during operation. At the same time, the review identified various areas in which the construction phase QA Program could have been improved. While the construction phase is essentially complete, the operations phase will shortly commence. In this light, it is appropriate to review the Waterford 3 operations phase QA Program with a focus on the lessons learned from the 23 issues.

LP&L has established a comprehensive program for quality assurance during the operating phase of Waterford 3. The Nuclear Operations Quality Assurance Program is applied to activities affecting the quality of those items which prevent or mitigate the consequences of postulated accidents which could cause undue risk to public health and safety. Those activities include plant operation, maintenance, repair, modification and refueling.

The QA Program is described in Chapter 17.2 of the Waterford FSAR and in the Quality Assurance Manual. Section I of this assessment provides an overview of the QA Program, not a detailed discussion. In Section II selected aspects of the QA Program will be covered in detail in counterpoint to the issues raised in the 23 NRC concerns.

I. QA Program Overview

A. Organization

LP&L retains and exercises responsibility for the QA Program at Waterford 3. The Senior Vice President Nuclear Operations, who reports to the President of LP&L, is responsible for defining quality assurance policy. Reporting to him are the Plant Manager-Nuclear, Nuclear Services Manager, Project Manager-Nuclear, Corporate Quality Assurance Manager, and the Safety Review Committee (the members of which are appointed by the Senior Vice President Nuclear Operations). The corporate organization for implementation of the QA Program is shown in Figure 17.2-1 of the FSAR.

While quality is a concern of all Nuclear Operations personnel, the Quality Assurance and Plant Quality Groups within Nuclear Operations deserve special mention. The Quality Assurance (QA) organization is responsible for developing, coordinating, and assuring implementation of the LP&L QA Program. Although most quality related activities are performed by personnel outside the QA organization, an overview of the performance of these activities relative to QA Program compliance is accomplished by QA personnel through reviews and audits.

QA is divided into two groups. The Engineering and Systems Development QA Group conducts surveys and audits of contractors and vendors, maintains the Qualified Suppliers List, reviews procurement packages, and conducts surveillance of quality related suppliers. The Nuclear Operations QA Group assures that the QA Program at the site is being effectively implemented.

Operations QA is a relatively new organization. It became a functional quality management tool with its first audit in January, 1982 of the system turnover process. In fact, it was as a direct result of this audit that the problem with Mercury (Issue #23) was first identified and reported to the NRC. Its responsibilities include the audit, monitoring, review and quality trending programs for Waterford 3.

The Plant Quality Department reports to the Plant Manager-Nuclear. This Department has direct responsibility to implement the requirements of the QA Program related to onsite-initiated activities including review, inspection, verification and surveillance requirements.

B. QA Program Scope

As described in the LP&L QA Manual, the QA Program is applied to all quality related areas of plant operation. For safety-related items, all applicable portions of the QA Program (i.e. Appendix B) criteria are applied. The QA Manual also provides a separate section of Special Scope QA Policies, defining application of selected 10CFR50 Appendix B criteria as necessary. Currently, such areas as fire protection, radiological environmental monitoring, the Availability Improvement Program, computer software, radiation protection and emergency preparedness are covered as special scope policies. Special scope policies will be issued to cover additional areas such as security and radioactive waste management.

C. Quality Training

Training is fundamental to quality. As a result, indoctrination and training programs are established for Nuclear Operations personnel performing quality related activities. The programs are designed to ensure that personnel are knowledgeable in quality assurance procedures/requirements and have the necessary proficiency to implement the requirements. The Quality Assurance Section assists with the development and conduct of quality assurance indoctrination and training with the Corporate Quality Assurance Manager reviewing and concurring with the program content.

D. Inspection/Audits

Monitoring of quality program implementation is performed through inspection and surveillances during operation, maintenance, modification. repair, material receiving, and storage activities. Maintenance and modification instruction, and work plans are reviewed by Plant Quality personnel to assure the inclusion of inspection requirements and to verify that methods and acceptance criteria are defined. Inspections are performed by qualified Plant Quality personnel. For quality related activities (e.g. surveillance testing) where direct inspection is not utilized, the Plant Quality Group surveil the activities in accordance with established procedures.

Audits are conducted by the Quality Assurance Section to provide a comprehensive independent verification and evaluation of quality related procedures and activities. Additional audits are performed as required to verify and evaluate supplier and contractor Quality Assurance Programs, procedures, activities, and interface controls.

E. Corrective Action Implementation and Verification

For deficiencies identified by plant staff or identified during the inspection/audit process, multiple means exist to implement corrective action. For each means of deficiency identification there exists a process to implement, track, and verify as complete the appropriate corrective action. Furthermore, through various trending programs the generic significance of individual deficiencies taken as a whole is identified, assessed and corrective action implemented. Such trending programs exist for the areas of programmatic, systematic and hardware deficiencies.

II. Selected Aspects of the Operations QA Program

The 23 NRC issues have dealt with possible quality problems during the construction phase of Waterford 3. During the review of these issues LP&L has identified various lessons learned that, in retrospect, would have led to changes in the construction QA Program. It is natural, therefore, to examine the operational phase QA Program for Waterford 3 in light of the construction phase lessons learned. The discussions which follow are intended to amplify on selected aspects of the operational phase QA Program which reflect incorporation of the major lessons learned from the construction phase. It should be noted that the Operations QA Program was developed independently of the construction QA Program in order to meet the needs of an operating plant. With minor exceptions, the Operations QA Program was not changed as a result of the lessons learned from the 23 NRC concerns, but rather anticipated and already encompassed those areas of concern.

The following discussions are divided into nine major areas:

A. Management Oversight
B. Quality Deficiency Identification and Resolution
C. Staffing
D. Certification of Inspection Personnel
E. Quality Assurance Indoctrination and Training
F. Audit/Review Programs
G. Control of Contractor Quality-Related Activities
H. Station Modification Program
I. Records

A. Management Oversight

Maintaining a high level of quality at an operating nuclear power plant requires continuous management involvement in the QA Program. LP&L management has structured the operational QA Program to ensure management oversight and control of all aspects of quality at Waterford 3.

The Plant Manager, reporting directly to the Senior Vice President Nuclear Operations, is responsible for the primary implementation of quality related measures during the operation activities at Waterford 3. The Senior Vice President Nuclear Operations, the Plant Manager, and other utility executives employ a number of management tools to implement and validate the operational QA Program.

1. Safety Review Committee

The Waterford 3 Safety Review Committee (SRC), of which the Plant Manager is a member, reports directly to the Senior Vice President Nuclear Operations through monthly reports of SRC activities. It is primarily responsible for the management level overview of the operation of the Waterford 3 plant to assure that the plant is operated in accordance with the Technical Specifications and to review significant safety issues.

One of the key functions of the SRC is to review the audit program as defined by the plant Technical Specifications. At Waterford 3 the SRC has established a subcommittee responsible for reviewing all QA audits specified by the Technical Specifications as well as reviewing any special audit or additional audits performed by the QA organization. The SRC Charter requires a minimum of quarterly reviews of the results of the audits performed. As a matter of practice, the audit subcommittee generally has review meetings scheduled concurrent with the monthly meetings of the full SRC. These subcommittee meetings include a review of the results of all audits performed since the last subcommittee meeting. Significant issues raised in these audits are brought to the attention of the full SRC. In addition to reviewing the individual audits and their findings, the subcommittee reviews the schedule of audits as prepared by the Operations QA Group to assure that it is in conformance with the requirements of the Technical Specifications and to ensure that audits are being conducted on a timely basis in accordance with that schedule.

Because the SRC is concerned with an overview of plant operation, and identification and review of significant safety issues, the SRC review of the operational QA audits serves to provide an additional review of root cause, generic implications, and safety significance of the findings in those audits. In addition, the SRC receives regular reports by the Corporate Quality Assurance Manager of significant issues and occurrences in the QA area. The combination of an overview of the QA program and the QA audit findings provides an opportunity to assess the quality of the audits in determining and evaluating QA issues at a management level.

2. Yearly Management Audits of the QA Program

Audits of the Quality Assurance Program are conducted as specified in the QA Manual, Chapter 18.7, and in the FSAR, Section 17.2. These audits are currently scheduled in accordance with QA procedure QASP 18.12.

Management audits are conducted by an independent audit team from the Middle South Services Quality Assurance group. Members of the audit team are qualified to appropriate standards. The review topics cover all activities associated with the administration and execution of LP&L's QA Program. Findings are reported to the Senior Vice-President level and assigned to the appropriate LP&L QA managers for corrective action. Findings are tracked using approved procedures and forms. Audit findings are reviewed for underlying causes to determine corrective action to prevent recurrence. Those deficiencies requiring long term action to correct, or which have the potential for recurrence, are reinspected in follow-on management audits to determine the effectiveness in addressing identified problems.

It is anticipated that the yearly management audit of the QA Program will be an effective management tool in assessing and maintaining the adequacy and effectiveness of the operations phase QA Program.

3. QA Trending Program Quarterly Reports

The Operations QA Group administers a QA Trending Program intended to identify adverse programmatic quality trends and initiate corrective action. While other mechanisms exist to identify and correct individual quality concerns, the QA Trending Program will allow management a tool to identify underlying "common mode" sources of quality deficiencies. The QA Trending Program is described in detail in Section II.B.2.a.

Trend analysis reports will be issued quarterly by the Corporate QA Manager to the Safety Review Committee and the Senior Vice President Nuclear Operations. It is expected that the QA Trending Program will prove a valuable senior management tool for assessing and controlling the level of quality at Waterford 3.

4. Quality Assurance Program Status Summaries

Summaries of QA Program activities at Waterford 3 are provided to the Senior Vice President Nuclear Operations on a weekly and monthly basis.

a) Weekly Report - provides a status as of the last day of the week reviewed for various QA Program subjects of interest which include Audits & Reviews, NRC Site Activities, and QA Training. These reports are posted in all QA office locations.

b) Monthly Report - presented to the Chief Executive Officer and Senior Vice President Nuclear Operations during the monthly Program Review meeting. It provides a summary of site-related QA activities similar to the weekly report and includes statistical studies where applicable.

5. Plant Operations Review Committee

The function of the Plant Operations Review Committee (PORC) is to advise the Plant Manager on all matters related to nuclear safety. In fulfilling this function the PORC reviews, among others, plant procedures that affect the public health and safety, proposed hardware modifications that affect nuclear safety and all reportable events. The PORC provides the Plant Manager, prior to implementation, with written recommendations and 10CFR50.59 safety evaluations with respect to the acceptability of procedural and hardware changes. The minutes of each PORC meeting, documenting the results of all PORC activities performed under the provisions of the Technical Specifications, are provided to the Plant Manager, Senior Vice President Nuclear Operations, and the Safety Review Committee.

6. Quality Inspection Activities Status Reports

The Plant Quality Department will provide quarterly reports to the Plant Manager-Nuclear. Included in the reporting is an analysis of quality trends with respect to deficiencies identified during processing of Discrepancy Notices, Quality Notices, and Plant Quality Department reviews/inspections of CIWAs, procedures and procurement documents. Reporting in this area has recently commenced. The frequency, format, and categories reported in the Quality Inspection Activities Status Reports are expected to change to fulfill the needs of the Plant Manager in detecting adverse trends in quality related activities on site.

7. Licensee Event Reports

LP&L has established a permanent onsite Event Evaluation Committee (EEC) for the purpose of coordinating the evaluation, reporting and closure of corrective actions associated with reportable events described in 10CFR50.73. The EEC is responsible to the Plant Operations Review Committee (PORC) and the Plant Manager.

Any individual identifying a reactor trip, transient, safety related equipment failure or malfunction, radiological event, security event, violation of a technical specification, or other events deemed to be potentially reportable, are responsible for initiating a potential reportable event (PRE) report. Following any necessary immediate corrective actions and/or modifications, the EEC ensures that a prompt, thorough PRE investigation is conducted. During the investigation, the cause of the event is identified and corrective action initiated to prevent recurrence. Generally, corrective action is documented and tracked via one of the deficiency identification mechanisms discussed in Section II.B.1.a-e. In addition to the standard closure verification processes, the EEC independently tracks and confirms adequacy of corrective action.

The EEC provides the PORC with a report of the completed investigation and recommendations. Following PORC review the Plant Manager is responsible for approving disposition of PREs as Licensee Event Reports for transmittal to the NRC.

8. Availability Improvement Program Reports

The Availability Improvement Program (AIP) is currently under development by LP&L for implementation during the operations phase at Waterford 3. Quality related problems, as described later in this submittal, will be periodically reported to senior management. Whereas the QA Trending Program will provide management input as to adverse programmatic trends, the AIP will provide adverse trend information on the system/hardware level.

9. Independent Safety Engineering Group

One of the functions of the Independent Safety Engineering Group (ISEG) is to prepare and conduct independent reviews of plant activities which may result in recommendations to plant staff and corporate management. These recommendations include corrective actions such as procedure revisions, equipment modifications and additional training necessary for improving overall quality assurance and plant safety. Evaluations of plant operations, maintenance and modification are documented through ISEG reports. These reports, as well as any action item resulting from them are logged by the ISEG group for purposes of tracking and resolution. To keep management appraised of ISEG activities, an ISEG Monthly Summary is provided to the Senior Vice President Nuclear Operations and the Engineering and Nuclear Safety Manager listing evaluations performed that month and areas of ongoing review.

10. Operations Assessment and Information Dissemination Group

The Operations Assessment and Information Dissemination Group (OA&ID) is responsible to the Nuclear Safety Supervisor for screening, evaluating, and disseminating operational experience information. A significant management overview function that the OA&ID group will provide is the detailed evaluation of selected LP&L Licensee Event Reports (LERs). This evaluation will explore generic implications or special aspects of the event which are outside the scope of normal LER evaluation and review. Periodic status reports will be provided to management.

11. Quality Team

The LP&L Quality Team offers concerned individuals the opportunity to voice quality concerns on a confidential basis. Reporting directly to the Senior Vice President Nuclear Operations, the Quality Team has been empowered with the authority to conduct investigations of any quality concerns brought to their attention; investigate instances of intimidation and harassment of individuals providing information to the Quality Team; and maintain strict independence and confidentiality. Following preparatory work the Quality Team was staffed and began full operation at the beginning of August, 1984.

The Team acquires quality concern information through the following methods:

a. Local and toll free hotline telephones are established to receive quality concern calls. The numbers are published widely to project personnel. Quality Team personnel man the phones during working hours, while calls are recorded at other times.

b. All personnel terminating employment from Waterford 3 exit through Quality Team headquarters. Personnel are afforded the opportunity to express quality concerns on a confidential basis. Any individuals who terminate employment off site or during other than working hours are sent a letter requesting any quality concerns they may have.

c. All Waterford 3 personnel can "walk in" the Quality Team headquarters at any time to discuss quality concerns.

d. Concerns received by the Quality Team from sources external to Waterford 3 are documented and processed in the same manner as internal concerns.

e. The Quality Team is re-evaluating all interviews conducted prior to the present Team configuration (see NRC Concern #16).

Regardless of how the quality concern was identified, each is addressed in the same manner. An initial review is conducted for reportability and safety significance requiring immediate corrective action. An Investigative Plan, intended to resolve each concern identified, is then developed and a Quality Team investigator assigned for completion. Once the investigative actions are completed and the concern is resolved all documentation is retained as an auditable file. The specific procedural steps are contained in QASP 19.11, "Quality Team Operating Procedure".

Substantiated quality concerns are documented for corrective action and verification on a Quality Team Deficiency Report (QTDR). The QTDR is very similar in form and handling to the Corrective Action Report (CAR) discussed in Section II.B.1.d. The Quality Team reviews the results of implementing the QTDR findings and, where the corrective action is unsatisfactory and/or attempts at resolution have been unacceptable, the Quality Team notifies the Senior Vice President Nuclear Operations by letter requesting resolution and action(s) to prevent recurrence. Final reports for all concerns are directed to the Senior Vice President Nuclear Operations with copies to appropriate senior managers.

The Quality Team is committed to investigate concerns in a manner that focuses on determining root cause and complete implementation of corrective action. To support root cause determination the Quality Team maintains a trending program categorized by type of quality concern (e.g. unqualified personnel, inadequate training) and means of identification (e.g. hotline, "walk-in"). The basic elements of the trending program center around data retrievability and sorting to suit management needs. The key attributes are:

a. Concern categorization and coding
b. Statistical data gathering
c. Evaluation and analysis.

The Senior Vice President Nuclear Operations, and other appropriate senior management, are provided with timely Quality Team information to assist in their assessment of the status of the QA Program. The Quality Team transmits, among others, the following reports:

a. Weekly Status Report of the Quality Team Program Activities
b. Quality Team Monthly Status Report
c. Quality Team Deficiency Trends Status Report (weekly)

B. Quality Deficiency Identification and Resolution

In maintaining and improving quality a comprehensive program must exist to identify and correct quality deficiencies. Two components are important for successful implementation of such a program. First, sufficient means and opportunity should be available to identify and correct individual quality concerns as they occur. Secondly, a capability should exist to assess the identified deficiencies as a whole to determine whether they are isolated occurrences or due to underlying common causes. The LP&L QA Program incorporates provisions for both components of quality deficiency identification.

1. Isolated Quality Deficiencies

LP&L employs a hierarchical system for identification of individual quality deficiencies. At the first level of the hierarchy it is intended that adverse quality conditions will be identified by plant staff using CIWAs (Condition Identification and Work Authorization), DNs (Discrepancy Notices) and QNs (Quality Notices). The second level of detection includes CARs (Corrective Action Request) and AFRs (Audit Finding Reports) issued by the Operations QA Group during monitoring and audits. Finally, at the third level are NRC Inspection Reports.

Upon identification of the quality problem, specific action is necessary for effective resolution: 1) cause is identified either explicitly or as part of the trending program, 2) appropriate corrective action is implemented, 3) a means of tracking the deficiency and corrective action(s) to completion is available, and 4) verification of completion and effectiveness of corrective action is documented. These steps are included for the deficiency identification mechanisms at Waterford 3 and are described in the discussions which follow.

a. CIWAs

PURPOSE: The Condition Identification and Work Authorization (CIWA) is the primary vehicle through which abnormal plant conditions are identified, evaluated and corrected, as well as the means for implementing routine maintenance.

ORIGINATION: If, during the course of inspection, testing or operation, a condition adverse to quality is identified by any Waterford 3 personnel, it is required that a CIWA be generated. Routine maintenance must also be performed via a CIWA.

CORRECTIVE ACTION IMPLEMENTATION: Except in cases requiring immediate attention, corrective maintenance may not commence without a processed CIWA in accordance with UNT-5-002. Any maintenance or adverse quality condition involving the basic power plant is forwarded to the Control Room Supervisor (CRS)/Shift Supervisor (SS) for review. The CIWA is then forwarded to Planning and Scheduling Department (P&S) for evaluation, dispositioning and work planning. CIWAs are evaluated as nonconformances when the adverse quality condition is determined to be a departure from specified requirements and, (1) is not the result of normal wear or, (2) is not a secondary effect due to failure of another component, or (3) is not identified as a routine part of the work process and will be corrected as a continuing part of the work process, or (4) is dispositioned as "repair" or "use-as-is", or (5) is a suspected generic problem. If the CIWA is dispositioned as "repair" or "use-as-is", it must obtain concurrence from Plant Engineering. Plant Engineering performs a technical evaluation in such cases (including a Safety Evaluation, if necessary) to determine cause and corrective action and documents the results on the CIWA. If a design change is necessary, a Station Modification Request number is entered on the CIWA. When the CIWA has been dispositioned, a copy is forwarded to On-Site Licensing for a 10CFR21 evaluation.

The CIWA is then processed as a work package by the appropriate discipline. The CIWA work package is reviewed and approved prior to commencement of work by the responsible Maintenance Supervisor and Plant Quality Group (for quality related work packages) to ensure inclusion of accurate and complete work instructions and/or inspection Hold Points. Subsequent changes which change the scope of work or acceptance criteria are reviewed by the same review organizations.

Upon completion of work, the responsible department Supervisor reviews the work package for completeness and forwards the CIWA work package to P&S for closure on the MTS (Master Tracking System). The MTS identifies all archived and active CIWAs at the plant site. Tight administrative controls are instituted to assure proper input and extraction of data to/from the MTS.

CORRECTIVE ACTION VERIFICATION: Post closure review by the Plant Quality Group and Plant Engineering consists of an overall review of the adequacy of the CIWA and corrective action. All CIWAs identified as Non-Conformance are periodically analyzed by Operations QA for adverse quality trends. The Nuclear Safety Section of the Project Management Department also provides an independent review of non-conformances, dispositions, and close-outs.

b. DNs

PURPOSE: The Discrepancy Notice (DN) is the mechanism through which discrepancies are identified during receipt inspections of quality related parts, material, and components by LP&L Plant Quality personnel at Waterford 3.

ORIGINATION: Upon receipt of quality related items, Stores personnel notify the Plant Quality Group and initiate a Material Receipt Inspection Report. For those items specified in the procurement package as requiring tailored or Special Receipt Instructions, a "Special Receipt Instruction Sheet" will be initiated by Plant Quality personnel. The inspector examines incoming materials in accordance with approved inspection instructions. In the event a discrepancy is identified during the inspection, a DN is issued by Plant Quality which maintains a log and status of all DNs. The DN is also forwarded to Licensing for 10CFR21 evaluation.

CORRECTIVE ACTION IMPLEMENTATION: A "hold tag" is attached to the discrepant item(s) inspected which is then placed in a segregated area. A Material Review Board (MRB) exists to ensure proper disposition of discrepant material. Representatives to the MRB, which is chaired by the Plant Quality Manager, include personnel from Maintenance, Plant Engineering and Purchasing. Upon completion of review and concurrence with the final disposition, members of the MRB sign and date the DN. If the discrepancy can be corrected after installation, the item may be released for installation on a "Conditional Release" (CR) basis subsequent to approval of the "Request for Conditional Release" (RCR). Once the RCR is approved and granted, the CR is sequentially numbered and logged in the CR Log and stated as such on the CR tag and the RCR. The "hold tag" will be removed from the item in exchange for a "CR tag". The original RCR stays with the DN and a copy is attached to the CIWA with special instructions (limitations) for installation. Conditionally released items may not be placed in-service until the DN is satisfactorily closed. Closure of the CR is a pre-condition for closure of the DN. In those cases where a design change was necessary to close the CR, a Plant Engineering representative has joint approval responsibility.

CORRECTIVE ACTION VERIFICATION: The Plant Quality Manager is ultimately responsible for approval of DNs through inspection/reinspection, as applicable. DNs are periodically analyzed by the Operations QA Group for quality trends. The Nuclear Safety Section of the Project Management Department will also provide an independent review of non-conformances (DNs), dispositions, and close-outs.

c. QNs

PURPOSE: Conditions adverse to quality which are due to a lack of, or a breakdown in, administrative controls are documented with a Quality Notice (QN). This document identifies non-conformances indicating a breakdown or substantial departure from required procedures or instructions to the extent that a loss of control is evident.

ORIGINATION: Any Waterford 3 employee may initiate a QN and request a sequential number from Plant Quality who maintains the log and status of each QN. Within 30 days of the identification of a QN, the responsible department is required to report the actions taken or proposed to cover the following:

a) the cause of the condition,
b) correction of the conditions identified,
c) action to prevent recurrence, and
d) schedule of implementation.

CORRECTIVE ACTION VERIFICATION: The Plant Quality Group is responsible for verification of corrective actions committed to in the 30-day response supplied by the affected discipline(s). The Licensing Group reviews QNs for reportability under 10CFR21. QNs are periodically analyzed by the Operations QA Group for quality trends. The Onsite Safety Review Subgroup of the Project Management Department provides an independent review of non-conformances, dispositions and close-outs.

d. CARs

PURPOSE: The purpose of a Corrective Action Request (CAR) is to provide a mechanism through which the Operations QA Group can document deficiencies based on monitoring of plant activities or conditions, and present such findings to the affected Manager for a timely and effective resolution of the concern.

ORIGINATION: A CAR originates as the result of monitoring or observation of a quality affecting activity or condition which could be detrimental to the safe operation of the plant and/or safety of personnel. QA personnel assess the cause and significance of the deficiency to determine if an immediate corrective action is required. Where such a determination is made, a "Stop Work Order" may be initiated, or other steps taken for immediate implementation. The CAR includes a description of the identified deficiency, and a requirement that corrective action, underlying cause and action to preclude recurrence be documented by the responding organization.

CORRECTIVE ACTION IMPLEMENTATION: The delivery date of the CAR to the affected organization is the start of the 30-day period during which the cognizant group must resolve the deficiency, or define steps to be taken to effect resolution and provide a schedule for completion.

CORRECTIVE ACTION VERIFICATION: If the resolution and corrective action are considered acceptable, the QA Representative indicates so on the CAR and recommends approval and closeout of the CAR. The original CAR is given to the applicable QA Supervisor for final approval and filing. If the resolution and corrective action are not considered applicable, the cognizant Group Head will be so informed and a schedule arranged for satisfactory disposition. The action taken will be filed in the Open CAR File. If corrective action and the schedule for resolution are acceptable, but such action has not yet been taken, the QA Representative may accept the proposed resolution on the original CAR and maintain it in the Open CAR File. After satisfactory resolution and closeout, as attested to by the applicable QA Supervisor's signature, the original CAR will be maintained.

e. AFRs

PURPOSE: The Audit Finding Report (AFR) is the Operations QA mechanism for documenting deficiencies identified during audits of organizations performing quality related activities at Waterford 3. These AFRs are then forwarded to appropriate levels of management.

ORIGINATION: An audit is structured around a checklist prepared by the auditor and concurred with by the supervisor. The checklist is used during the audit to compare the audited organization's mode of operation against procedures, standards and other documents which govern its domain of operation.

CORRECTIVE ACTION IMPLEMENTATION: The audited organization is required to complete the following actions upon receipt of the audit report:

a) Review and investigate the condition described in each audit finding,
b) Schedule appropriate immediate corrective action to correct the deficiency and to prevent recurrence, and
c) Respond to all findings within (30) days after acknowledging the audit finding. The response must clearly state the corrective action implemented and/or the scheduled date targeted for the completion.

CORRECTIVE ACTION VERIFICATION: The QA Audit Supervisor assures that corrective action is being accomplished in a timely manner by maintaining a tracking system of all unresolved items. The Lead Auditor confirms through personal observation or verification, that corrective action is accomplished as scheduled. The verification review also assures that the corrective action is adequately identified and implemented for each finding, including considerations for:

a) Similar conditions
b) Corrections as to cause
c) Software aspects
d) Hardware aspects
e) Schedule
f) Completeness

f. NRC Inspection Reports

ORIGINATION: These reports are transmitted to LP&L by the NRC Region IV office. A summary of NRC inspected areas of operations, maintenance, administrative controls, and license activities are contained therein and may identify open items, unresolved items, and/or Violations/Deviations.

CORRECTIVE ACTION IMPLEMENTATION: The Nuclear Services Manager and the Nuclear Support and Licensing Manager are responsible for the coordination of reviews and preparation of responses to NRC Inspection Reports. This task is performed by the Onsite Licensing Unit of the Licensing Section.

The specific task is performed by the Licensing Engineer (LE) through the development of a Licensing Action Plan (LAP). This plan may necessitate input from other departments and is transmitted to them through the use of a Licensing Information Request (LIR) form. The LIR is responded to and certified by the respective departments via the Task Review And Certification (TRAC) form. The response is reviewed by the LE for consistency with the LAP, LP&L commitments, completeness and the FSAR. Inspection Report responses are reviewed by the Plant Manager, Licensing Manager, and the Nuclear Support and Licensing Manager prior to transmittal to the NRC.

CORRECTIVE ACTION VERIFICATION: This is accomplished through receipt of signed off TRAC forms from responsible departments as well as a confirmatory review by the LE. LIRs are tracked from inception through completion by the LE via the computerized Licensing Commitment Tracking System. Responses to the NRC pertaining to Inspection Reports and 10CFR21 are further validated by the Operations QA group via QASP 19.13 prior to transmittal to the NRC.

2. Generic Quality Deficiencies

There may be cases where correcting individual quality deficiencies is insufficient to assure overall quality. Such cases occur where there are underlying causes common to more than one deficiency. Therefore, LP&L has established programs to provide timely identification and correction for such generic deficiencies. The following three sections will discuss the QA Trending Program, the Availability Improvement Program, and Hardware Trending.

a. QA Trending Program

Recognizing the need for early identification and correction of generic quality problems the Operations QA Group initiated a Quality Trending Program in May, 1984 with the publication of procedure QASP 16.1.

Data Reduction

The Operations QA Group collects and analyzes quality data for the purpose of identifying adverse trends. Responsible organizations initiate corrective action for Waterford 3 programmatic deficiencies.

Documents to be incorporated into the trend analysis include, but are not limited to:

CIWAs (Condition Identification and Work Authorizations)
QNs (Quality Notices)
DNs (Discrepancy Notices)
AFRs (Audit Finding Reports)
CARs (Corrective Action Reports)
NRC Inspection Reports

For each document the assigned QA representative will review and identify any deficiency in the effectiveness of the QA Program. The identified deficiency will then be categorized according to the following scheme:

Equipment Control
Training and Qualification
Design Control
Maintenance and Modification Control
Procedure Adherence
Plant Records Management
Control of Purchased Materials and Services
Identification and Control of Materials, Parts and Components

Control of Special Processes
Inspection
Test Control
Control of Measurement and Test Equipment
Surveillance Testing and Inspection Schedule
Plant Security
Corrective Action

As experience is gained in the trending program, categories will be added and deleted as necessary.

Trend Analysis

The Operations QA representative will evaluate the trend reports to determine if a possible adverse trend exists based on the following:

a. A significant increase in the number of occurrences of a specific adverse condition category is noted as compared to the previous reporting period.

b. A continuing and significant rise in the overall trend of adverse conditions for a responsible organization over the last three months is noted.

Further investigation to confirm possible adverse trends may be indicated and accomplished by monitoring the specific activity or program in question.

Corrective Action

Corrective action will generally be in the form of issuance of a Corrective Action Request (CAR) to the Manager of the responsible organization. Future trending reports will be used (in addition to standard QA confirmatory actions) to verify the adequacy of the corrective actions.

Reporting

The trend analysis report will be issued on a quarterly basis in the form of graphs and summary reports (including summaries of CARs and corrective actions) to the Safety Review Committee and to the Senior Vice President Nuclear Operations through the Corporate QA Manager. The reports will be formatted in a manner to facilitate the identification of trends in programmatic deficiencies.

Management Overview

The trending program provides a valuable senior management tool for assessing the effectiveness of the quality program at Waterford 3. Trends whose root cause may lie in the areas of staffing, corporate philosophy, management deficiencies, and the like, can most appropriately be resolved through the Senior Vice President Nuclear Operations following his quarterly review of the trending reports.

Current Status

The trending program has been recently initiated at Waterford 3 with the first quarterly report to the Senior Vice President issued in October, 1984.

b. Availability Improvement Program

The Availability Improvement Program (AIP) for Waterford 3 will be implemented to improve overall plant reliability. In so doing, quality related problems will be identified to management and corrective action implemented on a system/component level. While the QA Trending Program will identify generic programmatic deficiencies, it is expected that problems identified by the AIP will be predominately in the hardware area.

The AIP centers around a computerized model of the Waterford 3 plant. The plant will be divided into generic functions, which will be further subdivided into subfunctions, equipment systems, and, finally, equipment items. The model database will be regularly updated to reflect actual plant performance data, enabling the calculation of reliability/availability for any hierarchical level of the computer model. Availability goals will be set initially based upon industry performance of similar plants. As the AIP proceeds, and the database is extended, plant-specific availability goals will be utilized.

When an unusual characteristic affecting some measurement of availability is identified, or a problem is recommended for investigation, a Unit Availability Investig tion (UAI) will be undertaken. The UAI will focus on a gro p, or individual piece, of hardware as appropriate. ' oot cause analysis will be performed to determine the reasons for abnormal performance. The analysis may make use of plant personnel interviews, vendor interviews, consultant interviews, investigation of environmental conditions, special testing, etc.

Upon determination of the root cause of the problem, corrective action will be implemented as necessary and tracked to completion. Verification of effectiveness of the corrective action will be evidenced through improved availability performance under the AIP.

Periodic reports of the results of the AIP will be provided to Nuclear Operations management, including the Senior Vice-President Nuclear Operations. Such reports will identify adverse availability trends, the root cause of such trends, corrective action taken, and confirmation of effectiveness of the corrective action.

As with any trending program, an operational database is required prior to effective implementation of the AIP. LP&L expects the AIP to be fully implemented within two years.

c. Hardware Trending

The purpose of the Maintenance History System (MHS) is to identify potential improvements in the preventive maintenance program, to suggest improvements to corrective maintenance procedures, to identify equipment requiring upgrade, and to provide a tool for assessing adequacy of spare part inventory levels. After completion of a plant modification, repair or maintenance, a MHS form is filled out on the affected component describing the nature of the work performed. The MHS form is attached to the CIWA before routing for closure review. These forms are used for data entry into the MHS computer system. The MHS data base is currently under extensive review to update and verify accuracy and adequacy of input data. This data base will provide a complete preventive and corrective maintenance history of all plant system components. This will enable LP&L managers to detect equipment trends in systems under their control. Once operating time is accumulated on plant systems the Plant Maintenance Superintendent will select key systems to review the frequency and scope of preventive maintenance for changes as necessary to improve system operability.

Pump and valve testing performed under the requirements of the ASME Boiler and Pressure Vessel Code is another source of trending information. A list of Section XI tests performed on safety related equipment under this Code for which data must be recorded to identify failure trends has been established at Waterford 3. This list includes such equipment as the Emergency Diesel Generator, Charging Pump, Containment Spray Pump, Reactor Coolant System (RCS) Pumps, RCS Instrumentation, MSIVs and containment isolation boundary valves. This trend information will provide plant management with advance notice sufficient to take the necessary corrective actions to prevent failure of such equipment vital to nuclear safety.

In programs of this magnitude it is inevitable that changes will be necessary. As LP&L gains more experience in quality trending, program refinements will be made to support the program purpose of identifying adverse quality trends. It is also important to note that the effectiveness of any trending program is a direct function of its database. The identification of trends requires a detailed previous history. By initiating the trending program at this time LP&L expects it to become a useful management tool going into commercial operation.

C. Staffing

The organization, staffing levels and personnel qualifications for Waterford 3 are described in Chapter 13.1 of the FSAR. Staffing of key areas of plant operations and quality include:

Staff	Authorized Staffing Level	Actual Level as of 9/84
Plant Operations and Maintenance	211	191
Plant Technical Services	96	92
Plant Training	31	28
Plant Quality	13	13
Quality Assurance	46	42

The operations phase QA organization is divided into two main groups - Nuclear Operations QA and Engineering/System Development QA each of which is further subdivided into 3 sections. QA staffing for the operations phase is detailed below:

Staff	Authorized Staffing Level
Nuclear Operations QA Manager	1
- QA Audits	9
- QA Support	6
- QA Analysis	9
- Total	25
Engineering/System Development QA Manager	1
- Audit/Surveillance	5
- System Development	7
- Engineering/Procurement	4
- Total	17
QA Management	4

D. <u>Certification of Inspection Personnel</u>

Inspection personnel during the operations phase of Waterford 3 including those provided by contractors are certified in accordance with QI-10-001, "Qualifications of Inspection Personnel". Certification for Level I, II and III qualifications is done in accordance with ANSI N45.2.6-1978, and Regulatory Guide 1.58 Rev. 1. Prior to certification a background investigation must be satisfactorily completed verifying a candidate's education and employment experience. Recertification is performed every two years.

E. <u>Quality Assurance Indoctrination and Training</u>

1. Plant Staff Quality Related Training

An indoctrination and training program has been established for the Nuclear Operations Department personnel performing quality related activities. It is designed to ensure that personnel involved are knowledgeable in quality assurance procedures/requirements as well as the overall functional responsibilities in the plant, and have the necessary proficiency to implement the requirements. The scope, objective, and method of implementing the indoctrination and training program are documented in procedures developed by the Training Department. The Quality Assurance Training and Indoctrination Program requires that:

a) Personnel responsible for performing activities that affect quality are instructed on the purpose, scope, and implementation of quality related manuals, instructions, and procedures;

b) Personnel performing activities that affect quality are trained and qualified in the principles, techniques, and requirements of the activity being performed;

c) Proficiency and requalification of personnel performing activities requiring certification are maintained by retraining, re-examination, and/or recertification on a periodic basis;

d) Proficiency tests be given to those personnel performing and verifying activities affecting quality, and acceptance criteria developed to determine if individuals are properly trained and qualified;

e) Certificates of qualification clearly delineate (1) the specific functions personnel are qualified to perform and (2) the criteria used to qualify personnel in each function; and

f) Documentation concerning training and qualification programs which describes the content, who attended, and results of tests as required by the training program are maintained.

2. Quality Assurance Section Training

QA Procedure QASP 2.10 directs the development, implementation and documentation of the QA Section training program to reasonably assure that LP&L QA personnel have sufficient knowledge and experience to perform assigned tasks at Waterford 3. Training is implemented through:

- Completion of a QA required reading list;
- Formal classroom training (onsite and offsite) in specific topical and procedural areas to enable and enhance performance and effectiveness;
- Performance of on-the-job training assignments by individuals at their supervisor's discretion where formal courses cannot provide the level of training necessary for a particular quality related task;
- Special training where unique skills are needed for performance of specific functions such as monitoring of NDE, welding and fire protection;
- Periodic training such as the monthly QA Section training sessions or group sessions on an as-needed basis where changes, revisions or new requirements from LP&L QA Program documents, regulatory codes and standards are brought to the attention of QA personnel. Lessons learned or corrective actions as a result of quality deficiencies or undesirable programmatic trends identified at Waterford 3 and other nuclear generating facilities will be reviewed during these sessions.

The Quality Assurance Section Training Committee was formed on 12/16/83 to review the goals, objectives, effectiveness, and implementation of the training program for the Quality Assurance Section. It is composed of supervisory members from Engineering/Systems Development, Nuclear Operations, and Nuclear Construction QA Groups to act as a steering committee to provide management with an overview for evaluating the effectiveness and future direction of the QA Training Program.

An evaluation of the 1983 QA Training Program by this "ad hoc" group stressed three areas of concern for additional improvement: presentation and preparation of training lessons, attendance, and attitude and participation during training. As part of an effort to remain innovative and improve the skills of QA personnel two new training formats emphasizing professional development and corporate awareness were introduced. Under professional development, college professors and outside consultants provide instruction in stress management, leadership, oral communication, technical writing, time management, problem solving and negotiating skills. To enhance corporate awareness, representatives from various organizations within LP&L and the Middle South System will occasionally present their group's workscope to provide better understanding among QA personnel of company operations.

The success achieved by the Quality Assurance Section in meeting their training goals is evidenced in a Good Practice noted by INPO during a recent corporate assistance visit (December 1983). While evaluating senior corporate management attention and support of programs for developing experienced, trained, and qualified personnel required for the operation and support of Waterford 3, INPO stated in Good Practice 2.5A-1:

> "An excellent continuing professional training program has been developed for the Nuclear Operations Quality Assurance Group. This program is intended to enhance the inspecting, interviewing, and general management skills of QA personnel and has been well received by QA personnel."

3. Contractor Training

Contractors supplying quality related services to LP&L for which they conduct their own quality inspection and surveillance functions, are responsible for training their inspection personnel and documenting their qualifications under their own QA programs. These programs must meet or exceed the requirements of LP&L's QA Program, including training, before such vendors can be placed on the Qualified Suppliers List and enter into contract agreements with LP&L. QA program assessments of QSL vendors are made through Annual Evaluations and Triennial Audits (refer to Section II.G.1). Additionally, whenever contract personnel are performing quality related work onsite, implementation audits of vendor activities are conducted by Operations QA personnel (refer to Section II.G.3).

Contract personnel who perform quality related work under LP&L's QA Program must be trained in accordance with LP&L Procedures. LP&L managers directly supervising these personnel are responsible for ensuring they receive the proper QA training. Contract personnel performing inspection and monitoring functions are periodically evaluated by LP&L. Evaluation documentation is retained in individual training files in LP&L Project Files.

F. Audit/Review Programs

1. Nuclear Operations QA Audit/Monitoring Programs

a. Audit Program

As part of its charter to assure that the QA Program at Waterford 3 is adequate and being effectively implemented, the Operations QA Group administers an audit program of on-site quality related activities.

The QA Audit Supervisor, within the Operations QA Group, maintains a yearly audit schedule. Audit subject and frequency are based upon 10CFR50 Appendix B, the LP&L QA Manual, Technical Specification 6.5.2.8, Regulatory Guide 1.33, Rev. 2-1978, paragraph C.4, and Regulatory Guide 1.144, Rev.-1980, paragraph C.3. These documents establish minimum requirements which are generally exceeded. For instance, whereas the Technical Specifications require audits of Appendix B criteria to be conducted at least once per 24 months, such audits are presently scheduled on a yearly basis.

The annual audit schedule is updated every six months to incorporate any changes since the previously issued schedule. For example, when an unscheduled audit is performed it is added to the schedule as a record of the audit having been performed.

In revising the schedule, the QA Audit Supervisor considers the need for redirection of auditing efforts in response to problems identified as a result of the audit program, regulatory inspection findings, Site QA Reviews, Safety Review Committee direction, etc. Regularly scheduled audits are supplemented by scheduling additional audits for reasons such as:

a. Significant changes are made in functional areas of the QA Program such as significant reorganization or procedure revisions;

b. A systematic, independent assessment of program effectiveness is considered necessary; or

c. Verification of implementation of required corrective action is necessary.

The Corrective Action Audit, which is performed twice annually, includes items of noncompliance previously identified to the NRC between the two preceding Corrective Action Audits. Those items are also included within the audit checklist of the Corrective Action Audit conducted one year later to ensure that the corrective action for those items remains in compliance with commitments made to the NRC.

The overall scheduling and audit of unit activities is performed under the management cognizance of the Safety Review Committee (SRC) as previously described in Section II.A.1. In addition to periodic reports of audit activities from the SRC, the Senior Vice President Nuclear Operations receives the audit reports within 30 days of completion of the audit by Operations QA.

The audit process is described in detail in QA Procedure QASP 18.10 "Conduct of On-Site Internal and External Nuclear Operations Quality Assurance Audits".

b. Monitoring Program

Monitoring of plant activities is carried out by the Operations QA Group in order to provide additional observation of various aspects of plant quality related activities.

Monitoring may be initiated for a variety of reasons. For example, the QA Trending Program may identify an adverse quality trend; audit personnel may note a potential quality problem area outside the scope of their audit; or, during the course of review of CIWAs or procurement documents, QA personnel may identify areas of questionable quality.

Deficiencies identified during monitoring activities are documented through the use of a Corrective Action Report (CAR). The origination, tracking and verification of corrective actions for CARs has been previously described in Section II.B.1.d. The overall monitoring process is covered in QA Procedure QASP 18.9 "Conduct of Nuclear Operations Quality Assurance Monitoring of Quality Activities".

2. Plant Quality Group Review and Verification Process

The Plant Quality Group has responsibility to review and verify implementation of the quality requirements related to Waterford 3 on-site activities.

a. Plant Quality Inspection

Quality inspections are performed at designated inspection Hold Points. Quality and Technical Reviews are performed by the responsible department head and Plant Quality Group on all quality related maintenance, modification and testing procedures and work packages. This review ensures that the procedure or work package addresses applicable NRC requirements, Technical Specifications, applicable quality requirements and commitments made to the NRC. As a result of these reviews, Hold Points are designated in the procedure/work package, during which a Plant Quality Inspector:

1) Ensures necessary test and inspection equipment is properly calibrated before use,

2) Checks that the procedure is applicable to the work being performed,

3) Performs inspection in accordance with the work procedure,

4) Reinspects items found unacceptable during previous inspection,

5) Documents the results on the work instructions, attached data sheets or Quality Inspection Report, and

6) Writes or directs a CIWA be written to correct an unacceptable condition unless the item can be reworked.

Completed work packages/CIWAs are reviewed by the Plant Quality Group to ensure that inspections/verifications were properly performed and documented. In the unlikely case that an inspection required by an established Hold Point is missed or not documented, then a Quality Notice (QN) is initiated. The work package will remain incomplete until the QN is verified as closed by rescheduling and completing the inspection, or producing valid documentation of the inspection, or obtaining approval to delete the Hold Point.

b. Hold Points

Inspection Hold Points are required whenever there is a reasonable possibility that an undetected deviation could occur that affects plant safety. In determining probability for an undetected deviation, post-maintenance testibility, complexity, criticality, and uniqueness of the work being performed are considered. Information concerning Inspection Hold Points is obtained from related design drawings, specifications, codes, standards and controlled documents.

The following are examples of activities which would normally require Inspection Hold Points:

1) Activities which could affect the integrity of the reactor coolant pressure boundary of safety/quality related components (e.g., installation and/or setting of pipe or component hangers; bolt-up and torquing of closure studs; installation of locking devices; welding, including fit-up and welding/welder qualifications; heat treatment; and hydrostatic testing.)

2) Nondestructive examination.

3) Cleanliness and foreign material exclusion, including cleanliness of components with tight clearance, such as control rod drive mechanism internals and major pump seals, and system or component closure following maintenance.

4) Characteristics of electrical components or circuits such as cable routing, splicing, lugging and potting, tightness of connections, and penetrations and fire stop installation which cannot be verified by post-maintenance and/or modification testing.

5) Characteristics of materials or components, such as surface finish, hardness, dimensions, leveling, alignment, torque, and clearance when such characteristics are critical to safety and when they will not be verified in subsequent tests or inspections.

c. Quality Instructions

Quality Instructions (QIs) are provided for those quality related activities of the Plant Quality organization outside of maintenance, modification and testing procedures/work packages that require quality inspection/review. Some of the key instructions are:

1) Quality Review of Procurement Documents - The Quality Reviewer (QR), as designated by the Plant Quality Manager, conducts a quality review of purchase and contract requisitions which include: Local Emergency Orders, Spare Parts Equivalency Reports, Major Changes, Major Exceptions and Transfer Requests. The QR verifies during his review that the procurement document:

a) Meets the guidelines of the Purchase Requisition Quality Review Guide,

b) Has a review by the Requirements Engineer to ensure the technical requirements are included and meet or exceed previously imposed specifications,

c) Contains applicable references,

d) Contains a statement concerning vendor requirements, 10CFR50 Appendix B requirements, QA Program requirements, 10CFR21 Reporting, Right of Access and Nonconformance Reporting, and

e) Confirms that the recommended vendor is on the Qualified Suppliers List.

Reviews which result in comments are documented on a Purchase Requisition Review Comments sheet and tracked on the Outstanding Plant Quality Review Comments Sheet until resolved.

2) Materials Receipt Inspection - Quality related materials received on site are controlled through the use of a Materials Receipt Inspection Report (MRIR) initiated by Plant Stores personnel. A plant Quality Inspector will verify on the MRIR that:

a) Identification and markings are in accordance with codes, specifications, purchase orders and drawings,

b) The manufacturer documented fabrication and testing requirements,

c) Protective covers and seals are in place,

d) Coatings and preservatives meet specifications,

e) Dessicants are in place and unsaturated,

f) No physical damage exists,

g) Cleanliness has been maintained, and

h) Other checks including weld preparations, workmanship, insulation resistance checks and dimensional checks have been conducted as appropriate.

Items passing review are affixed with a RELEASE tag. Discrepant items are identified with HOLD tags. Discrepancies are documented by Discrepancy Notices which are logged and tracked by the Plant Quality Group until resolved or dispositioned by the Material Review Board (MRB) as described in Section II.B.1.b.

3) Material Storage Inspection - This instruction provides Quality Inspectors with detailed procedures for verifying proper classification, packing, storage, cleanliness and segregation of materials received.

4) Cleanliness Inspections - This instruction provides for cleanliness verification of materials, equipment and components as required by work package instructions.

5) Housekeeping Inspections - This instruction provides for the use of Quality Inspection checklists to verify prescribed standards of cleanliness in various plant areas for the purposes of personnel safety, morale, contamination- ation control, fire prevention and degradation of plant operability. Discrepancies are noted on the Quality Inspection Checklists and tracked and resolved through the Inspection Comments/Resolution Sheet.

d. Plant Quality Surveillances

In addition to Quality Inspections, Quality Surveillances provide for observations of quality related activities. These surveys are documented on Quality Surveillance Report (QSR) forms. When deficiencies are noted during the Surveillance, a QN shall be written requiring corrective action. Plant Quality Surveillances provide sampling of a portion of station activities, whereas Quality Inspections provide for checks of specific quality affecting activities.

e. Stop Work

The Plant Manager or Plant Quality Manager may issue verbal stop work orders (SWOs) to halt unsatisfactory work and to control the processing, delivery, or installation of nonconforming material at Waterford 3. A verbal SWO is followed up with a written SWO which is documented on an SWO form, and logged for tracking. Notification of the SWO is made to the Senior Vice President Nuclear Operations, Corporate QA Manager, Safety Review Committee, Control Room Supervisor, individual company involved, Plant Manager, applicable department supervisor, and the Plant Operations Review Committee. When the deficiency is corrected, or sufficient steps have been taken to ensure that further noncompliance will not occur, a Stop Work Order Release (SWOR) form is issued by the Plant Quality Manager to allow work to resume. A SWOR form notes the corrective action taken and the reason for release.

G. Control of Contractor Quality Related Activities

1. Evaluation of Supplier's Quality Assurance Program

Suppliers providing safety related material or services must be on the LP&L Qualified Suppliers List (QSL). Before a vendor can be placed on the QSL, that vendor must be evaluated for acceptability by the LP&L Engineering/Systems Development QA Group.

An initial evaluation of a prospective contractor is performed by reviewing the contractor's:

a. Current quality assurance program manual, procedures and records;

b. Capability to conduct quality activities as revealed through examination of the facilities for performing such work and ability of the supplier's personnel;

c. Past performance based on experience that LP&L and other users have gained using identical or similar products and services.

Based on results of the above evaluation process, a supplier is classified:

a. <u>Acceptable</u> - no questions/concerns were raised during evaluation, or questions/concerns have either been resolved or have an insignificant impact on the item/service to be provided.

b. <u>Unacceptable</u> - the supplier's program doesn't meet procurement document requirements, or is not adequately implemented and review questions not satisfactorily addressed/resolved.

c. <u>Conditionally Acceptable</u> - only certain portions of a supplier's program are acceptable and purchase activities are limited to restrictions as imposed by the Engineering/System Development QA Group and noted on the QSL and are to be reflected in procurement documents. Full acceptability will be based on satisfactory supplier resolution of questions/concerns.

Once a contractor is on the QSL, a documented evaluation of the supplier will be performed annually and kept in that vendor's file.

While an audit is not necessary for a satisfactory annual evaluation, an audit must be performed every three years for a vendor to remain on the QSL.

2. Conduct of Contractor Quality Assurance Audits

a. Off-Site QA Audits

The Engineering/Systems Development group is responsible for ensuring all QSL listed contractors' offsite activities are audited to requirements of 10CFR50 Appendix B and LP&L's QA Program. Either they themselves will audit these contractors, or a vendor audit group will be contracted which has been qualified to LP&L's QA Program to conduct these audits. Audits will be conducted triennially per NRC Regulatory Guide 1.44.

b. On Site Auditing and Monitoring of Contractors

The Nuclear Operations Quality Assurance Manager directs audits of those organizations not within LP&L that are performing quality-related services at Waterford 3. These type of contractor audits are designated as "On-Site External Audits" and are conducted as previously described in Section II.F.1.a.

Periodic monitoring of on-site contractor activities is done through the use of Monitoring Reports as assigned by the QA Analysis Supervisor under the Operations QA program previously described in Section II.F.1.b.

3. Deficiency Reporting by Contractors

All vendor personnel performing on-site quality inspections of their company's work under LP&L's QA Program are required to report deficiencies identified for inclusion on a CIWA. This includes deficiencies discovered outside the scope of work being performed. A CIWA, which documents a deficiency and its corrective action/rework, is approved and tracked by LP&L management as described in Section II.B.1.a. Corrective action verification is provided by post closure review of the CIWA by the Plant Quality Group.

H. Station Modification Program

The purpose of the Station Modification program is to provide a mechanism through which design modifications to Waterford 3 are controlled and tracked. The Station Modification Package serves as a comprehensive, stand alone design change document which has undergone the appropriate interdisciplinary reviews. The process assures that no changes are made to the plant structures, systems and components which may introduce an unreviewed safety question per the criteria delineated in 10CFR50.59.

Any individual with the concurrence of the department head may request a design modification. Reasons for the change could include enhancement of the plant structures, systems, or components as a result of engineering preference, regulatory requirements, licensing commitments, ALARA, Human Engineering Design considerations, etc. Upon management approval of the request, a Station Modification Package (SMP) is assembled and receives appropriate interdisciplinary review. During the course of the design and review process checklists are used to ensure that, among other things, generic criteria such as separation, failure effects, fire protection, etc., are taken into account. The LP&L Quality Assurance Program requires that documentation appropriate to satisfy 10CFR50 Appendix B will be generated and retained.

Typical SMP Contents include:

1. Summary Functional Description

2. List of Attachments
   a) Purchase Orders/Requisitions
   b) Recommended Spare Parts
   c) New or Revised Drawings/Description Documents/Tech Manuals/Equipment Specification/System Description
   d) Vendor Information
   e) Design Calculations/Analyses
   f) Work Procedures

3. List of References

4. Bill of Material

5. Installation Instructions

6. Examinations (e.g. NDE requirements, PSI/ISI surveillance requirements)

7. Testing (including acceptance criteria)

8. Nuclear Safety Evaluation checklist (10CFR50.59 review)

Modification is performed via the Condition Identification and Work Authorization (CIWA) process described in Section II.B.1.a. Detailed Construction Packages (DCPs) are prepared for work activities. Pertinent design and reference information (e.g. isometric drawings, engineering instructions, code type testing requirements, installation procedures) is included in the DCP as well as instructions for implementation documentation. Acceptance criteria/tests/checks are developed and included as part of the DCP prior to implementation.

With the exception of minor changes, alterations (or field changes) to the DCP may not be made without approval of a revision to the SMP. For minor changes, the Action Engineer may authorize a Detailed Construction Package Change (DCPC) in which case a detailed description of the change is documented prior to implementation of the change. All DCPC documentation is retained as part of the work package and subject to post-implementation review.

Verification of implementation is first performed by the Station Coordinator and the Action Engineer who had the responsibility for developing the package. The Action Engineer assures that all work was accomplished according to the SMP and that acceptance criteria are met. Control Room controlled drawings are redlined to reflect the change. The Action Engineer then initiates a Modification Project Closeout Review form, and forwards it to the SM Coordinator

(SMC). The SMC forwards a Work Completion Notice to all affected disciplines so that appropriate documents are revised. Completed Document Update Forms are returned to the SMC to certify that all affected drawings, procedures, programs, and/or training plans have been revised and approved. At this time the CIWA is closed and the SM Closeout Review form initiated and sent to the Systems Engineering Department Head for review and approval of the Modification Project Closure Review form. See Section II.I.3 for quality review and storage of SMPs.

I. Records

1. Project Files

Project Files is the focal point for storage and maintenance of uncontrolled records and documents. The filing system used is a computerized document retrieval system. Completed records forwarded to Project Files are indexed on the computer, then microfilmed and stored by Film Access Number. This number indicates the roll and frame number of a particular document or its hard copy location. Records are thus effectively filed under document number, record type, date, title, vendor, subject, equipment number, etc., allowing a user to retrieve documents in a timely manner.

Records processed by Project Files are received under a standard transmittal form which lists the contents forwarded. The records transmitted are inspected to ensure that all of the records on the transmittal form are present, complete, and validated. If the records are complete and agree with the transmittal form, then the form is signed by the package reviewer, filed, and a copy sent to the originator.

Unlimited access to Project Files is granted only to personnel assigned to the Project Files Group. This minimizes the possibility of lost/misplaced records by personnel who have not been indoctrinated in the proper procedures for control of documents. The Project Files Supervisor may authorize temporary access when individual requirements cannot be handled by the Project Files personnel. QA records may be accessed by request for work/review, but may only be reviewed in designated controlled areas.

2. Document Control

Document Control is the organization responsible for processing controlled documents such as approved drawings, specifications, technical manuals, FSARs, SMPs and some procedures. This process includes receiving, recording, distributing, updating and retrieval of those documents affecting quality to ensure only the latest applicable revision is used for operation and maintenance at Waterford 3. Controlled issue is maintained by the use of transmittal forms which must be signed and returned by assigned copy holders on established distribution lists. Direct access to files maintained by the Document Control is limited to group personnel and their supervisors.

3. Records Quality Review

Quality-related Station Modification Packages (SMPs) are reviewed by the Operations QA group before final closure and transmittal to Project Files. A Quality Reviewer (QR) completes a QA Review Checklist on the SMP to ensure that records establishing proper review and other necessary records are retained. The QR review scope ensures that documents required by the SMP index and controlling procedures are included, proper review and approval is indicated on the records, applicable codes and quality standards are identified, test and inspection requirements are documented, and safety evaluation and design verification is performed.

Comments from this review are tracked and closed out on a standard Procedure Review Comments sheet, ensuring completeness of the SMP. The Checklist, comments sheet and any additional records generated by the QR's review are filed for storage.

Similarly, quality related documents generated by the Plant Quality and Quality Assurance groups in the performance of their duties are reviewed and retained in Project Files. These records include audit reports, nonconformance reports, receipt inspection reports, CIWAs, QNs, DNs, Stop Work Orders, QC surveillances, QC Inspector certification, hold tags, conditional release tags, various NDE documents, calibration records, and NDE personnel qualification and training records.

(NOTE: Some aspects of Records Quality Review, particularly records storage, are not yet fully implemented due to their recent adoption by Waterford 3.)

4. Status

During the construction phase, records management was primarily handled by the architect/engineer. As a result, although current records are handled and processed as described above, there remains a backlog of construction phase records to process through the LP&L Records System. Additionally, to assure continued high quality in records storage and retrieval, LP&L management is evaluating the current records management process for Waterford 3 to identify any areas needing improvement. It is expected that appropriate recommendations of this evaluation will be initiated by November 30, 1984.

IV

RESPONSES TO THE ISSUES

Responses to the 23 issues are formatted as follows:

1. NRC DESCPIPTION OF CONCERN

   This section is taken verbatim from the NRC requests for additional information (References 1 and 2).

2. DISCUSSION

   This section provides (as appropriate) summary background information related to the specific issue, discussion of the methodology employed in resolving the issue, descriptions of specific results and/or work in progress, and conclusions.

3. CAUSE

   This section describes the cause (if any) which led to the perception of alleged concern.

4. GENERIC IMPLICATIONS

   This section describes the results of investigation into the potential broader implications of the specific issue.

5. SAFETY SIGNIFICANCE

   This section states LP&L's opinion regarding readiness of the constructed plant for fuel load and power operation with respect to each issue.

6. CORRECTIVE ACTION PLAN/SCHEDULE

   This section indicates additional corrective action, if any, taken, or to be taken, in order to fully resolve the particular issue and the generic implications (if any).

7. ATTACHMENTS

   This section provides an index to the information provided as attachments, if any, to the specific responses. Some attachments to submitted responses have been omitted from the final responses included herein. Omission of such attachments was solely for the purpose of making the size of this report more manageable and the material in omitted attachments is available for NRC review at the Waterford 3 Site.

8. REFERENCES

This section provides a bibliography of the major reference material associated with the specific response.

The specific responses to the NRC requests for additional information have previously been submitted to the NRC. The final responses included herein include the following types of changes (marked by change bars in the right hand margins) from the previously submitted responses:

1. Changes to incorporate information submitted in supplements to particular responses;

2. Changes reflecting completion of work which was in progress at the time of initial formal transmittal of the responses;

3. Changes reflecting new information; and

4. Changes of an editorial nature.

RESPONSE

ITEM NO: 1 (Final)

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 (CM) and J.A. Jones QA/QC personnel.

The program, which was performed under the overall direction of LP&L, consisted 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 erification 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 - Construction 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 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 QA/QC personnel 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 was 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 non-inspector QA/QC personnel qualifications is complete and no significant concerns have been identified.

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 1

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"

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.

A. LP&L (Continued)

6. Non-Inspector QA/QC Personnel:

The Verification Program determined that non-inspector LP&L QA/QC personnel were qualified.

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 not be 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 inspeccions. 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.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program identified eighty-six (86) non-inspector Ebasco QA/QC personnel whose qualifications were initially determined as not meeting program requirements. Corrective Action Request (CAR) EQA84-41 was initiated to track the disposition of this deficiency.

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

a. Sixteen (16) individuals were not qualified as auditors. A review indicated their audit activities were performed under the guidance of a qualified lead auditor, thus providing an acceptable level of confidence in their work.

b. Thirty-four (34) individuals were considered unqualified due to inadequate job description and limited information on their work activities. Adequate confidence in the work of these individuals was established as follows:

   1. Twelve (12) individuals were determined to have been clerks or secretaries.

2. Nine (9) individuals were determined to have performed limited QA activities for which their indoctrination and training was considered adequate.

3. Five (5) were determined to have performed no QA related activities at Waterford 3.

4. Four (4) individuals acted as Quality Assurance Engineers. Two worked under the direction of the Site QA Supervisor, and two had training/indoctrination considered adequate for QAE's.

5. Four (4) individuals were determined to be Ebasco Corporate QA employees assigned to perform administrative functions.

c. Thirty-seven (37) individuals were considered unqualified as document reviewers due to insufficient documented training. This deficiency was previously identified as a result of Audit RCB/AEZ 83-10-1. The problem occurred because on-the-job training was not clearly required to be documented by QAI-14 Rev. 0 (Training Guidelines and Requirements for Quality Assurance Records Personnel). Nevertheless, it was confirmed by key personnel that on-the-job training was provided for document reviewers.

d. One (1) individual not qualified as an auditor was determined to have performed no audits.

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 Deficienc es:

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

6. Non-Inspector QA/QC Personnel

   The Verification Program determined that non-inspector American Bridge QA/QC personnel were qualified.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector B&B QA/QC personnel were qualified.

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.

6. Non-Inspector QA/QC Personnel

   The Verification Program identified one (1) non-inspector CB&I QA/QC individual whose qualifications were initially determined as not meeting program requirements. Corrective Action Report (CAR) EQA-40 was initiated to track the disposition of this deficiency.

   It was determined that, based upon additional information concerning the individuals education and work history, the individual was qualified to function as a Quality Assurance Engineer.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector CE QA/QC personnel were qualified.

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 equiprent 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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector F&M QA/QC personnel were qualified.

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 SNT-TC-1A.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector GEO (NDE) QA/QC personnel were qualified.

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.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program identified one (1) non-inspector Gulf QA/QC individual whose qualifications were initially determined as not meeting program requirements. Corrective Action Request (CAR) EQA84-39 was initiated to track the disposition of this deficiency.

It was determined that, based upon a thorough review of the individual's personnel qualification file, the individual was given sufficient indoctrination and training, as well as key QA concepts and techniques, prior to certification. In addition, audits performed by this individual were reviewed and approved by Gulf's Corporate QA Manager. As a result of this review, the individual was deemed qualified for the activities he performed.

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.

J. MERCURY COMPANY OF NORWOOD (Continued)

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.

J. MERCURY COMPANY OF NORWOOD (Continued)

D. Primary Sampling ˉ ·ǐ.ıg and Related Supports/Restraints

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

Verification activities independent of the initial in-process inspections are discussed in relatior 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 vᵖre ᶠound. This reinspection covered most of the ıɪstallation attributes which are subject to in-ṗrocess 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:

1) 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.

J. MERCURY COMPANY OF NORWOOD (Continued)

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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector Mercury QA/QC personnel were qualified.

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 HERC.	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 I	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.	DOCUMENT REVIEW EBASCO	DOCUMENT REVIEW 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 (NI 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 (NI 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:

VERIFICATION OF THE ACCEPTABILITY OF MERCURY INSTALLATIONS (Continued)

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.

ATTACHMENT NO. J-3

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 relat: 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.

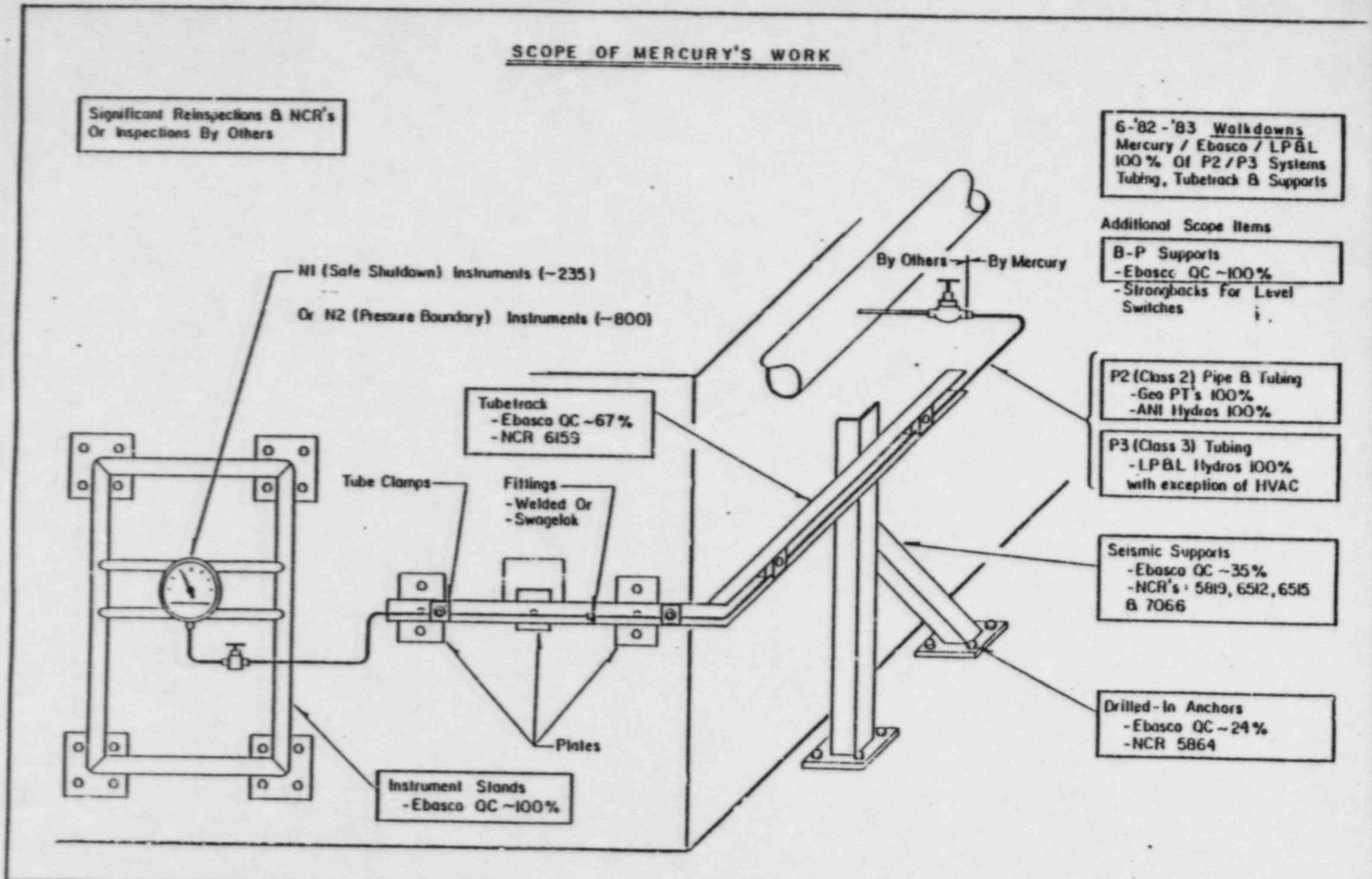
TABLE 1

SUMMARY BY DISCREPANCY TYPE

VIOLATION CODE	APPROXIMATE TOTAL ITEMS INSPECTED**	TOTAL DISCREPANCIES IDENTIFIED*		TOTAL NUMBER OF REWORK ITEMS	ACCEPTED AS IS
		CITED	ACTUAL		
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
N1 (Safe Shutdown) Instruments (~235)
Or N2 (Pressure Boundary) Instruments (~800)
By Others
By Mercury
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
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
Plates
Seismic Supports -Ebasco QC ~35% -NCR's : 5819, 6512, 6515 & 7066
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.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program identified two (2) non-inspector Nisco QA/QC personnel whose qualifications were initially determined as not meeting program requirements. Corrective Action Request (CAR) EQA84-36 was initiated to track the dispositions of this deficiency.

It was determined that, based upon additional investigation and specific job functions, one (1) identified individual was qualified to function as an auditor as of 9/3/79, but lacked objective evidence in the areas of orientation, training and on-the-job audit training to substantiate his qualifications. In addition, the individual demonstrated his knowledge by satisfactorily passing an oral examination on 9/12/78; by conducting two (2) audits prior to his certification and assignment to Waterford SES-3; and the individual's work history indicated eight (8) years of overall QA/QC experience, three (3) of which were in the nuclear construction QA/QC.

One (1) identified individual, although qualified to function as a Level III NDE Examiner, was not considered qualified to function in the capacity as Lead Auditor. However, it was determined that this individual functioned as a technical specialist for an audit team whose purpose was to determine Peabody Testing Company's suitability for approval and use as a qualified supplier. Since Peabody Company specializes in performing non-destructive examination services, the appointment and utilization of this individual in that capacity were considered acceptable.

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.

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 we.. 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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector Q4/QC personnel were not employed by Nooter.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program identified three (3) non-inspector Sline QA/QC personnel whose qualifications were initially determined as not meeting program requirements. Corrective Action Request (CAR) EQA84-37 was initiated to track the disposition of this deficiency.

M. SLINE (Continued)

Although the qualifications of these three (3) individuals were questioned when literally compared to the requirements, adequate confidence has been gained by the following:

(1) During the period of 1974 through 1983, Ebasco performed approximately sixty (60) QA audits and/or surveillances of Sline. Of these, audit GD/NS-83-7-3 identified the fact that Sline's Auditor qualifications did not meet all technical requirements of ANSI N45.2.12 and N45.2.23. Proper resolution of this finding was documented by Ebasco in letter W3QA-27399 dated December 23, 1983.

Resolution of this finding, and the numerous audits/surveillances of Sline by Ebasco, provides adequate assurance that the questionable qualifications of these three individuals did not adversely effect the Sline QA Program.

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. HANGEPS
      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.

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

(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 ' ı 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 scructural 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.

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.

6. Non-Inspector QA/QC Personnel

The Verification Program identified twenty-two (22) non-inspector T-B personnel whose qualifications were initially determined as not meeting program requirements. Corrective Action Request (CAR) EQA84-38 was initiated to track the disposition of this deficiency.

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

a. One (1) individual lacked records of indoctrination and training or audit participation. Further review indicated this individual acted as an administrative coordinator for audit activities, but did not function as an auditor or lead auditor. This was confirmed by review of audit W3-47-5-79 that listed the individual as a member of the Audited Organization with title of QA Coordinator. The audit plan on this individual described his responsibilities, which did not include participation in audit activities.

b. One (1) individual was considered questionable as an auditor due to no documented training specifically referencing ANSI 45.2 and 45.2.12, and poorly documented audit experience. A review revealed that this individual did complete a documented required reading list consisting of the T-B QA, QC and Welding Manuals and Procedures, in addition to Appendix B of 10CFR50. This reading has been considered functionally comparable to an "Orientation to ANSI 45.2 and ANSI 45.2.12". These factors, in addition to the review of all T-B audits by a T-B QA Engineer, are sufficient to establish an acceptable level of confidence in this individuals audit activities as a member of the audit team.

c. Four (4) individuals were found to be Ebasco employees who were either on loan or available for use by T-B as document reviewers. A review of their Ebasco files indicated they were qualified to perform document reviews.

d. Two (2) individuals lacked objective evidence of training as QA document reviewers. A further review of these individual's files indicated they were qualified as confirmed by documented evidence attesting to their training found in their files. Additionally, the comments regarding the final review for acceptance by the Ebasco QAIRG, as discussed under paragraph 6.f, also apply to these individuals.

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

e. Two (2) individuals lacked objective evidence of training as QA document reviewers. A research of their work assignments indicated that these two individuals were involved in performing engineering/technical reviews, and were not involved in reviews to assure compliance with the QA program.

f. Twelve (12) individuals lacked objective evidence of training as QA document reviewers. A review of these individual's work histories has indicated that their document reviews can be characterized as a clerical function performed by following the explicit instructions provided in T-B Procedure SI-56 Rev. "B"-QA Records Review Instruction (Piping). The detailed review for final acceptance was performed by Ebasco's Quality Assurance Installation Records Group (QAIRG).

Tompkins-Beckwith T-B Scope of Work

PIPING

Overinspections, Reinspections and Walkdowns

COMPONENT	CODE CLASS	QUANTITY INVOLVED	PRIMARY WELD CONFIGURATION	CODE REQ'D NDE	QC INSPECTION PERFORMED BY T-B	ASME CODE INSPECTION	NDE	RADIOGRAPH REVIEW	PRESERVICE INSPECTION	HYDROSTATIC TESTS	DOCUMENTATION REVIEW T-B	DOCUMENTATION REVIEW EBASCO	DOCUMENTATION REVIEW LP&L	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. PWHT 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) LP&L 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) 1" and above Same as above Independent Inspection by Virginia Corp.	(5) Same as above	(6) 100%	(6) 100%	(6) 10% (Min.) 3% 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.) 3% 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.) 3% Field Verified	
Containment Pene.'s	ASME III Subsec. MC	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 Walkdowns

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)	DOCUMENTATION REVIEW EBASCO (16)	DOCUMENTATION REVIEW LP&L (16)	OTHER
Seismic Hangers	AWS D1.1 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 200 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.

ATTACHMENT 1

O. WALDINGER (Continued)

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 majo. 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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector Waldinger QA/QC personnel were qualified.

ITEM NO.: 2 (Final)

TITLE: Missing N1 Instrument Line Documentation

NRC DESCRIPTION OF CONCERN:

The staff examined the documentation concerning installation of safety-related N1 instrument lines. Part of that review dealt with the situation where there is a change of design classification for systems. As a result of the staff review it was determined that communications between LP&L and Ebasco prompted a revision to be written by Ebasco to an LP&L drawing to clarify the "class break" for N1 instrument lines. The revision imposed ASME Class requirements for all installations between the process piping and the instrument lines installed after April 7, 1982. Prior to the revision a class break was defined to show the location where ASME class stopped and ANSI B31.1 applied.

Although ANSI B31.1 does not relate to records retention, 10 CFR 50 Appendix B does require installation and inspection records. Therefore, for locally mounted N1 instruments, even though they were installed prior to April 7, 1982, these records could not be located. Examples of the instrument lines with no supporting installation and inspection records for zones classified as ANSI B31.1 are LT-SI-0305B, LT-SI-0305D, PS-CH-0224X, PS-CH-0224Y, and PS-CH-0224Z.

Examples of the type of deficient data are weld reports, welder identification, weld filler material, base material and weld inspection results.

The NRC staff concluded that based upon the lack of quality records, for instrumentation installation to B31.1 the requirements of 10 CFR 50, Appendix B and the related other QA program elements may not have been complied with.

The lack of documentation to demonstrate the quality of installation of these safety related lines calls into the question the acceptability of these installed components.

LP&L shall: (1) Provide the missing documentation required by 10 CFR 50 Appendix B for the B31.1 instrumentation for local mounted instruments; (2) Review other design changes and documentation for all safety-related N1 instrumentation systems to assure all system installations were properly documented and inspected; and (3) If the documentation cannot be located, action must be taken to assure affected portions of safety-related system comply with NRC requirements.

DISCUSSION:

Prior to April 7, 1982 the instrumentation design permitted a class break to be taken in N1 instrument lines which would have allowed the installation, after the second accessible isolation valve, to be installed per ANSI B31.1. This approach has been endorsed by the Instrumentation Society of America Standard ISA-67.02-1980, "Nuclear-Safety Related Instrumentation Sensing Line and Tubing Standards for use in Nuclear Power Plants." After 4/7/82, no class break was taken in Class 1E N1 instrument installations and full documentation is provided.

Prior to the NRC special review, Ebasco Quality Assurance Installation Records Group (QAIRG) had commenced a review of all Mercury safety-related N1 instrumentation systems. This review is now complete. The program reviewed documentation on all N1 locally mounted instruments from the process connection up to the class break, and all cabinet mounted instruments from the process connection up to the cabinet. Full documentation on the installations under the scope of this review is provided and available.

This initial review indicated that a total of 192 N1 instruments were installed prior to April 7, 1982. These are noted in DCN-IC-232 R1. Of these installations, 102 were cabinet mounted and subject to the QAIRG review as indicated above and full documentation is available. Ninety were locally mounted and fell into the following five categories:

1.	Reclassified to N2 instruments	24
2.	Thermocouples (no tubing involved)	19
3.	Installed Full ASME III (without class-break)	35
4.	Threaded connections	8
5.	Welded and needed re-inspection	4
		90

The reclassification of the 24 instruments to N2 was accomplished by DCN's issued in 1981, 1982 and 1983 (Refer to Table I). This includes three of the five instruments identified by the NRC (PS-CH-0224X, PS-CH-0224Y and PS-CH-0224Z) which were reclassified to N2 by DCN-IC-1006R1 (September, 1982). This reclassification was made because the instruments, although safety related for pressure boundary reasons (up to and including the class break valves), did not perform a Class 1E function. Table I documents the reasons for these reclassifications.

There is no tubing involved in the thermocouples and the concern is, therefore, not applicable.

Thirty-five installations were installed without class break. That is, they meet the requirements of ASME Section III from the process connection to the instrument. Full documentation is available.

The remaining 12 installations (4 welded and 8 threaded) constituted the scope of this concern based on this initial review. Available documentation is compared in Table II to ASME Section III requirements.

The welded and threaded installations met ANSI B31.1 requirements (except for welder ID) as can be seen in Table II. In addition, they even approached full compliance with ASME Section III.

Of the four welded installations noted in Table II, two (LT-SI-0305B and LT-SI-0305D) were subject to a hydro test of 31.2 psig. This compares to the normal operating pressure of approximately 15 psig. These instruments (LT-SI-0305B and LT-SI-0305D) had welder ID on ten of sixteen welds, were installed by ASME Section IX qualified welders, were hydro tested, had final visual inspection, and were installed using material that met or exceeded the requirements for ANSI B31.1 installations. The other two welded installations (DPT-HV-5108AS and DPT-HV5108BS) are HVAC installations and received final visual examination of all welded connections. The operating pressure of these installations is sub-atmospheric.

Based upon the above, it was concluded that sufficient documentation existed for all locally mounted N1 instruments to demonstrate the quality of installation of these installed components per the requirements of ANSI B31.1. However, for additional assurance, these 12 installations were reworked to ASME requirements.

Subsequent to the above review and in preparation for the reinspection of N1 instrument lines conducted in response to Issue No. 1 (Inspection Personnel Issues), an inconsistency was identified between the Instrument List and Mercury isometric drawing. A review was therefore conducted consisting of a cross-check between the Instrument List and the Mercury isometric drawings for all N1 instrument lines, and a review of Design Change Notices (DCNs) posted against either the Instrument List or the Isometric Drawings pertaining to the classification of N1 instruments. As a result of the review, the following have been identified:

- 10 additional N1 instruments installed prior to April 7, 1982 were identified (for a total of 202 instead of 192).
- Of the 10 additional N1 instruments identified, eight are cabinet mounted (for a total of 110 instead of 102) and two are locally mounted.
- Four of the eight additional cabinet mounted N1 instruments identified underwent QAIRG review and full documentation is available.
- Four cabinet mounted and two additional locally mounted N1 instruments identified were installed with ASME III/ANSI B31.1 class breaks.

The 12 N1 instrument installations noted in the initial review plus the six N1 instruments identified above (four cabinet mounted/two locally mounted) were reworked to ASME Code requirements.

CAUSE:

A program existed for these installations and was adhered to. As discussed above, a review verified that sufficient documentation existed to ensure the quality of the N1 ANSI B31.1 installations subject to the review summarized in Table II. No ANSI B31.1 documentation review was conducted for the additional N1 ANSI B31.1 installations identified later since by then a decision had already been made to rework them to ASME Code requirements.

GENERIC IMPLICATIONS:

This concern has been addressed generically. The combination of the QAIRG Program, the documentation reviews and rework described above provides assurance that sufficient quality records exist to assure that all N1 instruments are in compliance with the applicable criteria of 10CFR50, Appendix B.

SAFETY SIGNIFICANCE:

LP&L recognizes the validity of the concern over whether record requirements for the installation of N1 locally mounted instruments were in complete compliance with 10CFR50, Appendix B. It is believed, however, that the documentation developed as part of the B31.1 installation process was sufficient to demonstrate with reasonable assurance that the quality of construction was such that fuel load and power ascension would not endanger public health and safety. However, to eliminate any doubts regarding the quality of both the 14 locally mounted and four cabinet mounted instruments, they have been reworked, reinspected and documented in accordance with ASME requirements which satisfy the applicable criteria of 10CFR50, Appendix B.

CORRECTIVE ACTION PLAN/SCHEDULE:

The 14 locally mounted and four cabinet mounted instruments were reworked to ASME Code requirements prior to fuel load.

ATTACHMENTS:

Table I - Reasons for Declassifying the 24 Instruments from N1 (Class 1E) to N2 (Non-Class 1E).

Table II - Comparison of Qualifications Documentation of the ANSI B31.1 Portions of N1 Instrument Installations to Documentation Requirements of ASME Section III.

REFERENCES:

None.

TABLE I

REASONS FOR DECLASSIFYING THE 24 INSTRUMENTS FROM N1 (CLASS 1E) TO N2 (NON-CLASS 1E)

TAG NO.	DATE DECLASSIFIED	DOCUMENT DCN NO.	JUSTIFICATION
(1) FIS-CC-5770 A1S (2) FIS-CC-5770 A2S (3) FIS-CC-5770 B1S (4) FIS-CC-5770 B2S (5) FIS-CC-5770 C1S (6) FIS-CC-5770 C2S (7) FIS-CC-5770 D1S (8) FIS-CC-5770 D2S	7/7/83	DCN-IC-1292	These switches provide status of the RCP cooling coils. Switches are not required for safe plant shutdown.
(9) PS HV-5222 AS (10) PS-HV-5222 BS	5/14/81	DCN-IC-421R3	Although these switches are still N1 on the instrument list due to their use in Class 1E circuits, their use (low pressure alarm only) is not required for safe shutdown of the plant. Failure mode of the associated valve is fail-close which is the failsafe position, therefore, the tubing does not need to be N1.
(11) PS CC-3081 (12) PS CC-3082 (13) PS CC-3083B (14) PS CC-3083C (15) PS CC-3083D (16) PS CC-3084A (17) PS CC-3084C (18) PS CC-3084D (19) PS CC-3086	10/8/82	DCN-IC-744R1	Low instrument air indication to non-Class 1E plant computer for information only. Instruments are not required during accident condition.
(20) PS-IA-9740A (21) PS-IA-9740B	10/8/82	DCN-IC-966R1	Low instrument air indication to non-Class 1E plant computer for information only. Instruments are not required during accident condition.

TABLE I

(Continued)

TAG NO.	DATE DECLASSIFIED	DOCUMENT DCN NO.	JUSTIFICATION
(22) PS-CH-224X (23) PS-CH-224Y (24) PS-CH-224Z	9/1/82	DCN-IC-1006R1	These switches (charging pump suction pressure) provide protection from low suction pressure to the charging pumps during normal operation. During accident conditions the switches are bypassed, hence they do not have a Class 1E function. The failure of these switches will not result in an unsafe condition.

TABLE II

COMPARISON OF QUALIFICATION DOCUMENTATION OF THE ANSI B31.1
PORTIONS OF N1 INSTRUMENT INSTALLATIONS TO DOCUMENTATION
REQUIREMENTS OF ASME SECTION III

	DOCUMENTATION AVAILABLE					
	Welded Installations (4)			Non-Welded Installations (8)		
ASME Section III Req	Full Compliance	Partial Compliance	No Compliance	Full Compliance	Partial Compliance	No Compliance
Material Traceability to point of installation		x(1)			x(1)	
Welder Qualified to ASME Sect. IX	x			NA	NA	NA
Welder ID for each weld		x(2)		NA	NA	NA
Fit-up inspection before weld-out			x(5)	NA	NA	NA
Final visual	x			NA(3)		
NDE	NR(4)	NR(4)	NR(4)	NA	NA	NA
Hydro	x(6)			x		

(1) LP&L has CMTRs and/or C of Cs to the material specifications for all fittings/weld rods/ tubing and valves showing that the material meets or exceeds the requirements for ANSI B31.1 installations.
(2) Two of the instrument installations have welder ID on ten of the sixteen associated welds. The other two have their welder ID partially consumed by the welds on all four associated welds; the Weld Control Record in the CCR, though, does provide reasonable assurance as to the welder identity.
(3) Documentation included in hydro packages.
(4) The instruments are P3 which require only a final visual inspection and no liquid penetrant tests.
(5) Not required by ANSI B31.1. All installations are low pressure (less than 30 psi) and fit up is not critical.
(6) LT-SI-0305B and LT-SI-0305D were hydro tested; DPT-HV-5108AS and DPT-HV-5108BS were not hydro tested due to their location across the filters in the suction side of fans E-35 (3A-SA) and E-35(3B-SB), respectively. In addition, instruments installed in HVAC Systems do not require hydrostatic testing in accordance with ASME Section III.

RESPONSE

ITEM NO.: 3 (Final)

TITLE: Instrumentation Expansion Loop Separation

NRC DESCRIPTION OF CONCERN:

As a part of its review of NCRs the staff identified a concern in NCR-W3-7702. This NCR was written as a result of Mercury OCR Package 1782. Drawing 172-L-012-C Revision 4 had a handwritten note on it identifying two lines DPT-RC-9116 SMB (HP) and DPT-RC-9116 SMA (HP) where the separation criteria had been violated. The violation occurs where these instrument lines from different trains leave the tube tracks and form an expansion loop before returning to the continuation of the tube track. Lack of separation could result in failure of redundant lines that could prevent a safety function.

LP&L shall correct the separation criteria violation found in System 52A. They shall also provide a program for review of other safety-related systems for separation criteria violations and take the necessary corrective actions.

DISCUSSION:

This item is concerned with separation criteria deviations which may result when instrument line expansion loops leave their tube track. The violation identified by the NRC has been dispositioned in NCR-W3-7702 [lines DPT-RC-9116SMB (HP) and DPT-RC-9116SMA (HP)] to remove the expansion loops. This permits the instrument lines to be fully protected by their respective tube track. The expansion loops can be deleted because the actual tubing installations contain expanding legs and minimum (absorbing) legs which relieve the thermal stresses. This follows the criteria established on drawing B430 Sheet X23D through X23D.5. The calculations supporting the elimination of the loops are attached to NCR W3-7702. It should be noted that in these cases, the violations, had they remained uncorrected, would not have affected plant safety. The instrumentation was installed solely for the purpose of providing protection for a Reactor Coolant Pump shaft break accident. This event would not generate any conditions such as gravity missiles, pipe whip or jet impingement that would disable these instrument lines.

A full inspection of the instrument lines for the 8 RCP shaft break instruments (DPT-RC-9126SMA through DPT-RC-9126SMD, DPT-RC-9116SMC, DPT-RC-9116SMD, and the remainder of the loops for DPT-RC-9116SMA and DPT-RC-9116SMB not covered in NCR-W3-7702) was then conducted and NCR-W3-7730 was generated to disposition six areas of potential separation violations found on these lines. All were evaluated by Engineering to be acceptable. An additional sample of 45 instrument lines were then identified for reinspection to the separation criteria. This reinspection was documented as a supplement to NCR-W3-7730. The installations identified for reinspection were in areas of congestion where additional separation violations would most likely be found.

In general, the separation requirement is 24 inches between exposed safety channels (N1 and N1) and safety and non-safety (N1 and N3) channels. The specific details and approved exceptions are delineated in Drawing B430 sheet X-23. The results of the reinspection indicate that for the 53 N1 instrument lines inspected under NCR-7730 there were 13 violations out of a total of 276 locations (expansion loops and exposed tubing). The Engineering evaluation of these violations indicate that no rework is required. These 13 violations were evaluated and found to be acceptable due to the lack of external threat (i.e. jet impingement or seismically induced missile) or due to the functional requirements of the instrumentation.

To provide full assurance that no separation criteria deficiencies exist which could affect plant safety a QC verification of all lines where redundant tubing lines were run in proximity to each other was performed. This entailed a walkdown of 72 additional N1 instrument installations. Only one item requiring minor rework was identified during this walkdown.

CAUSE:

The primary cause of this problem was insufficient attention to the specified installation separation criteria by the installing contractor.

GENERIC IMPLICATIONS:

It is evident that the application of the prescribed separation requirements was inconsistent on the part of the installing contractor. However, the review of 51 instrument installations indicates that in the instances where separation deficiencies occur, plant safety is not affected. This is due to the fact that separation was an integral part of the plant layout of equipment, and instrumentation. In addition, followup field verification studies relative to seismically induced missiles, seismic interaction and jet impingement were conducted by Ebasco to ascertain and evaluate external threats to redundant instrumentation installations. Separation criteria relative to electrical raceways has been reviewed by physical walkdowns and documented in the Final Report submitted to the NRC on Significant Construction Deficiency (SCD) 105; interdiscipline separation criteria were evaluated under the Interdiscipline Clearance Criteria program initiated in response to Violation No. 2 as noted in NRC Surveillance Report No. 83-13 dated 4/13/83. An evaluation of the overall QA program in regard to Mercury is contained in the Response to Concern 23.

SAFETY SIGNIFICANCE:

LP&L acknowledges that there were instances where separation criteria were not complied with. As indicated above, however, LP&L has reinspected approximately 130 N1 instrument lines including all those judged to have the potential for separation violations. A small number of violations were identified but only one was considered to have safety significance after engineering evaluation. The instrument tubing involved in this case has been reworked to meet separation criteria. The only other rework performed was the removal of the expansion loops on the RCP shaft break instrumentation described above. On this basis, this concern presents no constraint to fuel load or power ascension.

CORRECTIVE ACTION PLAN/SCHEDULE:

All reinspections and required rework associated with this concern have been completed.

ATTACHMENTS:

None.

REFERENCES:

NCR-W3-7702
NCR-W3-7730

RESPONSE

ITEM NO.: 4 (Final)

TITLE: Lower Tier Corrective Actions Are Not Being Upgraded to NCRs

NRC DESCRIPTION OF CONCERN:

The staff reviewed the Corrective Action system to verify if lower tier corrective action documents were being properly upgraded to NCRs as required by 10 CFR Part 50, Appendix B Criteria XV and XVI. Specifically the staff looked at a number of Field Change Requests (FCRs), Design Change Notices (DCNs), and Engineering Deficiency Notices (EDNs) selected from printouts of safety-related equipment and systems document issuance logs. The selected documents were reviewed for content and basis for issuance (i.e. before the fact design change or after the fact nonconformance). Finally a walkdown was performed to verify proper identification and change control completion. In addition Tompkins-Beckwith (T-B) Discrepancy Notices (DNs) were reviewed.

As a result of its review the staff found the following issues.

a. Field Change Requests - Sixty-three FCRs and 21 revisions to FCRs were evaluated. It appears as though 35 should have been NCRs and another 4 reflected conditions that may have warranted an NCR. The list below provides examples of FCRs that should have been NCRs.

F-MP-1818	F-AS-1631
F-AS-3698	F-E-3089
F-AS-3648	F-MP-2138
F-AS-2338	F-MP-2151
F-MP-1434	F-E-2288

b. Design Change Notices - Fourteen DCNs and 5 revisions to DCNs were reviewed. It appears as though 4 of those should have been upgraded to NCRs. Listed below are examples of these.

DCN-703 and Revision 1
DCN-IC-478
DCN-ME-30
DCN-E-790

It appears as though the problems identified in DCN-703 are related to FCR-MP-2138 and may have been reportable under 10 CFR Parts 21 or 50.55(e).

c. Engineering Discrepancy Notices (EDNs) - Seventy-six EDNs were reviewed for proper identification and control. Of those 76, it appears as though 51 of those should have been NCRs. Examples of these are listed below.

EDN-EC-1476
EDN-EC-1548
EDN-EC-1502
EDN-EC-1479

In addition during the review, another 35 were "voided" with no action taken. The voiding action was performed by a clerk. Examples of voided EDNs are as follows:

EDN-EC-0630
EDN-EC-1175
EDN-EC-1176
EDN-EC-1140

d. Tompkins-Beckwith - The staff reviewed a sample of the handling of information requests and Discrepancy Notices by Ebasco. As a result of that review it appeared that a number of these items should have been upgraded to NCRs. Examples of these are listed below.

W-6519	W-5755
W-6183	W-742
W-6322	W-5917
W-3656*	W-381
W-1876	W-5824*
W-4112	W-5047
W-5692	W-5416
W-6243	W-5916
W-6349	W-2105
W-728*	W-4968*
W-4648	W-4969*

The asterisked (*) items all related to incorrect heat numbers being entered incorrectly or clerical errors being made on rod slips.

In summary, the staff found that the QA program requirements for nonconformance identification, control and proper action do not appear to have been complied with.

LP&L shall review all FCRs, DCNs, EDNs, and T-B DNs to assure that proper corrective action was taken, including an adequate review by QA. This action shall include the steps required by 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, and for Construction Deficiency Reporting, 50.55(e). Also included in this review shall be the examination of improper voiding of all other design changes or discrepancies notices that affected safety-related systems or that were misclassified as non-safety related.

DISCUSSION:

To confirm that the requirements of 10CFR 50 Appendix B, Criteria III, XV and XVI and 10CFR50.55(e)/10CFR21, as applicable to FCRs, DCNs, EDNs and T-B DNs, were met, LP&L has taken the following actions:

° A review of the FCR's/DCN's and lower tier documents identified by the NRC has been performed to determine if the conditions described should have been processed as an NCR. Any determined to have warranted such processing were then reviewed for safety significance under the reportability criteria of 10CFR50.55(e) and 10CFR21.

- A similar review was performed on a sample of approximately 900 lower tier documents and FCR's/DCN's.

- The voided EDNs identified by the NRC were reviewed to ensure that proper actions had been taken or that voiding was proper. An additional sample of 49 voided EDNs was reviewed in the same manner.

- A sample of over 160 EDNs were reviewed to determine if the proper safety classification had been assigned.

- All 145 Mechanical (M) and Welding (W) voided T-B DNs were reviewed to ensure that proper actions had been taken or that voiding was proper.

In the discussion that follows, the results of these actions as well as a description of the size and type of sample reviewed will be presented. An overview of the lower tier reporting system as well as the processing of DCNs and FCRs is provided as Appendix A. The discussion together with the appendix demonstrates that, although interpretive errors allowed a small percentage of conditions that should have been dispositioned on an NCR to be processed on another document, adequate procedural quality safeguards existed such that high confidence exists that conditions of safety significance received the proper evaluation and reportability review. Of the documents reviewed none met the criteria for reportability of 10CFR50.55(e) or 10CFR21. In addition, no plant hardware changes were required as a result of this review.

I. <u>REVIEW OF LOWER TIER DOCUMENTS AND FCRs/DCNs IDENTIFIED BY THE NRC</u>

In addition to those items specifically cited in the NRC DESCRIPTION OF CONCERN, the NRC subsequently provided a list to LP&L of uncited lower tier documents and FCRs/DCNs which the NRC identified as potentially warranting processing as an NCR.

A review of these documents was performed by Ebasco to determine if any warranted processing as an NCR, and if so, whether the condition described met the criteria for safety significance and reportability in accordance with 10CFR50.55(e) and 10CFR21.

In addition, a joint committee, headed by LP&L (two LP&L and two Ebasco engineers) conducted an indepth evaluation of the 121 documents identified by the NRC. This committee determined how many documents warranted processing as an NCR; reviewed all documents pursuant to 10CFR50.55(e) and 10CFR21; and determined how many FCRs/DCNs had been appropriately preceeded by a construction field document. These field documents were then reviewed to ensure that they were being used to identify in-process constructability problems and not "after the fact" deficiencies.

The committee identified the following two items which required retesting or reverification:

- FCR-MP-2151 - This FCR was developed to add a one inch isolation valve upstream of a damaged regulator valve during RCS hydrostatic testing. These valves are located in a branch line (sample line) off of the pressurizer surge line. Our review indicated that the regulator valve was subsequently repaired. However no documentation was available to substantiate that six welds on line 2RC3/4-051A/B-2 had been hydrostatically tested.

On October 2, 1984 Ebasco initiated Condition Identification and Work Authorization (CIWA) - 19024 to test the welds. On October 4, 1984, all welds were hydrostatically tested and confirmed to be acceptable.

- EDN-EC-1595 - Satisfactory documentation could not be located to show proper closure of this EDN. The EDN required specific QC signoffs for wiring modifications performed within the Process Analog Control (PAC) system panels CP-42 and 49.

  Since some of the individual signoffs were not done initially, the EDN required that LP&L perform a QC check on the terminations. On September 25, 1984 two CIWAs were developed to perform the specific wiring verifications and to evaluate any noted discrepancies. After verification of all terminations, and by utilizing referenced DCNs to determine subsequent changes, all wiring was confirmed to be correct.

The following are the overall results of the reviews for documents questioned by the NRC:

- Of the 36 identified FCRs, six (6) were judged to have warranted processing via an NCR; none was judged to meet the criteria for reportability per 10CFR50 55(e) and 10CFR21.

- Of the seven (7) identified DCNs, none were judged to have warranted processing via an NCR; none was judged to meet the criteria for reportability per 10CFR50.55(e) and 10CFR21.

- Of the 55 identified EDNs, two (2) were judged to have warranted processing via an NCR; none was judged to meet the criteria for reportability per 10CFR50.55(e) and 10CFR21.

- Of the 23 identified T-B DNs, two (2) were judged to have warranted processing via an NCR; none was judged to meet the criteria for reportability per 10CFR50.55(e) and 10CFR21.

- Of the 43 design documents (36 FCRs and 7 DCNs) reviewed, 40 should have appropriately been preceeded by a lead field document. Of these, seven (7) either did not have a lead field document or the field document identified a nonconformance instead of a constructability problem. Two of these 7 design documents were non-safety related.

Details of the evaluation of the cited examples are contained in Attachments 1 and 2.

II. RANDOM SAMPLE OF LOWER TIER DOCUMENTS AND FCRs/DCNs

A sample size of approximately 900 documents was initially reviewed by Ebasco from a total population of approximately 32,000 documents. Except for the fact that only documents pertaining to safety-related components, structures or systems were chosen, the sample was random.

The objectives of the review were to:

- Determine if the condition described on the document should have been processed as an NCR, and

If so, did the condition meet the criteria for safety significance and reportability as defined in 10CFR50.55(e) and 10CFR21.

The review was conducted by experienced engineers familiar with the Waterford-3 design. The initial evaluation was checked by another reviewer. If it was judged that the condition should have been upgraded to an NCR, Ebasco Licensing and QA performed a review for safety significance and reportability. These results were further reviewed by two committee representatives (LP&L committee chairman and an Ebasco representative).

Of the total documents reviewed, it was judged that 39 (4%) should have been processed as an NCR. However, the disposition for these 39 documents was, in all cases adequately evaluated and documented. Additionally, none of the document-described conditions were considered to meet the criteria for safety significance and reportability in accordance with 10CFR50.55(e) and 10CFR21.

III. REVIEW OF VOIDED DOCUMENTS

To address the apparent NRC concern that improper voiding of documents may have caused the identified conditions to go unresolved, LP&L and Ebasco conducted a sample review of EDNs and a total review of T-B "M" and "W" DNs. In addition, LP&L identified that voiding of EDNs was never procedurally allowed and voiding of T-B DN's was only allowed after August, 1981.

LP&L reviewed 53 of a total of 222 voided EDNs. These documents are identified in Attachment 3. The review indicated that the EDNs were voided because either they were not an actual deficiency or were subsequently resolved by other means. Based on the review of the 53 voided documents, there is a confidence level of 95% that 95% of the unsampled voided EDNs contained no safety significant issues.

A total of 145 "M" and "W" T-B DNs were voided. Of this total, 13 were voided because they were found to be non-safety related and required no further review. Sixteen of the DNs had been voided because they were upgraded to NCRs. The balance of voided DNs (116) were voided for one of the following reasons:

1) The review concluded that no discrepancy existed.

2) Misinterpretation of procedures by inspectors.

3) Premature inspection of in process work.

4) Duplication of lost DNs where original was later found.

5) Code Case acceptance.

Voiding of design changes (DCNs, FCRs) does not represent a safety issue in that final plant configuration must be in accordance with final design specifications and drawings. If a potential design change was voided, the change was not implemented and the design configuration must still be in accordance with the latest revision of the drawings.

Based on the above reviews, LP&L believes that the voiding of these documents does not represent a significant safety issue.

IV. REVIEW FOR PROPER SAFETY CLASSIFICATION

The NRC also requested that LP&L evaluate the document types in the concern to assure that non-safety related discrepancies/changes were not misclassified. As noted on Figure 1, correct DCN/FCR classification was reviewed and accepted by Construction Engineering and Design Engineering. These reviews provided adequate assurances that design documents were classified properly.

The TB-DN procedure did not differentiate between safety and non-safety related. All DNs were procedurally required to be reviewed by QA for upgrading.

EDN processing was slightly different. Non-safety discrepancies did not normally receive QA review. For this reason LP&L has sampled 163 out of the approximately 1200 non-safety related EDNs to determine if: 1) they were classified correctly and 2) if they were misclassified, was the discrepancy a significant safety problem. The results of the sample showed that none of EDNs were misclassified. On that basis, there is a confidence level of 95% that 98% of the total non-safety related EDN population was classified correctly. Based on this sample LP&L believes that no further review is warranted.

CAUSE:

The cause of the concern was due to the utilization of several specialty contractors with individual QA programs. The corrective action sections of these programs did not standardize the definition and use of NCR. This lack of standardization caused a minor number of interpretive errors to be made. Interpretive errors led to processing a small percentage of conditions on a lower tier document or FCR/DCN that should have more appropriately been dispositioned on an NCR.

GENERIC IMPLICATIONS:

The potential generic implications of this concern were that significant conditions adverse to quality and safety may not have been properly evaluated, corrected, and reported in accordance with Criteria XVI of Appendix B to 10CFR50 and 10CFR50.55e/10CFR21.

The review conducted has provided LP&L with a high level of confidence that such conditions have been processed properly.

CORRECTIVE ACTION PLAN/SCHEDULE:

LP&L feels that no further action is necessary for items that should have been upgraded to NCRs. Our review has shown that the dispositions and corrective actions defined on lower tier documents were adequately evaluated and properly documented.

With respect to procedural violations identified during the review, LP&L is highly confident that present programs as implemented by Nuclear Operations should preclude recurrence. Since the operation phase will not utilize the number of subcontractors required during the construction phase, the QA program will be inherently less complex. As presently structured, the operations QA program is designed to implement the requirements of 10CFR50, Appendix B, Criteria III, XV, and XVI. The approved QA program is outlined in chapter 17.2 of the FSAR and implemented by well defined procedures and management controls. In addition Nuclear Operations and Nuclear Services have implemented programs to meet the legal reporting requirements defined in 10CFR parts 20, 21, 50, 70 and 95. LP&L will provide a more in depth discussion of the overall QA program in the submittal that discusses the collective significance of the 23 NRC items of concern.

SAFETY SIGNIFICANCE:

The reviews described above reached the following conclusions:

- No conditions were found which required physical plant changes.
- No lower tier or design documents (FCRs/DCNs) that were judged to warrant processing as an NCR described conditions which, if left uncorrected, would adversely affect plant safety.
- The dispositions and corrective actions defined on the lower tier documents that should have been upgraded to NCRs were conservative and correct. Upgrading the documents would not have changed the dispositions or corrective actions.
- The sample of lower tier documents discussed in Section II was random and consisted of over 900 documents out of a total of approximately 32,000. The basic concern relates to the ability of the hardware to perform its intended safety function. For statistical purposes, therefore, a defect is defined as an instance in which, as a result of the review, a hardware deficiency was identified which, if left uncorrected, would adversely affect safety. No such defects were found and on that basis there is a confidence level of 95% that 98% of the total population neither describe conditions that have safety significance nor meet the reportability criteria of 10CFR50.55(e) and 10CFR21.

LP&L therefore believes that this concern has been adequately addressed and should not be considered a constraint to fuel load or power operation.

ATTACHMENTS:

1) DCNs/FCRs Cited by NRC

2) Evaluation of T-B DNs and EDNs

3) Voided EDNs

Appendix A: Overview of Lower Tier Documenting Reporting System and Processing of FCRs/DCNs.

ATTACHMENT 1

DCNs/FCRs CITED BY NRC

FCR/DCN NO.	RESOLUTION/COMMENTS
FCR-MP-1818	This FCR and NCR W3-3897 were written within one day of each other. TB-182 (NCR) initiated W3-3897. The FCR provided dimensional information for the NCR disposition of "replace". Drawings G-204-S7 provides evidence of FCR implementation. This item is not considered reportable.
FCR-AS-3698	This field change was generated to revise plate and bolts to accomodate as-built condition. DN-SQ-0924 was developed which subsequently caused CEIR-090 to be written. CEIR-090 was submitted and caused development of FCR-3698. The item is not considered reportable.
FCR-AS-3648	Several design and corrective action documents were associated with this support. Support deficiencies were initially identified by an NCR. This NCR appears to have been closed prematurely, however subsequent design documents corrected the conditions. FCR-AS-3648 was issued to accomodate the "as built" condition developed by the previously written NCR and design documents. The item is not considered reportable.
FCR-AS-2338	No NCR was generated. Based on definition, an NCR should have been generated since a prefabricated piece of structural steel was shop released and incorrect. This item is not considered reportable.
FCR-MP-1434	Two TB-IRs (4559, 5356) properly identified and documented the incorrect installation of the Dravo spool piece. The installation error is significant due to the piping segments safety function and should have been written as an NCR prior to shipment of the piping assembly. Additionally the spool, as initially installed, caused further fit up problems which had to be corrected to affect proper piping alignment. The disposition for the IRs is conservative and properly documented on the FCR. The item is significant but not reportable since construction controls were in place to prevent the improperly installed spool from going uncorrected.

ATTACHMENT 1
DCNs/FCRs CITED BY NRC
(Continued)

FCR/DCN NO.	RESOLUTION/COMMENTS
FCR-AS-1631	Original cracks were repaired via NCR W3-1548. Continued attempts at the repairs required by W3-1548 still resulted in cracked weld. FCR AS-6131 was generated to allow alternate configuration to eliminate cracking at this joint. This item is not considered reportable.
FCR-E-3089	An NCR was written on this matter. NCR-5371 revealed that the enclosures for reactor coolant pump speed sensor amplifiers had been replaced. Apparently heavy corrosion had been noted. Stainless enclosures were substituted for carbon steel. Subsequently, Ebasco performed an unauthorized modification which negated the NEMA Type III requirements for a weather proof enclosure. The FCR was generated to document the enclosure change and gasket replacement. The plant contains 24 sensor amplifiers. 16 are considered safety related since they feed safety channels for the Core Protection Calculator (CPC). However, failure of the amplifiers signal due to environmental effects would cause a reactor trip, but not prevent a trip. Therefore the stated condition does not represent a significant deficiency that could adversely affect the safe operation of the plant.
FCR-MP-2138 DCN-MP-703	This item was identified by NCR-W3-4739. In addition several CIWAs were generated to implement corrective actions. The cause of the cracking was due to overtorquing of the valves to limit RCS leakage prior to hydrostatic testing. The valves were replaced and tested satisfactorily. Although, this deficiency is not considered reportable it was noted that the NCR was inadequately evaluated during the time of occurrence. The condition was evaluated with only one failure noted. After the addition of 13 valves to the NCR the condition was not immediately re-evaluated by Ebasco. During our review Ebasco Engineering and LP&L Engineering concluded that the condition was not reportable pursuant to 10CFR50.55(e) and 10CFR21.

ATTACHMENT 1
DCNs/FCRs CITED BY NRC
(Continued)

FCR/DCN NO.	RESOLUTION/COMMENTS
FCR-MP-2151	The FCR added a manual valve upstream of a damaged regulating valve to facilitate cold hydro testing. Documentation was available to document repair of the regulating valve; however no documentation was available to substantiate the hydrotesting of six welds in line 2RC3/4-051A/B-2. Subsequently, the line was hydrotested successfully. A more detailed explanation of this FCR is contained in the body of the response. This item is not considered reportable.
FCR-2288	This FCR was written in response to RFI-4143 which requested additional cable pull clarification. These cables are non-safety. This item is not considered reportable.
DCN-IC-478	This DCN involved retagging of instruments in the warehouse based on an inventory survey. Subsequent to the inventory survey, a DN was generated to document discrepant tag numbers based on a revised EMDRAC drawing. The DN (MC-3188) was dispositioned to change the tag numbers based on procedure ASP-IV-54, a DCN was not necessary. The tags have been changed and the DN is closed. QA documentation reflects revised tag numbers. This item is not considered reportable.
DCN-E-790	This DCN was written as a result of CIWA 820056 which revealed a disparity between design documents. This circuitry is not safety-related. This item is not considered reportable.
DCN-ME-30 R1	This DCN was generated to document the as-built condition reflected in DCN-IC-1415 R1. DCN-IC-1415 R1 revised the model number for the ASCO solenoid from NP 831664E to NP 831665E. The difference between these two types of solenoids is that the 665E model has an explosion proof and watertight enclosure while the 664E model only has a watertight enclosure. Both models are environmentally and seismically qualified. The change represents an upgrade based on ME-30 requirements. This item is not considered reportable.

ATTACHMENT 1
DCNs/FCRs CITED BY NRC
(Continued)

The DCNs/FCRs cited by the NRC were evaluated individually in this attachment. In 2 cases an NCR should have been written to document the discrepancy based on definition. However, there is no safety significance with respect to 10CFR50.55 (e)/21. In other cases, a corrective action document had been previously written, the item was nonsafety-related or the condition was identified on a pre-approved design document.

ATTACHMENT 2

EVALUATION OF T-B DNs AND EDNs

W-381 - Welds painted prior to visual examination and dispositioned by Ebasco letter. The welds are not safety-related.

W-728 - Hold Point for ANI bypassed. An additional LP examination was subsequently performed with ANI present. Discrepant condition brought back to requirements by additional testing.

W-742 - Electric power off for an unknown time (weld rod ovens). Disposition by T-B welding engineer assured that rod would be held at correct temperature for required time prior to issuance. Discrepant condition brought back to requirements. (Response to Concern 22 addressed this issue).

W-1876 - Post Weld Heat Treatment not verified for FW5R1 by QC. Records were subsequently generated by involved craft per disposition.

W-2105 - Bypassed ANI hold for fit-up inspection. Four additional reviews were procedurally required including the ANI review of completed 11008 & 11009 forms for acceptability.

W-4112 - Coupling installed not in conformance with MP-488R1. DCN MP-488 required the addition of 6000# couplings to an MSIV Bypass line. Apparently 3000# couplings were incorrectly installed. This DN documented and identified the problem and requested design information. 3000# couplings were subsequently documented via redline procedures and was approved and the DCN and DN closed.

W-5047 - Incorrect weld procedure used. Weld procedure which was used was metallurgically compatible. The disposition was conservative and correct.

W-5416 - Two DNs and NCR 4010 were affiliated with this deficiency. The DN listed several welds that were deficient due to documentation problems. The problems were identified as part of the DN-T-2474, NCR-4010 support walkdown program. (NCR-4010 was upgraded and reported as SCD-60 which is still open).

W-5692 - No RT performed on base metal repair area. The DN was initiated to identify the need for RT instead of visual and PT examination specified on 2 previous DNs. This condition should have been written as an NCR. However, the DN disposition was conservative and not considered reportable.

W-6183
W-6322
W-6519 - These DNs identified that flanges were torqued at values outside of the calibrated torque wrench range. However, specific torque values are not required by Code. These flanges were checked for leakage as part of system hydrostatic testing and were acceptable.

W-6243 - A non-conservative interpass temperature of 600°F versus 350°F was specified on a weld record. Due to the type of weld involved (Bimetallic), the process involved and the documented welder training, neither interpass temperature would have been expected to be exceeded.

W-6349 - Gap between lug and pipe clamp unacceptable per FCR 1553. Gap was evaluated by Ebasco per NCR 4010 program and accepted.

W-3656,4648, 4968,4869, 5755,5824, 5916,5917 - These DNs indicated clerical errors in transcribing heat numbers or filler material on to QA documentation. Based on evaluation of material dispursed by rod room, the justification for maintaining the position that a clerical error existed appears well documented and logical. The error both individually and collectively, is not considered safety significant.

EDN-EC-1479 - Material documentation on a hanger was unavailable on the four snubbers. A supplement to the purchase order was developed to require QC review of the documentation. The snubbers were released after documentation requirements were resolved.

EDN-EC-1476 - Root pass LP was not performed. Final UT inspection was performed which volumetrically accepted the weld. This item did not represent an AWS code violation.

EDN-EC-1548 - Small nicks on cable jacket. The condition was corrected by repairing the cable to design/installation criteria.

EDN-EC-1502 - An EDN should not have been issued. Conduit installed through other penetrations was allowed per design drawings (B-288) as long as cable identification was maintained.

Conclusions:

LP&L's evaluation of the cited EDNs/DNs indicates that one case, by definition, should have been upgraded to an NCR. In this case, evaluation was performed by the appropriate groups including the quality assurance organization. The DN that should have been upgraded is not considered safety significant.

ATTACHMENT 3

VOIDED EDNs

- 53 voided EDNs were reviewed
- of the 53, 17 were written against safety equipme:

EDN NO.	DESCRIPTION	RESOLUTION*
EC-0630	Inadequate drainage at -35 (RAB).	The EDN identified a non-safety/ non-seismic plumbing problem. Further action was required to correct drainage problems throughout the plant. This action was accomplished by a contractor in late 1983 and early 1984 under the CIWA program.
EC-1149	Potential Damaged Tubing.	The EDN was voided because the tubing damage was previously addressed and closed out on EC-1136.
EC-1431	Unable to Locate SF-83-4-5.	The Service Form was subsequently located.
EC-1104	Scale Change on Recorder JR-RC-005/006.	A scale change was identified by CIWA 832097 and corrected by DCN-ICP-540.
EC-1392	HPSI Pump on Lower Guard.	The coupling guard bolts (non-safety) on HPSI pumps were not completely snugged down. Potential Problem Report #244 was transmitted to LP&L. The PPR was closed by LP&L via CIWA 18006.
EC-1393	Valve Stem Protector 2SI-V1544B4.	Valve stem protector lengthened. No discrepancy exists.
EC-1175	Material On Hold.	Problem addressed in EDN-1175 as it pertains to proper control, storage and segregation of permanent plant material was resolved on DN-MC-5223.
EC-1176	QC Vol. AG WQC.1.	DN-1176 identified a potential warehouse inspection problem. Warehouse inspection forms were retrieved which indicated inspection.
EC-1347	Conduit Installation CP-6.	DCN-E-1024 was developed to implement the installation change.

ATTACHMENT 3
(Continued)

EDN NO.	DESCRIPTION	RESOLUTION*
EC-1350	Box 31008-SB & 31009-NAB are not installed per DCN-E-1100.	FCR-E-3253 was issued to correct the installation.
EC-917	Hilti Bolt for valve 2SI-V804A/B pulling out of concrete.	Based on field inspection, no discrepancy exists.
EC-1140	Operators interchanged for 3FW-V6074 & 6CD-V343.	Potential Problem Report 0245 was submitted to LP&L. Operators were not interchanged, tag on operator must be changed based on Pacific Valve Inc. Electric Motor Operating Testing Report dated 12/20/79. This report identified operator S/R 240727 as belonging to tag 3FW-V607A. Valve 3FW-B605B does not have operator. Limitorque motor operator for 6CD-V343 must also be corrected. The PPR was closed by LP&L via CIWA 10055.
EC-1205	Exposed Hilti and Core Hole 762.	Based on field inspection, no anchor plates existed in the described area. Discrepancy invalid.
EC-1110	Foundations for Fans E-22 A&B.	Based on field inspection, no discrepancy exists.
EC-0584	Cable Reel number change.	NCR-2833 was generated. The DN should have been closed.
EC-1502	Conduit Installations	As noted on Attachment 2, the conduit installation was allowed per B-288 drawings.
EC-1802	Tubetrack	Identified that several short Ell shaped cantilevers existed on tubetrack. FCR-ICP-654 was subsequently issued to define the engineering disposition.

All voided EDNs (cited) were evaluated in this attachment. In no case was an NCR required that was not generated. None of the problems identified in the EDNs have any safety significance as defined in 10CFR50.55(e) or 10CFR21.

APPENDIX A TO CONCERN NO. 4

OVERVIEW OF LOWER TIER DOCUMENT REPORTING SYSTEM AND PROCESSING OF FCRs/DCNs

During the initial design and construction phase LP&L established and implemented an approved QA program to evaluate discrepant and nonconforming conditions. This program was implemented throughout the construction phase of the project. In addition, Corporate procedures required that individuals within the various organizations report all discrepant conditions for proper evaluation, including 10CFR50.55e and 10CFR21 (Ebasco Procedure N-23) consideration.

The lower tier reporting system contributed to plant safety in that it allowed engineering, QA personnel and management to properly focus on issues of safety significance, evaluate their generic implications and trend performance. In the final analysis, however, judgement and interpretation was made on many conditions that came close to meeting the criteria for processing as an NCR.

Our review has demonstrated that based on a strict interpretation of the definition of nonconformance, such judgements were not always appropriate. It has also shown, however, that the program requirements which delineate the identification, processing and review guidelines for these lower tier documents as well as for DCNs and FCRs provided adequate safeguards such that significant safety problems received the review, evaluation and management visibility required by Criteria XVI of Appendix B to 10CFR50.

DN, EDN Processing and Review

Deviations from design criteria and specifications were generated from Engineering/QC inspections, whether by Ebasco or other contractor personnel. Ebasco/Contractor procedures require that these conditions be identified by discrepancy notices (e.g. EDNs and T-B DNs). Discrepancy notices, by procedures, were evaluated and dispositioned within the contractor's organization by Construction or QC.

In each case (DN, EDN), the responsible QA organization was required by procedure to review the recommended disposition to ascertain if the DN, EDN should have been upgraded to an NCR. If an NCR was written, the DN/EDN was closed. If QA agreed that the concern could be addressed properly on a DN, it was processed for corrective action and verification.

The processing and review of contractor DNs and Ebasco EDNs was very similar to the processing of NCRs with respect to evaluating organizations and review. Procedures clearly identified the appropriate evaluating organizations and formed an integral part of LP&L's Quality Program. Identification, control, and proper action, with respect to deviations design and installation requirements, were controlled by these procedures. (Attachment A-1) summarizes this processing and review cycle. Attachment A-2 summarizes these procedures with the responsible organizations for the processing and review of these documents.

The attachments demonstrate that whether a condition was originally documented as a DN or EDN, as opposed to an NCR, it received a quality review. Such a review effectively acted as a "safety net" for conditions with safety significance. Although occasional interpretive errors were made, the probability of conditions with safety significance not being processed on the appropriate level document was very low. Similarities in the review cycle are as follows:

- Condition identified by QC or inspection group
- Dispositioned by Construction, ESSE or QC
- QA supervisor or designee determined, by an interpretation of definition, if upgrading was required.
- QA/QC signature required/Engineering Inspector Signature
- Verification of disposition by inspection (EDN - Engineering Inspector/QC, DN-QC)

FCR/DCN PROCESSING AND REVIEW

Changes to design were generally initiated from three areas; information and new regulations received from regulatory agencies, field requests, and in-house design reviews which included vendor information received which was incorporated into design drawings and specifications. In house reviews and regulatory information were evaluated and directly transcribed onto a DCN or FCR. Field information was typically received via contractor documents such as an Information Request (IR) or a Request For Information (RFI). These requests were "in process" construction documents which provided the contractor with a documented system to request clarification, detailed information, or to advise the engineer of constructability problems.

DCNs and FCRs were used to advise the field of engineering approved changes to Ebasco design. These documents, when issued, carried the same impact and importance as design specifications and drawings. They were not considered "lower tier" documents. As discussed below, they received a level of review commensurate with the design change. They were not used in lieu of DNs, EDNs or NCRs for documenting and dispositioning design discrepancies. Utilization of DCNs/FCRs minimized original drawing revisions and were used as an interim modification until design drawings are "as-built".

It was the responsibility of the Lead Discipline Engineer to determine if the changes had a safety impact as defined in Ebasco Engineering Procedure E-69 entitled "Design Change Notice - Field Change Request". As defined in E-69, major and minor changes which affect safety-related aspects of the plant were processed, reviewed and documented in accordance with Topical Report ETR-1001, Section QA-I-4, Design Control (see Figure A-1). Processing of FCRs initiated by Construction included review and acceptance by Engineering. As in the case of DCNs, Engineering was responsible to verify that the change did not affect safety related aspects of the equipment/system. If the change affected safety, it was processed as defined in QA-I-4.

No documented review of DCNs/FCRs was required for 10CFR50.55e or 10CFR21 applicability. However, Engineering was responsible to meet the requirements of Ebasco Procedure N-23 "Reporting a Defect/Noncompliancy to the NRC". This procedure required each employee to consider the effect of deviations to design and procedures and to report these types of deficiencies for evaluation as potentially significant deficiencies. The supervisor responsibilities required contact with QA for this preliminary evaluation. This procedure, by requiring QA input, made it similar to processing DNs/EDNs. Attachments A-1 and A-2 detail the processing and review cycle for DCNs and FCRs. Based on our review, there were cases where a DCN/FCR described a condition that warranted processing an NCR. However, none of these cases were considered safety significant with respect to 10CFR50.55e/21.

MATRIX FOR
PROCESSING AND REVIEW OF
NONCONFORMANCES (NCRs)
DISCREPANCIES (DNs)
ENGINEERING DISCREPANCIES (EDNs)
DESIGN CHANGE NOTICES (DCNs)
AND
FIELD CHANGE REQUESTS (FCRs)

DOCUMENT	GENERATED BY INSPECTION PERSONNEL (QC OR ENGR)	DISPOSITIONED BY CONSTRUCTION OR QC	REVIEWED BY QA (EBASCO OR CONTRACTOR)	VERIFICATION OF CORRECTIVE ACTION BY QA/QC	PROCEDURE REFERENCE
DN (Ebasco)	Yes	Yes	Yes (Note 1)	Yes	WQC-150
DN (Contractor-Typical)	Yes	Yes	Yes (Note 1)	Yes	TB Procedure TBP-12
DN (Contractor-Typical)	Yes	Yes	Yes (Note 1)	Yes	Gulf Procedure PR 15.0
EDN	Yes	Yes	Yes (Note 1)	Yes or Engineering Inspector	ASP-IV-70
NCR	Yes	Yes (or ESSE)	Yes	Yes	ASP-III-7
DCN	No	Yes	As Req'd. by Procedure	N/A	Engineering Procedure E-69
FCR	No	Yes	As Req'd. by Procedure	N/A	Engineering Procedure E-69

NOTE 1: Review by QA for Upgrading to NCR

ATTACHMENT 1A

REVIEW OF CITED/UNCITED DCNs

NUMBER	RESOLUTION
AS-421, R2,R1,R0	MODIFY SUPPORT FOR RCRR-13 This DCN originated without a corrective action document because of revised loads. This is a normal design function and not a deficiency. Not considered a reportable item.
E-703	UPDATE PDMDs TO CONFORM TO CCL & CWD CEIR-558 and RFI-4265 identified and documented the fact that CCL did not list routing as did the CWD for four cables. DCN-E-703 was issued to correct the problem plus perform 5 additional design functions. Not significant and not considered reportable.
E-758	MISCELLANEOUS CHANGES This DCN was developed to incorporate various design changes and to perform initial design work for TMI items. Not significant and not considered reportable.
IC-478	INSTRUMENT TAGGING This DCN was developed in response to a survey conducted on instruments in storage. (Def. 79-1-74) The DCN was used to update and correct design documents. A copy of completed corrective actions for the referenced survey is available. The item is not significant and not considered reportable.
ME-30	NUREG-0588 SOLENOID REPLACEMENT This DCN was initiated to implement initial action upgrading solenoid valves to requirements defined and committed to by LP&L in accordance with guidance provided in NUREG-0588. No deficiency existed.

ATTACHMENT 1A

REVIEW OF CITED/UNCITED DCNs

NUMBER	RESOLUTION
MP-703	CRACKED VELAN VALVES
	This item was identified by NCR-W3-4739. In addition several CIWAs were generated to implement corrective actions. The cause of the cracking was due to overtorquing to limit RCS leakage prior to hydrostatic testing. The valves were replaced and tested satisfactorily. Although this deficiency is not considered reportable it was noted that the NCR was inadequately evaluated during the time of occurrence. The condition was evaluated with only one failure noted. After the addition of 13 valves to the NCR the condition was not re-evaluated by Ebasco Engineering and LP&L Engineering. Both groups concluded that the condition was not reportable pursuant to 10CFR50.55(e).

<u>ATTACHMENT 1B</u>

REVIEW OF CITED/UNCITED FCRs

NUMBER	RESOLUTION
AS-1605	MODIFICATION OF RAB MONORAIL SUPPORT DETAILS The FCR was generated because of eight American Bridge IRs. (Attached) These IR identified field interferences which required engineering evaluation. The items are not significant and are not considered reportable.
AS-1606	MODIFY PIPE WHIP RESTRAINT R-RC-12-16A A TB-IR (3975) properly identified and documented the deficiency. Subsequently FCR-AS-1606 was developed and later voided in lieu of FCR-AS-1600. FCR-AS-1800 appears to have provided a better engineering fix. This item is not significant and is not considered reportable.
AS-1631 R1	GUSSET CONNECTION TO BASE PLATE Originally NCR-W3-1548 documented the cracking problem. Subsequently AS-1631 R1 was development as an engineering solution since it was apparent that the previous design would not preclude cracking. The item is not considered reportable.
MP-2138	SEE DCN-MP-703
E-2671	CABLE ROUTING CHANGE RFI-5095 (Attached) identified the deficiency for evaluation. The item is non-safety, not significant and not considered reportable.
AS-2793	ANCHOR PLATE INSTALLATION The FCR provided evaluation for 5 different anchor installations that were identified on 5 corrective action forms. REI 1702, 1848, 2335, 2386, 2385, 2072. Not significant and not considered reportable.

REVIEW OF CITED/UNCITED FCRs

NUMBER	RESOLUTION
AS-2878	UPDATING VENDOR DRAWINGS The FCR was a followup to DCN-AS-385R1 to update vendor drawings. This item is not significant and is not considered reportable. Deficiencies were identified by CIWAs 824607, 824606.
AS-3247	ANCHOR PLATE INSTALLATION This FCR was developed for five Mercury IR. The IR's approximately identify and document the anchor plate concerns. The FCR provides engineering disposition. The item is not significant and is not considered reportable.
AS-3648	MODIFY DESIGN DETAILS FOR PIPE SUPPORT RCRR-94 Several design and corrective action documents are associated with this support. The chronology is as follows: - 4-19-82 EDN was cancelled - 6-10-82 FCR-AS-2607 initialed to clear NCR-W3-3927 (NCR appears to have been closed prematurely) - 9-26-82 AS-2607 R1 initiated - 12-29-82 AS-207 R2 initiated - 6-11-83 AS-2607 R3 initiated - 8-8-83 AS-2607 R4 initiated - 10-3-83 AS-3512 initiated AS-2604 R3, R4 voided AS-3512 initiated due to TB-IR 07276, CEIR-1215. - 11-7-83 AS-3512 R1 initiated - 11-17-83 AS-3624 initiated by CEIR-1220 - 12-02-83 AS-3648 initiated-referenced AS-3512 R1 and AS-3624 - AS-3648 - FCR appears to have been issued to accomodate the "as built" condition developed by all the previous documentation. Although the paper trail is somewhat complicated the deficiency appears to have been resolved. The NCR should not have been closed 7/28/82. The item is not considered reportable.

REVIEW OF CITED/UNCITED FCRs

NUMBER	RESOLUTION
AS-3674	ANCHOR PLATE INSTALLATION Two corrective action documents (CEIR-IC-513 and REI-3047) identified deficiency anchor installations for engineering evaluation. The deficiencies appear to have been properly evaluated and dispositioned. Not significant and not considered reportable.
AS-3685	ANCHOR PLATE INSTALLATION This FCR was developed as a result of a CEIR-447, DN-Q-101, W-6793 and Q-448. These documents properly identified and documents deficiencies which were reviewed and evaluated properly. Not significant and not considered reportable.
AS-3698	ANCHOR PLATE INSTALLATION Apparently DN-SQ-0924 was developed which subsequently cause CEIR-090 to be written. CEIR-090 was submitted and caused development of FCR-3698. The item is not significant and not considered reportable.
E-1115	CABLE ROUTING CHANGES F&M RFI #CP-1823 identified and documented deficiency. FCR was initiated to correct B288 drawings. Not significant and not considered reportable.
E-2622	MISSING JUMPERS IN REACTOR COOLANT PUMP MOTOR CKT. BOX #4 A corrective action document was not needed in this case. This discrepancy was identified during the course of design work. The design engineer identified the missing jumpers by comparing EMDRACs (vendor drawings) and CWD (Ebasco) drawings and immediately wrote the FCR. This circuitry is non-safety related. Not significant and not considered reportable.

ATTACHMENT 1B (CON'T)

REVIEW OF CITED/UNCITED FCRs

NUMBER	RESOLUTION
E-2977	CABLE SEPARATION WITHIN LCP-43 Results of field design inspections were directly transcribed to FCRs. Since the separation problem was identified as part of design evaluation and controlled no significance is apparent. In addition an REI indicates that the field was properly identifying constructability problems <u>after</u> the FCRs were initiated.
E-3076	CHANGE IN CABLE SEAL ASSEMBLIES RFI 6219 was written to identify that a DCN did not get properly implemented. The RFI should have caused an NCR and FCR to be generated. The item is not considered reportable.
E-3089	REACTOR COOLANT PUMP SPEED SENSOR AMPLIFIER ENCLOSURE MODIFICATION An NCR written on this matter. NCR _______ revealed that the boxes for reactor coolant pump speed sensor amplifiers were originally replaced. Apparently heavy corrosion had been noted. Stainless boxes were substituted for carbon steel. Subsequently Ebasco performed an unauthorized modification negated environmental qualification. The plant contains 24 sensor amplifers. 16 are considered safety related since they feed safety channels for the Core Protection Calculator (CPC). however failure of the amplifiers signal due to environmental affects would cause a reactor trip, but not prevent a trip. Therefore the stated condition does not represent a significant deficiency that could adversing affect the safe operation of the plant.
E-3259 R1, R0	This FCR provided engineering clarification on routing for one cable, a point connection and conduit size. The rerouting was subsequently completed by CIWA 839089 as defined by DCN-E-1007. Not significant and not considered reportable.

REVIEW OF CITED/UNCITED FCRs

NUMBER	RESOLUTION
MP-1037	REJECT WELD ON CLASS 1 PIPING Review of T-B Traveler SI-1130 shows that a partial wall X-ray was done on FW#4 and was rejected due to incompleted fusion of the insert. An Ebasco engineer redlined the weld to be "open-roof" and then issued the FCR. Procedures were followed. No NCR was required. Not a significant deficiency and not considered reportable.
MP-1434	INCORRECT INSTALLATION OF SPOOL PIECE/REACTOR COOLANT SYSTEM Two TB-IRs (4559, 5356) properly identified and documented the incorrect installation of the Dravo spool piece. This spool is within line IRC2-41RL1 which is the charging line to RCS Loop 1A. The installation error is significant due to the lines' safety function and should have been an NCR. The disposition for the IRs is conservative and properly documented on the FCR. The item is significant but not reportable since construction controls were in place to prevent the improperly installed spool from going uncorrected. Additionally the spool, as initially installed, caused further fit up problems which had to be corrected to affect proper piping alignment.
MP-1556 -1935 -1972	ACCEPT AS BUILT CONDITION OF CATEGORY 6 PIPING All three of these FCRs were developed in response to field generated corrective action documents (Ref. TB-IRs or redlines). This piping is non-safety category 6 piping on the discharge side of the pressurizer relief valves. Not significant and not considered reportable.
MP-1747	MODIFY PIPING SPOOL PIECE TO ACCOMODATE FIELD CONDITIONS TB-IR-5984 properly identified and documented this deficiency. FCR-MP-1747 evaluated and dispositioned the item. Not significant and not considered reportable.

ATTACHMENT 1B (CON'T)

REVIEW OF CITED/UNCITED FCRs

NUMBER	RESOLUTION
MP-1818	Apparently this FCR and NCR W3-3897 were written within one day of each other. TB-182 (NCR) initiated W3-3897. The FCR provided dimensional information for the NCR disposition of "replace". Drawing provides evidence of FCR implementation. This item is not considered reportable.
MP-1903	FCR-MP-1903 was developed from Redline #NS-135. This item is considered in process design work. Not significant and not considered reportable.
MP-1924	REROUTE PIPING TO ELIMINATE INTERFERENCE This FCR was initiated by two redline drawings (#565 and 566). The line is non-safety, seismic category 1. The deficiency is not significant and not considered reportable.
MP-2432	REPLACE CLASS II BOLTS AND NUTS ON CLASS I PIPING Originally DN 5533 identified this deficiency. Subsequently the DN was upgraded to NCR 5754. The FCR was generated to provide a suitable alternate for originally specified material. This item is not considered reportable.

ATTACHMENT 1C

REVIEW OF CITED/UNCITED EDNs

NUMBER	RESOLUTION
EC-002	EMBEDDED PLATES WITH WRONG COATING The DN identifies and documents a failure to properly implement an FCR. This item should have been an NCR. However the deficiency action was conservative i.e. wrong coating removed and correct coating applied. This item is not considered reportable.
EC-061, 074	FIRE PROTECTION SYSTEM Viking is a designer and constructor for fire protection. Their method appears to be one of field design/construct with "as building" as the last step prior to turnover. EC-061 appears to be similar in nature. Both are non-safety related. Neither are considered significant or reportable.
EC-068	VOIDS IN GROUT BENEATH STAINLESS LINERS An NCR should have been initiated to correct this matter. However the disposition and corrective action appear to appropriate. The deficiency was identified as part of the construction testing process. The item is not considered reportable.
EC-082	A-490 HIGH STRENGTH STRUCTURAL BOLTS This EDN appears to have been written to identify a specification violation. The specification which was in the process of being changed or had just been changed required that wrenches be calibrated using bolts of the same grade, diameter and condition as those being inspected. The specification change stated "A325 or A490 bolts used for calibration of impact wrenches or torque wrenches shall be of the same manufacturer, size, type and lot as the bolts being tightened or inspected." Installations prior to the issuance of this FCR are acceptable providing inspection was in accordance with the applicable specification. The EDN appears to reflect the FCR. The bolts were subsequently replaced. This item is significant and was reported as SCD-78. SCD-78 is open. This item is also discussed in NRC concern No. 12.

ATTACHMENT 1C

REVIEW OF CITED/UNCITED EDNs

NUMBER	RESOLUTION
EC-121	EDG "A" AND "B" The EDN appears to have identified documented, evaluated, dispositioned and corrected the deficiency on an instrument. Not significant and not considered reportable.
EC-134	CONCRETE VOID AT HILTI ANCHOR This deficiency is considered minor in nature. The deficiency is well documented and corrected. The new installation was properly QC inspected. This item is not significant and is not considered reportable.
EC-198	CCRR-421 EC-198 indicated that a support was not worked to R3 prior to performing R4 work. After identification, the process was performed correctly. An NCR should have probably been written. However, the disposition for the EC is conservative and accepted by the Senior Resident Engineer and QA. Not significant and not considered reportable.
EC-283R1	DIESEL OIL TANK SUPPORT NOT PER DESIGN Several minor problems appear to exist with this issue. AS-2313 was originally issued t implement an NRC commitment to add weld plates to support oil distribution headers. At least one plate was not located correctly i.e. 2ft below specifications. Subsequently the support was redesigned to fit the plate and the drawing revised. However, the EDN was referenced in the revision block versus the FCR. Although two procedural problems are apparent the final product was correct. This item is not significant and not considered reportable.
EC-285	HANGER GAP REQUIREMENTS Appears to be a well documented question concerning gap criteria. The gaps were dispositioned and corrected. This item is not significant and not considered reportable.

ATTACHMENT 1C

REVIEW OF CITED/UNCITED EDNs

NUMBER	RESOLUTION
EC-406	Similar to EC-285. IR 6237 documented problem initially.
EC-288	BMRR-411 INSTALLATION Two problems existed 1) Gaps were unacceptable per FCR-MP-1553 and 2) EDN was not properly classified as safety-related. The first problem was accepted by engineering and documented on IR-5298 and the EDN. The second problem was identified on W3-4183. Attachments to the EDN show the correction. This item is not significant and is not considered reportable.
DN-728	WELD HOLD POINT MISSED The DN identified, documented and corrected a missed ANI hold point for a PT examination. Not significant and not considered reportable.
EC-997	GROUT PLACEMENT The EDN should have been closed instead of voided since a deficiency actually existed. FCR R2 returned condition to original design utilizing FCR-CH-1238 guidance. Not significant and not considered reportable.
EC-1080	RCSR-32 INSTALLATION Snubber stroked rough during inspection. Deficiency appears to have been identified, documented, corrected and accepted properly. the deficiency is not significant and not considered reportable.
EDN-1175	Voiding this EDN appears to have been proper and the issue appropriately closed by responsible management. This item is similar to EDN 1176. This item is not significant and not considered reportable.

ATTACHMENT 1C

REVIEW OF CITED/UNCITED EDNs

NUMBER	RESOLUTION
EDN-1176	This EDN contains an attachment that defines a personnel related conflict which has no apparent safety significance. After voiding, the EDN attachment was signed by responsible management. This item is not significant and not considered reportable.
EC-1312	RCB POLAR CRANE INSTALLATION Appears to have been a minor deficiency that was properly identified, documented, dispositioned, and corrected. Not significant and not considered reportable.
EC-1313	Similar to EC-1312.
EC-1330	FLOOR SLOPE The EDN identify, documents, dispositions and corrects a minor civil deficiency. Not significant and not considered reportable.
EC-1387	CABLE TRAY DEFICIENCIES The EDN identified, documented, dispositioned and corrected 3 minor cable tray installation deficiencies. The item are not significant and are not considered reportable.
EC-1463	STEEL INSTALLATION The deficiency was properly, identified, documented, dispositioned and corrected. Not significant and not considered reportable.
EC-1476	WHIP RESTRAINT WELD BYPASSED This EDN properly identified, documented, evaluated and dispositioned a bypassed hold point. The AWS code does not specifically required NDE. The code does state that the contractor specify necessary testing. In this case the Ebasco specification 1564.723 requirement was violated but acceptance was based on satisfactory completion of final UT. Not significant and not considered reportable.

ATTACHMENT 1C

REVIEW OF CITED/UNCITED EDNs

NUMBER	RESOLUTION
EC-1486	EXCESS GROUTING Minor deficiency was identified documented, dispositioned and corrected. Not significant and not considered reportable.
EC-1502	CONTROL ROOM PENETRATIONS OF CONDUITS An EDN was not necessary. Relocation of conduit is authorized by LOU 1564.B288 drawings. This item is not significant and not considered reportable.
EC-1527	This EDN is still open. Corrective Actions have not been documented or accepted as of 9/24/84. The problem does not appear significant or reportable.
EC-1548	CABLE 31042D-SB This EDN identified minor cable insulation damage that required repair using existing design guidance. The work was performed as part of CIWA 83B637.
EC-1566 R0, R1	The EDN identifies four (4) deficiencies on a non-safety related seal ring. The EDN properly corrects the problems. Not significant and not considered reportable.
EC-1581	SI SUMP SCREENS EDN documents a minor repair to ensure that subsequent welding could be performed adequately. Not considered significant or reportable.
EC-1594	WELD PREHEAT The DN identified, documents, dispositions and corrects a suspected deficiency. The deficiency apparently did not exist. Not significant and not considered reportable.

ATTACHMENT 1C

REVIEW OF CITED/UNCITED EDNs

NUMBER	RESOLUTION
EC-1611	WHIP RESTRAINT WELD REPAIR The EDN identifies unauthorized work performed on welds which were not authorized for repair per an NCR. Not significant and not considered reportable.
EC-1616	ANCHOR PLATE EVALUATION Deficiency was properly identified, documented, evaluated and dispositioned. Not significant and not considered reportable.
EC-1618	PROTECTIVE COVER BOX INSTALLATION This EDN was written to identify a violation of work procedure. The installation was accepted by engineering, QC and QA. Not significant and not considered reportable.
EC-1647	HILTI BOLT INSTALLATION The EDN identifies, documents, evaluates and dispositions a deficient anchor installation. Not significant and not considered reportable.
EC-1648	CONDUIT SUPPORT EX3-1114 This EDN properly identified, documented, evaluated and dispositioned an apparent field weld deficiency. Not significant and not considered reportable.

ATTACHMENT 1D

REVIEW OF CITED/UNCITED T-B DNs

NUMBER	RESOLUTION
W-381	The DN identifies a significantly large number of welds as not being visually inspected prior to being coated. All welds are located in the Turbine Building and are not safety related.
W-742	POWER OFF IN ROD ROOM The deficiency appears to have been properly identified, documented and corrected in accordance with an established procedure. The item is not significant and not considered reportable.
W-3556, 4648, 4968, 4869, 5755, 5824, 5916, 5917	These DNs indicated clerical errors in transcribing heat numbers or filler material on to QA documentation. The justification for maintaining the position that a clerical error existed appears well documented and logical. The error both individually and collectively, is not significant and not considered reportable.
W-4112	COUPLING INSTALLATION A DCN (488) required the addition of 6000# couplings to an MSIV Bypass line. Apparently 3000# couplings were incorrectly installed. This DN documented and identified the problem and requested design information. 3000# couplings were subsequently approved and the DCN and DN closed. Not significant and not considered reportable.
W-5047	WELD PROCEDURE VIOLATION The DN identifies, documents, dispositions and corrects a deficiency associated with weld procedure. Not significant and not considered reportable.
W-5416	SIRR-1341 SUPPORT Two DNs and NCR 4010 are affiliated with this deficiency. The DN lists several welds that were deficient due to documentation problems. The problems were identified as part of the DN-T-2474, NCR-4010 support walkdown program. (NCR-4010 was upgraded and reported as SCD-60 which is still open) The deficiency as it stands alone is not significant and not considered reportable.

ATTACHMENT 1D

REVIEW OF CITED/UNCITED T-B DNs

NUMBER	RESOLUTION
W-5692	NO RT ON BASE METAL FLAWS Apparently W-5682 was initiated to identify the need for RT examination instead of the visual and PT examinations specified on two previous DNs. This condicion should have been written as an NCR, however the disposition on the DN is conservative and acceptable. This item is not considered reportable.
W-6183	TORQUE WRENCH OUTSIDE CALIBRATION RANGE This item is similar to the deficiency noted on W-6519. No code violation exists since only even tightening is required. This deficiency is not significant and not considered reportable.
W-6243	WRONG INTERPASS TEMPERATURE RECORDED ON WELD RECORD The DN properly identifies and documents the deficiency. The justification appears logical. The item is not significant and is not considered reportable.
W-6322	INCORRECT TORQUE WRENCH FOR THE SPECIFIED APPLICATION Similar to W-6183, 6519. No code violation existed. Hydrostatic testing revealed no apparent leakage. This item is not significant and not considered reportable.
W-6349	LUG GAP The DN identified and documented an improper lug gap (off by 1/64"). The gap was accepted using IT-07198 and Ebasco redline. The item is not significant and is not considered reportable.

ATTACHMENT 1D

REVIEW OF CITED/UNCITED T-B DNs

NUMBER	RESOLUTION
W-6519	TORQUE WRENCH WRONG FOR APPLICATION

The DN stated that a 0-250 ft/lb. wrench was used to apply torque to 370 ft/lbs. Although the application was incorrect the code was not violated in that only even tightening is required. A hydrostatic test, although not designed for flange leakage detection, can identify non welded connection leaks. Apparently no leakage was evident. The deficiency is not significant and is not reportable.

RESPONSE

ITEM NO. 5 (Final)

TITLE: Vendor Documentation - Conditional Releases

NRC DESCRIPTION OF CONCERN:

As a part of the staff review of the QA Program, the staff evaluated the Ebasco vendor QA program. In assessing this program, the staff specifically looked at the receipt inspection program and the conditional release system.

As a result of its evaluation, the staff found deficiencies with the handling of conditional certification of equipment (C of E) for Combustion Engineering supplied equipment. For example, one conditional C of E for the reactor vessel and internals was issued because as-built drawings, material certifications, and the fabrication plans had not been forwarded when the equipment was delivered to LP&L in 1976. The missing documents were sent to Ebasco sometime in 1978, according to the Ebasco quality records supervisor, but were apparently lost prior to being placed in the Ebasco document control system. The conditional certification of equipment was found when a check of all files was made in April or May 1984. The missing documents have been requested from CE, and a deficiency report was issued and placed on a master deficiency list. This problem has existed since July 20, 1976.

The safety significance of this is that problems with the vendor QA records could affect installed safety related equipment. LP&L shall examine their records and determine if all conditional certifications of equipment have been identified, reviewed and promptly resolved.

DISCUSSION:

LP&L has reviewed their records to ensure that Conditional Certifications of Equipment and other conditional release conditions have been identified, reviewed and resolved. The following discussion outlines the results of the review which indicate that such conditions are adequately under control and do not constitute a situation adverse to the health and safety of the public.

Combustion Engineering

The quality records associated with Combustion Engineering material and equipment have been re-reviewed. An initial review concluded that Conditional Certifications of Equipment had been received for 45 purchase orders, and that for 31 of these, Combustion Engineering had provided Unconditional Certifications of Equipment prior to the audit. Ebasco Deficiency Report 84-5-3, was prepared and issued on May 1, 1984, identifying the items for which Unconditional Certifications had not been received. This Deficiency Report was entered into the site tracking system.

Subsequently, during its validation review in support of the Task Force effort, the Pre-Licensing Issues Task Force Support Group identified two additional CE purchase orders for which unconditional certifications did not exist in the files. This finding prompted a 100% re-review of the quality records associated with CE material and equipment for the existence of conditional certifications. This subsequent review identified a total of nine additional purchase orders which at one time had Conditional Certifications of Equipment. Of these, only one was still without an unconditional certification at the time of the review.

Unconditional Certifications have now been received for the 54 purchase orders, including the replacement copy of the unconditional certification for the Reactor Vessel Assembly. Although the probability was considered very low, there was, however, a possibility that the operability of equipment could have been affected. A review was therefore performed for the 54 purchase orders received with Conditional Certifications of Equipment. It was determined that the ability of the equipment to perform their intended design function was not compromised.

LP&L acknowledges that Combustion Engineering issued Conditional Certifications of Equipment associated with the Nuclear Steam Supply System (NSSS) that were not being formally tracked as open items.

The existence of Conditional Certifications of Equipment was not considered a problem based on the site's understanding that they reflected incompleted purchase orders as opposed to hardware or software deficiencies. This situation has existed since the original shipments of material and equipment from Combustion Engineering. The site did informally track the Conditional Certifications of Equipment as open items and the issuance of Conditional Certifications of Equipment is controlled under CE's QA program. In addition, letters were periodically sent to CE requesting the status and resolution of these items.

To provide further assurance, site activity associated with conditional certifications was assessed. As of August 7, 1984, LP&L operations has placed 69 purchase orders with CE for spare parts. Of these 69 purchase orders, one had a CE Conditional Certification. The equipment related to this Conditional Certification was issued to the plant on an LP&L QC Conditional Release in accordance with plant procedure OI-10-006.

Other Vendors and Contractors

To assess the potential for existence of other manufacturing open items not tracked in the site tracking system, the site's material receiving and control system was reviewed. It was found that the system was being properly implemented and that any problems identified during the material receiving quality control inspection and manufacturing records review were being properly tracked as Discrepancy Notices (DNs) and Deficiency Reports (DRs), respectively. However, it was realized that the potential for a similar situation existed in areas where problems are identified off-site relating to material to be shipped to the site. Based on this, three areas have the potential for similar situations, and were selected for additional evaluation:

a) Concerns noted by Ebasco Vendor Quality Assurance Representatives (VQARs) on the Release for Shipment forms,

b) Nonconformance Reports (NCRs) controlled by Ebasco's Home Office, and

c) Material received at the site under manufacture, deliver and erect type contracts.

The evaluation conducted is described on Attachments 1, 2 and 3, respectively, and the results summarized as follows:

a) A sample of 36 of a total of 118 Ebasco New York safety-related Purchase Orders for material/equipment were selected on a discipline-by-discipline (e.g.: Mechanical, Electrical, Instrumentation) basis and reviewed. This sample entailed approximately 750 shipments and approximately 11,000 items. No items adversely affecting plant safety were identified.

b) The status of Ebasco Home Office NCRs was reviewed to ensure adequate on-site identification and control. The review concluded that there exists adequate on-site identification and control of Ebasco Home Office NCRs.

c) The evaluation of all safety-related manufacture, deliver and erect type contracts is complete. No items adversely affecting plant safety were identified.

Therefore, based on this review, LP&L believes that vendor QA records are adequately administered.

CAUSE:

The reviews performed have indicated that the issue concerning the tracking of open items is limited to CE Conditional Certifications. The cause was identified as using informal rather than formal tracking methods. This was due to the perception that the problems underlying the Conditional Certifications were limited to commercial concerns.

GENERIC IMPLICATIONS:

LP&L has addressed this concern generically. A review was conducted, as described above, and it was determined that there exists adequate identification and control of vendor material being shipped to the site. Material tracking is currently being performed using detailed written procedures for materials received onsite both for the remaining construction activities and for plant operation activities.

SAFETY SIGNIFICANCE:

Based on the above evaluations, all items potentially affecting plant safety are being properly controlled on site.

CORRECTIVE ACTION PLAN/SCHEDULE:

Based on the CE records review outlined in this Response, any CE open items that have been identified are now formally tracked. Any new CE Conditional Certifications will also be formally tracked.

A review has been conducted of the Conditional Certifications which had been received for 54 CE purchase orders. It has determined that these conditions would not have adversely affected the operability of equipment.

ATTACHMENTS:

1) Concerns Noted by VQARs on the Release for Shipment Forms

1-A) Ebasco New York Safety Related Manufacturer Purchase Orders.

1-B) POs Included in Scope of Audit.

2) NCRs Controlled by Ebasco's Home Office

2-A) Comparison of NYO NCR Log to the MTS Closed NCR Printout

2-B) NYO NCRs Requiring Verification of Disposition

2-C) Audited NYO NCRs

3) Material Received at the Site Under Manufacture, Deliver and Erect Type Contracts.

REFERENCES:

None

ATTACHMENT 1

Concerns Noted by VQARs on the Release for Shipment Forms

To resolve the NRC concern and determine the basis for the sample audit of vendor documentation the following data base was generated.

A listing was generated of all New York Purchase Orders. This was generated on a discipline basis with the following guidelines:

Mechanical: ASME Code Class 1, 2, 3, MC and/or ANSI Safety Class 1, 2, 3 Purchase Orders.

Electrical: Class IE Purchase Orders.

Instrumentation & Control: ASME Code Class 1, 2, 3; ANSI Safety Class 1, 2, 3; IEEE Class IE and/or Seismic Category I Purchase Orders.

Architectural - Structural: Seismic Category I Purchase Orders.

Miscellaneous: ANSI Safety Class 1, 2, 3; ASME Code Class 1, 2, 3; IEEE Class IE and/or Seismic Category I Purchase Orders.

The Nuclear Steam Supply System (NY-403402 and Field Purchase Orders to CE) was reviewed in total during the audit. (See Attachment 1-A for the listing generated.)

Attachment 1-A lists all of the one hundred-eighteen (118) New York Office safety-related purchase orders. From this the sample size of 36 (30%) was chosen (see Attachment 1-B) for the breakdown of orders reviewed. The safety-related purchase order documentation packages identified on Attachment 1-B were researched.

During this review a single concern was identified. On purchase order number NY-403659, Material Receiving Inspection Report #83-00598 (FCR-E-3119) material was received and accepted on site with an outstanding Vendor Non-Conformance Report. The material (cable) was purchased on a Class 1E Purchase Order, but was used in a Non-Nuclear Safety application. The disposition of this NCR (NY-586) required the implementation of the referenced FCR. The corrective action was considered a "paper change" only and, therefore, there is no safety significance.

ATTACHMENT 1-A

EBASCO New York Safety Related Manufacturer Purchase Orders*

Mechanical	Electrical	I&C	Arch-Structural	Miscellaneous
403418 (2)	403447 (1E)	403470 (2,3)	403407 (I)	403514 (Radwaste - 2,I)
403422 (2/MC)	403454 (1E)	403485 (1E)	403480 (I)	403518 (Radwaste - 2,1E)
403431 (3)	403455 (1E)	403489 (1E)	403509 (I)	403543 (HVAC - 3)
403433 (1,2,3)	403463 (1E)	403492 (2,3)	403513 (I)	403547 (HVAC - 2)
403436 (2)	403472 (1E)	403499 (2,3)	403532 (I,3)	403548 (HVAC - 3)
403452 (3)	403487 (1E)	403502 (1,2,3)	403533 (I)	403549 (HVAC - 3)
403458 (1,2,3)	403495 (1E)	403519 (1E)	403573 (I)	403555 (HVAC - 2,3)
403461 (2,3)	403496 (1E)	403523 (1E)	403574 (I)	403556 (HVAC - 2,3)
403467 (3)	403497 (1E)	403565 (2,3)	403578 (I)	403557 (HVAC - 3)
403469 (1,2,3)	403503 (1E)	403585 (I)	403582 (I)	403558 (HVAC - 2,3)
403479 (3)	403516 (1E)	403588 (1E)	403584 (I)	403559 (HVAC - 2)
403482 (3)	430517 (1E)	403594 (I)	403592 (I)	403566 (HVAC - 3)
403483 (2,3)	403530 (1E)	403627 (I)	403593 (I)	403567 (HVAC - 3)
403484 (1,2,3)	403534 (1E)	403641 (2)	403608 (I)	403621 (Applied Physics - I)
403488 (2,3)	403535 (1E)	403642 (1,2,3)	403611 (I)	403639 (HVAC - 3)
403493 (2,3)	403536 (1E)	403649 (1E)	403613 (I)	403675 (Applied Physics - 1E)
403500 (2)	403550 (1E)	403681 (1,2)	403620 (I)	
403501 (2,3)	403552 (1E)	403688 (1,2,3)	403647 (I)	
403504 (3)	403615 (1E)	403694 (2,3)	403648 (I)	
403505 (2,3)	403623 (1E)	403802 (1E)		
403506 (1,2,3)	403625 (1E)			
403507 (1,2,3)	403638 (1E)			
403511 (1,2)	403640 (1E)			
403512 (3)	403644 (1E)			
403522 (3)	403657 (1E)			
403528 (3)	403659 (1E)			
403539 (2,3)				
403542 (2)				
403546 (2)				
403591 (I)				
403606 (1,2,3)				
403650 (3)				
403661 (2)				
403674 (1,2,3)				
403676 (1,2,3)				
403699 (1,1E)				
403801 (1,1E)				

*Information in parentheses after P.O. number refers to the following safety related classes:
1,2,3 - ASME Code Class 1,2,3 and/or ANSI Safety Class 1,2,3
MC - ASME Code Class MC
1E - IEEE Class 1E
I - Seismic Category I

ATTACHMENT 1-B

POs Included in Scope of Audit

ELECTRICAL

PURCHASE ORDER NUMBER	SAFETY RELATED CLASS	COMPONENT	# OF SHIPMENTS (MRIRs) *	# OF ITEMS	
NY403447	IE	5 and 15 KV Power Cable	25	72	
NY403455	IE	480V Volt Power Centers	26	1,812	
NY403463	IE	Storage Batteries	1	3	
NY403496	IE	Electrical Penetrations	35	403	
NY403497	IE	480 Volt Motor Control Centers	34	139	
NY403516	IE	Static Uninterrupted Power Supply	6	28	
NY403659	IE	Refueling Disconnect and Missile Shield Cable	55	1,111	
7			182	3,568	SUB TOTAL

ARCHITECTURAL - STRUCTURAL

PURCHASE ORDER NUMBER	SAFETY RELATED CLASS	COMPONENT	# OF SHIPMENTS (MRIRs)	# OF ITEMS	
NY403407	I	Reactor Building Crane	10	5 (lots)	
NY403582	I	Maintenance & Hatch Shielding Door	5	6	
NY403584	I	Anchor Bolts & Anchor Studs	5	1,164	
NY403613	I	RAB - Structural Steel	22	22 (lots)	
NY403532	I,3	Misc. Shop Fabricated Tanks	2	6	
5			44	1,203	SUB TOTAL

* Material Receiving Inspection Report

ATTACHMENT 1-B
(Continued)

MECHANICAL

PURCHASE ORDER NUMBER	SAFETY RELATED CLASS	COMPONENT	# OF SHIPMENTS (MRIRs)	# OF ITEMS	
NY403422	2/MC	Containment Piping Penetrations	41	78	
NY403458	1,2,3	2½" and Larger Stainless Station Valves	142	147	
NY403469	1,2,3	2½" and Larger Stainless Steel Valves	8	8	
NY403484	1,2,3	Control Valves	5	11	
NY403506	1,2,3	600# and Higher Gate and Check Valves	70	656	
NY403507	1,2,3	Stainless Steel Valves	30	177	
NY403511	1,2	Safety and Relief Valves	23	29	
NY403606	1,2,3	Control Valves and Accessories	8	50	
NY403674	1,2,3	Line Service Solenoid Valves	8	39	
NY403676	1,2,3	Self Contained Regulating Valves	1	8	
NY403699	1,1E	Limit Switches	4	94	
NY403801	1,1E	Pilot Solenoid Valves	2	51	
12			342	1,348	SUB TOTAL

ATTACHMENT 1-B
(Continued)

INSTRUMENTATION & CONTROL

PURCHASE ORDER NUMBER	SAFETY RELATED CLASS	COMPONENT	# OF SHIPMENTS (MRIRs)	# OF ITEMS	
NY403485	1E	Differential Pressure Switches	15	136	
NY403519	1E	Process Analog Control	83	3,684	
NY403585	I	Local Instrument Cabinets & Racks	10	86	
NY403627	1	Annubars	1	4	
NY403642	1,2,3	Low Differential Pressure Transmitters	4	28	
NY403681	1,2	Thermocouple Assemblies	4	291	
NY403688	1,2,3	Low Differential Pressure Transmitters	4	39	
7			121	4,268	SUB TOTAL

MISCELLANEOUS

PURCHASE ORDER NUMBER	SAFETY RELATED CLASS	COMPONENT	# OF SHIPMENTS (MRIRs)	# OF ITEMS	
NY403518 (Radwaste)	2,1E	Hydrogen Analyzing	3	7	
NY403547 (HVAC)	2	Check Valves	2	6	
NY403556 (HVAC)	2,3	Electric Heating Coils	11	159	
NY403559 (HVAC)	2	Containment Fan Coolers	10	24	
NY403675 (Applied Physics)	1E	Accidental Radiation Monitoring/System	30	349	
5			56	545	SUB TOTAL

ATTACHMENT I-B
(Continued)

SUMMARY

DISCIPLINE	# OF PURCHASE ORDERS AUDITED	SHIPMENTS	ITEMS
ELECTRICAL	7	182	3,568
ARCH/STRUCT	5	44	1,203
MECHANICAL	12	342	1,348
I&C	7	121	4,268
MISCELLANEOUS	5	56	545
TOTAL	36	745	10,932

ATTACHMENT 2

NCRs Controlled by

Ebasco's Home Office

1. In June, 1984, a review of all NYO (New York Office) issued NCRs has been accomplished to determine if any NYO NCRs still open have been properly identified as open by the site in the Master Tracking System.

   The result is that there is one NYO NCR still open (NCR 646), and it was and still is properly identified on the Master Tracking System as an open item. (See Attachment 2-A)

2. Concurrently, a review was also conducted to determine if NYO NCRs that required corrective action and Verification of Disposition were closed properly. The Criteria for correct closure were:

   a) Item(s) repaired, replaced, or otherwise rendered correct before receipt at site.

   b) Item(s) were identified as requiring corrective action upon receipt at site and tracked until accepted disposition was verified.

   A total of 144 NCRs were identified as requiring Verification of Disposition. A sample of 20 were reviewed. One concern was noted. The Temporary Fuel Storage Racks should have been identified as having incomplete documentation (analysis of fuel drop impact) when received on 5/21/81. NCR 628 was not issued until 11/10/83 to identify the problem and implement a solution. DCN-NY-AS-758 was issued on 3/14/84 and Station Modification Package 84-133 was issued on 4/4/84 to implement the corrective action. This item has been properly tracked since the issuance of NCR 628. Temporary Fuel Storage Racks will not be used until installation of modifications described in SMP 84-133 is complete. There is no safety implication.

   Therefore, the QA process for controlling NYO NCRs requiring corrective action and Verification of Disposition is acceptable.

ATTACHMENT 2-A

Comparison of NYO NCR Log

to the MTS Closed NCR Printout

Comparison:

1. - All items listed in MTS as closed were also listed as closed in NYO NCR log.

Problems Identified:

a) NCR 30 was listed as closed in MTS and NCR 30 was superseded by NCR 40 per NYO NCR log. NCR 30 and the closed copy of NCR 40 are located in the correct file under P.O. NY403405 in the QA Records Vault.

b) NCR 576 was listed as voided in MTS. NCR 576 was closed per NYO NCR log. The closed copy of NCR 576 is located in the correct file under P.O. NY403458 in the QA Records Vault.

The NYO NCR log was correct in both cases. The errors do not affect the validity of closed status. MTS has been updated.

Comparison:

2. - There were 111 NCRs indicated as being closed in the NYO NCR log but were not listed in MTS. As MTS only tracks those NCRs which require corrective action by the site, a 100% review of these NCRs was performed. NCRs which required corrective action are closed and located in the files in the QA Records Vault.

Problems Identified:

None

ATTACHMENT 2-B

NYO NCRs Requiring Verification of Disposition

011	* 133	251	349	390R1
012	136	254	351	498
019	147	256	* 361	518
024	* 155	* 263	360R1	* 549
026	156	* 264	361R1	551R1
* 028	* 170	265	367	557
031	171	266	371	563
034	176	* 268	379	569
036	179	277	380	575
037	192	278	385	585
040	195	279	387	587
042	197	* 284	389	588
043	201	285	397	589
050	206	* 286	410	590
* 054	* 207	296	411	593
055	208	297	412	601R1
059	209	300	317R1	606
068	* 210	302	423	607
* 081	218	310	428	611
082	* 221	311R1	429	612
083	225	312R1	430	613
* 093	228	316	431	613R1
103	* 232	317	447	617
108	236	318	448	618
112	237	320	449	622
119	241	321	453	625
121	243	332	454	* 628
118	284	* 347	467	635
129	246	348	457R1	

* Items audited, see Attachment 2-C

ATTACHMENT 2-C

Audited NYO NCRs

Total of 144 NYO NCRs required verification of disposition. A random sample for investigation follows.

1. - NCR 28, P.O. NY403509, C-3660-N, C3661-N
   - Verify UT was performed.
   - UT performed.
   - NCR closed prior to shipment.

2. - NCR 54, P.O. NY403487
   - Verify flux and other material removed from tray.
   - Reinspection performed.
   - NCR closed prior to shipment.

3. - NCR 81, P.O. NY403405
   - Wide gap weld.
   - Procedure required and reviewed without comment.
   - NCR closed prior to shipment.

4. - NCR 93, P.O. NY403439
   - NCR 93 superseded by W3-1518.
   - W3-1518 tracked until closure.

5. - NCR 133, P.O. NY430539
   - Confirm castings meet ND 2571 of ASME III ND.
   - NCR closed prior to shipment.

6. - NCR 155, P.O. NY403484
   - Verify conformance to ASTM standard for 2" 6-C70-28-1.
   - Item is non-safety/non-seismic per Purchase Order spec.
   - NCR closed.

7. - NCR 170, P.O. NY403509
   - Problem with heat treatment temperature.
   - Resolved through evaluation.
   - NCR tracked until closure.

8. - NCR 207, P.O. NY403578
   - Lakeside Steel to furnish shims.
   - Letter dated 12/18/78 states shim material provided to J. A. Jones. Problem resolved through NCR 210. As-Built installation verified by letter dated 12/18/78.
   - NCR tracked until closure.

9. - NCR 210, P.O. NY403578
   - See NCR 207.
   - NCR tracked until closure.

10. - NCR 221, P.O. NY403573
    - High silicon content.
    - Problem resolved.
    - NCR closed prior to shipment.

ATTACHMENT 2-C

(Continued)

11.- NCR 232, P.O. NY403583
- Missing documentation.
- Qualification reports accepted.
- NCR tracked until closure.

12.- NCR 263, P.O. NY403483
- Weld repair on end prep.
- Part not used.
- NCR closed prior to shipment.

13.- NCR 264, P.O. NY403483
- Weld repair end prep.
- Repair complete.
- NCR closed prior to shipment

14.- NCR 268, P.O. NY403557
- Confirm correct type motor supplied.
- Confirmed.
- NCR closed prior to shipment.

15.- NCR 284, P.O. NY403496
- Missing documentation.
- Reports accepted.
- NCR tracked until closure.

16.- NCR 286, P.O. NY403583
- Missing documentation.
- Reports accepted.
- NCR tracked until closure.

17.- NCR 347, P.O. NY 403613
- Spray Booth doors require repair.
- Repaired.
- NCR closed.

18.- NCR 361, P.O. NY403557
- Rev. 1 replaced - verify motor extension leads consist of acceptable material.
- Verified by VQAR.
- NCR closed prior to shipment.

19.- NCR 549, P.O. NY403640
- Need to identify unique color on CWDs 2945, 2646.
- CWDs issued.
- NCR tracked until closure.

20.- NCR 628, P.O. NY403608
- P.O. requires drop analysis.
- Items received 5/21/81; NCR issued 11/10/83.
- Problem not promptly identified.
- NCR is being tracked.
- NCR-628 superceded by SMP 84-133.
- SMP 84-133 tracked until closure.

ATTACHMENT 3

Material Received at the Site Under Manufacture, Deliver and Erect Type Contracts

Scope

Deliver and Erect Purchase Orders and Contracts (Safety Related Only)

Purchase Orders:
NY403405
NY403508
NY403525

Contracts:
W3-F-6
W3-NY-4
W3-NY-17
W3-NY-23
W3-NY-27

Discussion

Deliver and Erect N.Y. Purchase Orders and Contracts

Due to the differing nature of each Deliver and Erect (D&E) purchase order and contract, the definition of the scope of research differed.

Essentially for each of the following, a review was performed to assure that problems identified on material, parts or components were tracked.

Deliver and Erect Purchase Order Review Scope and Results

NY403405; Chicago Bridge & Iron; Steel Containment Vessel; Safety Class 2/Seismic I

A review of all Ebasco Vendor QA Release for Shipment (form 1035), Vendor QA Release Reports (form 719) and Ebasco New York office reviewed NCRs was performed. Additionally, a review of the CB&I Non-Conformance Control List, Shop Release for Shipment Checklist and Site Receiving Inspection Reports was performed.

The review identified one Ebasco Release for Shipment (form 1305) which noted that 12 items required sandblasting at the site. The associated CB&I Release for Shipment form did not identify the condition and there are no CB&I records to support that sandblasting was done. Of the 12 items, 7 are embedded in concrete and did not require sandblasting. The remaining 5 items are part of the construction hatch storage rack located inside containment and would have been repainted had any coating distress appeared per NCR-W3-4825 (PRI-94). Furthermore, these 5 items are of small surface area. The failure of the coating of such small and scattered areas during a DBA would not be of any safety significance. In addition, there is no indication that any of these materials will have adverse interactions with engineering safety features.

ATTACHMENT 3

(Continued)

NY403508; Nooter Corporation; Fuel Pit and Canal Liners; Safety Class NNS/Seismic Class I

A review of all of the Ebasco Vendor QA Release for Shipment (form 1305) and Vendor QA Release Reports (form 719) was performed. All documentation for each fabricated item was also reviewed for inclusion of appropriate Ebasco QA review stamp and/or signature.

The review did not identify any problems which were not tracked and resolved.

NY403525; Chicago Bridge & Iron; Diesel Oil Storage Tanks; Safety Class/Seismic Class I

The safety related tanks on this order consist of the 1) - Diesel Oil Storage Tanks (2 each) and 2) - Diesel Oil Storage Feed Tanks (2 each).

A review of all of the Ebasco Vendor QA Release for Shipment (form 1305) and Vendor QA Release Reports (form 719) was performed. Additionally, a review of all documentation packages was performed which included the vendors Receiving Inspection Reports.

The review did not identify any problems which were not tracked and resolved.

Deliver and Erect Contracts

W3-F-6; Louisiana Industries; Concrete Supply and Delivery; Seismic I

W3-NY-4; J. A. Jones; Civil Erection; Concrete and Structural Steel

W3-NY-23; Sline Industrial Painting; Application of Nuclear Coatings and Painting; Nuclear Safety Related - Inside Containment Coatings

W3-NY-27; B&B; Installation of Penetration Radiation Seals, Fire Stops and Air Seals for Electrical, Mechanical and HVAC Systems; Non-Nuclear Safety - Fire Protection

The contracts listed above did not have QA programs which allowed for conditional releases. Upon receipt the material was inspected and documentation was reviewed or verified complete. Any discrepancies either in hardware or software required the material to be placed on hold, in a hold area or rejected as appropriate. The material remained unavailable for issue until the noted discrepancies were dispositioned and closed. Because of the contractor's programs only acceptable material was available for installation.

ATTACHMENT 3

(Continued)

W3-NY-17; The Waldinger Corporation; HVAC Ductwork, Supports and Accessories; HVAC Safety Class 1 (Safety Related/Seismic I), Class 2 (Non-Safety Related/Seismic 1), and Class 3 (Non-Safety Related/Non-Seismic)

A search was made of Waldinger Deficiency Reports generated at their shop in Des Moines. This search revealed 12 Shop DRs which were transferred to the jobsite for closure. Tracking and closure has been verified for all of these DRs. It should also be noted that subsequent to May of 1979 a 100% review of the Waldinger shop manufacturing records was performed by Ebasco QA Records personnel. Documentation deficiencies identified during the review were addressed and closed at that time.

RESPONSE

ITEM NO.: 6 (Final)

TITLE: Dispositioning of Nonconformance and Discrepancy Reports

NRC DESCRIPTION OF CONCERN:

The staff conducted a review of Ebasco nonconformance reports (NCRs) randomly selected from the Ebasco QA vault and the NCR tracking system. The selected NCRs were reviewed for content, compliance with procedures, accuracy, completeness of the disposition and final closure. Of the NCRs reviewed it is the staff's judgement that approximately one third contained questionable dispositions. Other NCRs were found still open.

The implied safety significance is that improperly dispositioned NCRs or lack of NCR closure could place the quality of installation in question.

For example, Ebasco NCR-W3-5564 identifies that welds were painted before the final weld inspection was performed. The NCR was closed out with a letter stating that the final inspection will be performed to inspect only for undersizing and lack of weld material where installation drawing calls for weld material. No paint was to be removed therefore the inspector could not inspect for welding defects.

The NCRs reviewed by the staff dealt with a wide variety of issues. The following is a list of example Ebasco NCRs that the staff feels contain questionable dispositions or exceeded closure time requirements.

Ebasco W3 NCRs

NCR-7139	NCR-7177	NCR-3912	NCR-7182	NCR-5563
NCR-7181	NCR-7184	NCR-6159	NCR-6723	NCR-3919
NCR-7547	NCR-6221	NCR-1650	NCR-6511	NCR-6623
NCR-4219	NCR-5586	NCR-7432	NCR-7180	NCR-4137
NCR-6165	NCR-4088	NCR-7099	NCR-6786	NCR-6597
NCR-7533	NCR-7179	NCR-7140	NCR-5565	

The staff also found similar type problems related to Mercury NCRs in that the dispositions were questionable; supporting documentation could not be located; rework appears to have not been accomplished; NCRs were not processed; a sufficient basis was not provided; and closure basis was inadequate.

The following NCRs fall into these categories:

Mercury NCRs

180	420	528	568	625
255	429	540	591	656
268	438	554	594	658
363	487	560	595	
380	491	565	614	

Additionally during this review the staff found problems with Ebasco discrepancy reports (DRs) in that it appears some DRs should have been elevated to NCRs: closure references were incorrect or inappropriate; closure action was improper; documentation was inaccurate; closure was via a DR, should have been an NCR; disposition failed to address the discrepancy; and the disposition of "use-as-is" had insufficient basis.

The following DRs fall into these categories:

Ebasco DRs Related to Turnover Packages

Q2-CS-1C-27	BD-1C-1143
Q2/3-FW/1C-851	Q1-RC-LWS-RC-2
Q2-SI-1C-89	LW3-RC-29
QMC-APO-P47E	Q2-LW3-SI-10F/E
C(W)-1C-342	CC-1C-6

The staff concludes that some Ebasco and Mercury NCRs and Ebasco DRs were questionably dispositioned and that LP&L shall (1) Propose a program that assures that all NCRs and DRs are appropriately upgraded and adequately dispositioned and corrective action completed, and (2) correct any problem detected.

DISCUSSION:

LP&L initiated a program, beginning in February 1984, to review Ebasco site Nonconformance Reports (NCRs) to verify the effectiveness of the Waterford 3 deficiency reporting/disposition programs during construction. That program consisted of a review of Ebasco site NCRs closed prior to initiation of the program (approximately 7100). Each Ebasco site NCR was reviewed and independently assessed by LP&L to determine if:

- The disposition addressed the described discrepancy;
- The NCR was reviewed for reportability 10CFR50.55(e) and 10CFR21; and
- The NCR had received the appropriate signatures.

This response discusses and presents summary results of the original review and a significantly expanded program addressing dispositioned NCRs/DRs (voided and administratively closed NCRs are addressed in the response to Issue 13). This program provides adequate confidence that the overall construction deficiency reporting/disposition system was effectively implemented. Corrective action as a result of the expanded review is also discussed. Discussion of the issue is structured along the lines of the major elements of the expanded program as follows:

I. Review of the specific nonconformance reports and deficiency reports identified by the NRC.
II. Review of Ebasco Nonconformance Reports
III. Review of Mercury Nonconformance Reports
IV. Review of Ebasco Deficiency Reports.

Three general conclusions have resulted to date from the original and expanded reviews, as follows:

1. No additional condition was identified in these reviews which, were it to have remained uncorrected, would have affected adversely the safety of operations of Waterford 3.

2. Corrective action required as a result of the reviews involved correction of documentation deficiencies, reinspection or engineering evaluation and only limited hardware rework.

3. Due to the structure of the filing system, systematic review of the Waterford 3 construction deficiency documentation is difficult, but is achievable.

I. <u>Review of the Specific NCRs and DRs identified by the NRC</u>

The Ebasco and Mercury NCRs and the Ebasco DRs identified by the NRC were first reviewed by Ebasco Quality Assurance Engineers. The NCRs and DRs were reviewed for proper disposition, corrective action completion, appropriate documentation, and proper closure. Upon completion of Ebasco's review and required corrective actions, LP&L QA reviewed the NCRs and corrective actions taken by Ebasco, and sampled the Ebasco review of DRs. LP&L Project Engineering reviewed the NCR's for technical content. The review of NRC identified Ebasco and Mercury NCRs and Ebasco DRs was scoped as follows:

A. Ebasco Nonconformance Reports

Thirty Ebasco NCRs are identified by the NRC in this issue. In addition, seven Ebasco NCRs related to this issue are specifically identified in Supplement 7 to the Safety Evaluation Report (SSER)* which was issued on October 1, 1984. Attachment 1 summarizes the results of the review of NRC identified Ebasco NCRs.

B. Mercury Nonconformance Reports

Twenty-three Mercury NCRs are identified by the NRC in this issue. An additional fifteen Mercury NCRs related to this issue are specifically identified in the SSER. Attachment 2 summarizes the results of the review of NRC identified Mercury NCRs.

C. Ebasco Deficiency Reports

Ten Ebasco DRs are identified by the NRC in this issue. An additional three Ebasco DRs related to this issue are specifically identified in the SSER. Limited documentation deficiencies were identified and corrected, none of which were safety significant.

* NUREG 0787 (SER Supplement 7 - September 1984)

The review of the NRC identified documents has been completed. While QA program procedural deficiencies existed, no safety significant deficiencies have been identified.

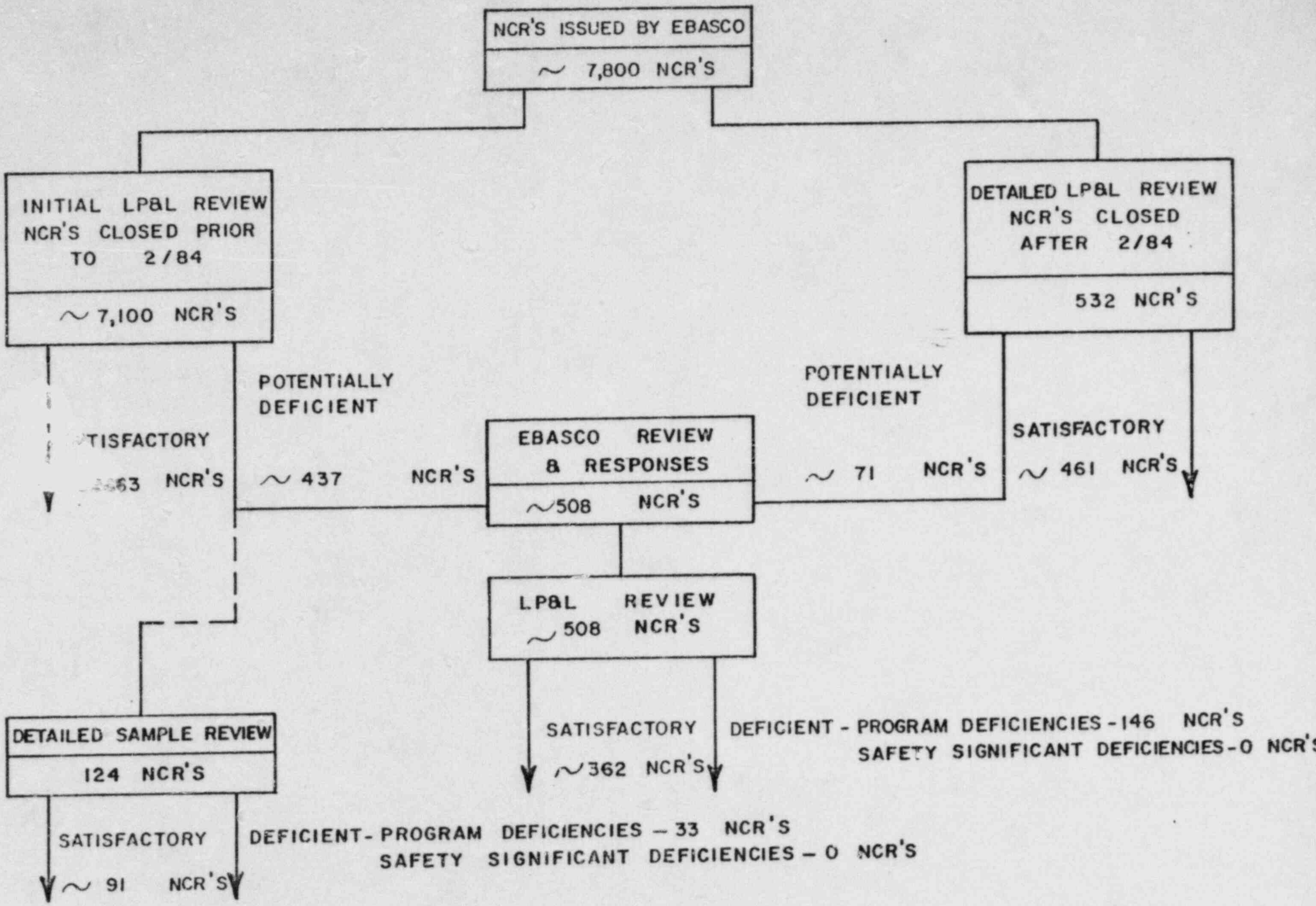
II. Review of Ebasco Nonconformance Reports

The review of Ebasco site Nonconformance Reports encompassed approximately 98% of the site NCR numbers issued by Ebasco during the construction of Waterford 3. The review consisted of several elements, each with its own particular level of review. Figure 6-1 depicts the elements of Ebasco NCR review process in the form of a flow diagram, in order to facilitate understanding of the process.

FIGURE 6-1

REVIEW OF EBASCO NCRs

FIGURE 6-1
EBASCO NCR REVIEW



The following paragraphs discuss the individual elements of the review of Ebasco NCRs:

A. LP&L QA Review of Ebasco NCRs closed prior to February 1984

1. Initial Review

In February 1984, LP&L QA initiated a review of Ebasco NCRs. This review was undertaken to verify, by way of a Work Instruction, that:

a. The disposition addressed the described discrepancy;

b. The NCR was reviewed for reportability under 10CFR50.55(e) and 10CFR21; and

c. The NCR had received the appropriate signatures.

Approximately 7100 Ebasco NCRs were reviewed and 437 potentially deficient NCRs were identified. Upon completion of the evaluation, it was determined that 122 NCRs were deficient in disposition, corrective action, software or closure, or combinations thereof. Corrective action required as a result of this review involved only limited hardware rework and correction of documentation deficiencies.

Seventy-two of the NCRs were considered potentially deficient for lack of documented evidence that they had been reviewed for reportability per 10CFR50.55(e) or 10CFR21. Subsequent documented reviews of these NCRs determined that none were reportable.

2. Detailed Review

LP&L selected 124 (approximately 28%) of the potentially deficient NCRs identified in the initial review for an in-depth review. This review included hardware verification for rework/repair, software verification for updating as-built drawings and specifications and evaluation of documentation for the required corrective actions and retrievability of documentation.

As a result of this detailed review, 33 NCRs were found to be deficient, and seven CIWAs were initiated to address the deficiencies. None of these deficiencies met the criterion for safety significance. Corrective action for 30 of the deficient NCRs involved correction of documentation deficiencies, reinspection or engineering evaluation. For the remaining three, limited discretionary rework is being performed.

B. Detailed LP&L QA Review of Ebasco NCRs closed after February 1984

Ebasco NCRs closed after February 1984 were reviewed as a separate group by LP&L QA. Review of these NCRs was in-depth and was for the purpose of verifying proper disposition, adequate documentation to support the required corrective action, required software changes completed and proper closure. Five hundred thirty two (532) NCRs were reviewed with 71 NCRs requiring resolution of comments. Of those 71 NCRs, 24 were determined to have valid deficiencies. Corrective action for 22 of the deficient NCRs involved correction of documentation deficiencies, reinspection or engineering evaluation. For the remaining two, limited discretionary rework is being performed.

C. Ebasco NCR Closure Timeliness

With respect to the NRC concern regarding timeliness of Ebasco NCR closure, Ebasco procedure ASP-III-7, "Processing of Nonconformance", required completion of corrective action within twenty (20) days of receipt of the dispositioned NCR. If the verification of corrective action was not completed within the allotted twenty days, a written request for extension was to be filed with the Ebasco Quality Assurance Department for approval. The twenty day time period did not begin until the nonconformance report had been dispositioned and evaluated by the appropriate departments. The twenty day requirement was for administrative control only and did not adversely affect the quality of Waterford 3. In December, 1983, Ebasco procedure ASP-III-7 was revised to delete this requirement.

All Ebasco NCRs closed as of approximately the end of September, 1984 (Approximately 98% of the Ebasco NCRs issued) were subjected to an LP&L review as described above. While program deficiencies existed, and minor rework was required, no safety significant deficiencies have been identified.

III. Mercury Nonconformance Reports

Mercury dispositioned approximately 3700 Mercury NCRs. Of these, approximately 1700 were upgraded to Ebasco NCRs and, as such, were reviewed as Ebasco NCRs (See Section II of this response). The remaining Mercury NCRs were reviewed as follows:

A. Mercury NCRs dispositioned "Use-As-Is" were reviewed to assure that they were upgraded to Ebasco NCRs, as required. As a result of this review, eleven NCRs were deemed to require upgrading to Ebasco NCRs. These eleven NCRs are now identified on Ebasco NCRs, and were processed under the Ebasco NCR program.

B. Approximately 1850 Mercury NCRs were dispositioned "rework/repair" or "reject." In most cases, when Mercury designated a deficiency to be corrected by "repair", it was, in fact, a "rework." For example, in dispositioning rejected welds, Mercury would specify the weld be "repaired" in accordance with procedures to meet the design requirements. This is actually a "rework" disposition. Mercury procedures did state that deviations from original design or technical specification outside the tolerances allowed was a "repair". Mercury procedures required nonconformances meeting this criteria to be upgraded to Ebasco NCRs so that these deviations would be reviewed and approved by Ebasco.

   A random sample of 66 Mercury NCRs from those dispositioned "rework/repair" was selected for review. These NCRs were reviewed for proper disposition, adequate documentation of corrective actions required and proper closure. LP&L QA reviewed each sampled Mercury NCR in accordance with QASP 19.17. Deficiencies were corrected and documented. None were found to be of safety significance.

C. Seven hundred twenty five (725) of the 1850 Mercury NCRs dispositioned "rework/repair" and "reject" were reviewed by Ebasco for reportability per 10CFR50.55(e). None of the NCRs were determined to be reportable. LP&L QA selected a random sample of 64 of these NCRs for a reportability review and the Ebasco conclusions were confirmed.

D. Mercury documented material conditionally released from Ebasco on Material Receiving Reports (MRR) and assigned Mercury NCR numbers to each such MRR in accordance with Mercury Procedure SP664. Approximately 120 Mercury NCRs of this type were identified by Ebasco. LP&L reviewed the Mercury files and, although the conditional releases appeared to have been properly handled, there were instances where supporting information (Ebasco NCRs, DNs) was neither referenced nor included in the documentation package. The supporting information is available and will be either included or referenced, in the NCR packages, as appropriate.

This review of dispositioned Mercury NCRs is complete. While program deficiencies existed, no safety significant deficiencies have been identified. The results of these sample reviews establish a 95% confidence level that at least 95% of the total population of Mercury NCRs do not contain unreported conditions reportable under 10CFR50.55(e) or 10CFR21.

IV. Review of Ebasco Deficiency Reports

The Ebasco QAIRG review of contractors records required that deficiencies be documented on Deficiency Reports in accordance with QAI-9, "Review and Handling of Construction Installation (DRs) Records". A random sample of DRs generated as result of the review of Mercury and Tompkins-Beckwith records was reviewed for proper closure. For each contractor, 230 QAI 9.2 Deficiency Report Sheets were selected and reviewed as follows:

A. The review of Deficiency Reports on Tompkins-Beckwith included 115 Deficiency Report Sheets on piping and one hundred fifteen QAI 9.2 Deficiency Report Sheets on seismic hangers and supports. These QAI 9.2 Deficiency Report Sheets included approximately 856 DRs. This review identified 12 DRs which required engineering evaluation and concurrence. Although minor deficiencies, such as missing references, signatures or dates were identified, the DR closures were satisfactory.

B. The review of the 230 Mercury QAI 9.2 Deficiency Report Sheets was divided equally among P-2 and P-3 tubing, and tube track supports. These QAI 9.2 Deficiency Report Sheets included approximately 1173 DRs. The review identified 31 DRs which required engineering evaluation. The engineering evaluations are in progress. Although minor deficiencies, such as missing references, signatures or dates were identified, the DR closures were satisfactory.

LP&L QA performed audits of the Ebasco review. These audits included random samples of the Mercury and Tompkins-Beckwith DRs reviewed by Ebasco. While documentation deficiencies existed, no safety significant deficiencies, or deficiencies requiring rework, have been identified.

CAUSE

The review program verified that deficiencies were generally processed in accordance with the site procedures. However, those procedures did not provide adequately specific guidelines for the implementation of procedural requirements which led to excessive need for judgements and interpretations. This program weakness led to the inconsistencies in handling deficiencies at Waterford 3 which have been identified by LP&L and the NRC.

GENERIC IMPLICATIONS

The review program encompassed approximately 98% of the Ebasco NCRs and statistically justified samples of Mercury NCRs and Ebasco DRs. The results of an in-depth review and verification of a conservative sample of NCRs and DRs has provided adequate confidence that the deficiency system did not allow conditions in dispositioned NCRs/DRs to remain unreported per 10CFR50.55(e) and 10CFR21.

SAFETY SIGNIFICANCE

LP&L has performed a review of major elements of the construction deficiency reporting/disposition system. The results of this review indicate that, in general, the system was effectively implemented. The procedures contained the basic requirements for documenting and controlling deficient conditions. The deficiencies identified during the review of nonconformances are considered minor in nature and were generally resolved with the addition of documentation or further evaluation. The items dispositioned as rework were based on good engineering practice or management conservatism rather than on safety significance. There is no recognized reason that this issue should constrain fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE

All reviews and required corrective actions are completed.

ATTACHMENTS

1. Ebasco Nonconformance Reports Identified by the NRC.

2. Mercury Nonconformance Reports Identified by the NRC.

REFERENCES

None.

ATTACHMENT 1

EBASCO NONCONFORMANCE REPORTS IDENTIFIED BY THE NRC

The following is a list of EBASCO Nonconformance Reports (NCRs) identified by the NRC in Issue No. 6 and in Supplement 7 to the Safety Evaluation Report (SSER). The list identifies the NRC Concerns with each NCR and the Resolution or Corrective Action. The list also summarizes additional concerns identified as a result of the LP&L Review and the Resolution or Corrective Action. It should be noted that dispositioned NCR's were reviewed for reportability under 10CFR50.55(e) and 10CFR21 and none were found to be reportable.

A. Ebasco NCR's Identified in Issue No. 6

1. NCR W3-1650

(a) NRC CONCERN

How was it determined which bolts to retest when QCP 309 did not require the recording of tester serial number on previous tests?

RESOLUTION OR CORRECTIVE ACTION

All uses of gauge QC 4.2.2 by F&M (QCP-309) were accepted-as-is by ESSE with no further action required.

Tension tester gauge QC 4.2.2 was issued and tracked on Ebasco's M&TE Master Log. Review of this log indicated each contractor that was issued QC 4.2.2 during the time it was out of calibration. Each contractor reviewed his installation records to see if tension testing was done during this time. If so, a description of the work was given to ESSE for evaluation. Each use was accepted as-is by ESSE based upon the small degree of error found during recalibration.

(b) LP&L IDENTIFIED CONCERNS

1. All issuances of subject pressure gauge not properly addressed in NCR.
2. Statement by user of pressure gauge is not acceptable for dispositioning of NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Records of tension tests were evaluated by ESSE of those users (contractors) of gauge not previously addressed.
2. Review conducted of contractor tension test records did not reveal any use of pressure gauge by this individual. Documentation of this review attached to NCR.

2. NCR W3-3912

(a) NRC CONCERNS

1. Involved nine 23J-2 type supports discovered during walkdown for which the fit-up inspection was by-passed. The original NCR disposition failed to address the actions required to prevent the reuse of the items. Attachment No. 14 of this NCR identified this issue which was resolved by stating "it was not required for the disposition of this NCR..." No other NCR was reopened or referenced to resolve the issue.

RESOLUTION OR CORRECTIVE ACTION

1. Support #8 was not removed because of HVAC interferences. This support will be properly tagged as "not to be utilized-nonconforming".
2. Support #13 (angle to plate) would be acceptable for reuse in its intended design application since it would not be possible to cluster enough tubing attachments to reach the yield point of the structure.
3. The remainder of the supports (angle to existing steel) were removed. Since the material is traceable by heat number, it is approved for safety-related applications.

3. NCR W3-3919

(a) NRC CONCERNS

1. 530' more tubing installed than received.
2. Requisition on warehouse (ROW) changed using Liquid Paper.
3. 10% of OCR Packages selected to verify heat number of installed tubing. Only one (1) OCR Package actually reflected heat in question.

RESOLUTION OR CORRECTIVE ACTION

NCR re-opened and re-evaluated by QA Engineering and ESSE. Final evaluation was to accept-as-is based upon the contractor's Material Control Program.

4. NCR W3-4088 (Mercury 491)

(a) NRC CONCERNS

There was no description attached to the NCR to verify that corrective action was accomplished or completed.

4. NCR W3-4088 (Continued)

RESOLUTION OR CORRECTIVE ACTION

1. Found and attached a copy of LP&L CIWA 828372, which was issued to perform the corrective action for NCR-W3-4088,
2. Found and attached a Mercury Q.C. report which verifies adequate completion of corrective action.
3. Found and attached a Mercury weld data report for the replacement welds.
4. Found and attached a copy of drawing 100-T-035-A, which reflects the replacement welds described in #3 above.

(b) LP&L IDENTIFIED CONCERNS

1. Inadequate "use-as-is" justification provided by engineering, for discrepant items B, C, & G on NCR attachment #1.
2. Drawing 100-T-035-A showing the affected instrument line was not attached to the NCR.
3. Supporting weld data documentation was not attached to the NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Obtained and attached additional ESSE evaluations to the NCR.
2. Obtained and attached copy of drawing 100-T-035A to the NCR.
3. Obtained and attached a copy of Mercury's weld data report for the replacement welds.

5. NCR W3-4137 (Mercury #420)

(a) NRC CONCERNS

1. Improper NCR closure and reopening.
2. Incorrect reporting system (DN in lieu of NCR).

RESOLUTION OR CORRECTIVE ACTION

1. NCR-W3-4137 was reopened and processed in accordance with applicable procedures.

(b) LP&L IDENTIFIED CONCERNS

1. NCR Corrective Action did not adequately correct the discrepancies.
2. DN-SQ-1991 was not properly processed in accordance with the applicable procedures.

5. NCR W3-4137 (Mercury #420)

RESOLUTION OR CORRECTIVE ACTION

1. Support was reinspected to provide "as-built" and submitted to engineering for design evaluation. ESSE evaluated the condition to be acceptable and drawing was revised to reflect existing field condition.
2. Corrective action for violation of Procedure WQC-150 (DN in lieu of NCR) cannot be accomplished since subject procedure has been retired.

6. NCR W3-4219

(a) NRC CONCERNS

There are no records for rework or reinspection to indicate satisfactory reinstallation of supports and sample lines.

RESOLUTION OR CORRECTIVE ACTION

Sample line was reworked to original design and tracked on Mercury NCR 684. Reference Attachment #3 of NCR W3-4219 for an acceptable evaluation by Construction Engineering.

7. NCR W3-5563

(a) NRC CONCERNS

1. Inspections signed off by an unqualified inspector.
2. Inspection reports co-signed by Level II inspector 3 years and 5 months later.

RESOLUTION OR CORRECTIVE ACTIONS

NCR reopened and CIWA #011340 written to re-inspect Fuel Handling Building (FHB) Crane. This work was completed and CIWA closed on 11/15/84. The installation was found to be acceptable.

8. NCR W3-5564

(a) NRC CONCERNS

Disposition of NCR for inspection through paint is unacceptable, due to paint precludes adequate visual inspection of the welds.

RESOLUTION OR CORRECTIVE ACTION

Downgrading of FHB stairways from seismic class I to seismic class II eliminates the requirements for visual inspection.

8. NCR W3-5564 (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. No QC verification signature on the sketches provided in attachment #23 of the NCR.
2. Insufficient ESSE evaluation for downgrading seismic Class I stairs in the FHB, to seismic class II.

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco Q.C. performed and documented a verification of the items identified in the stairwell on NCR attachment #23, and attached the results to the NCR as attachment #24.
2. ESSE Electrical and HVAC reviewed the information in NCR attachments #23 and #24, and determined them to be non-safety.

9. NCR W3-5565

(a) NRC CONCERNS

1. The Qualification of the Q.C. inspector who performed the inspection of reeving of the F.H.B. Crane.
2. The documentation of the reinspection was not attached to the NCR as directed by the NCR.

RESOLUTION OR CORRECTIVE ACTION

1. The Fuel Handling Building Crane was turned over to the LP&L with subsequent testing and reinspection performed by the LP&L on 1/29/83 per procedure SPO-40-002.
2. The testing and inspection data performed by LP&L has been attached to the NCR.

(b) LP&L IDENTIFIED CONCERNS

Nonconformance was reopened on April 26, 1984 to add attachment 1A and closed the same day without documented evidence that the investigation as required in the attachment was actually performed.

RESOLUTION OR CORRECTIVE ACTION

Attachment 5 has been added to the NCR to reference LP&L test procedure SPO-40-002 which documented the final functional testing of the subject crane.

10. NCR W3-5586

(a) NRC CONCERNS

1. Welders Test Lab was not on Mercury's qualified suppliers list, and this item was not addressed in the NCR disposition.
2. Statement provided by Welders Test Lab, that "a Mercury Inspector reviewed all tests", is not adequate.

RESOLUTION OR CORRECTIVE ACTION

1. Mercury audits of Welders Test Lab for years 1979, 1980, 1981 & 1982 added as information to verify Mercury surveillance of supplier's activities.

2. Statements from present and former contractor employees and corporate officials added to support the fact that qualified contractor personnel reviewed all tests.

11. NCR W3-6159

(a) NRC CONCERNS:

1. Traceability problems were not identified and addressed by the NCR.
2. The sample used for tensile testing the welds was questionable in that the worst case example should have been used for the test.

RESOLUTION OR CORRECTIVE ACTION

1. All tubetrack materials are purchased, received and maintained by Ebasco's QA Program. Material is requisitioned by subcontractors from the Ebasco warehouse.
2. Calculated stress levels imposed on the weld were conservatively established, taking credit for only 50% of the specified weld length and assuming design basis earthquake.

(b) LP&L IDENTIFIED CONCERNS

1. Six (6) out of twenty-two (22) welds were found to contain weld defects. What was done to increase the sample size?
2. No evidence to indicate the test samples were selected from "Worst Case" installations.

11. NCR W3-6159 (Continued)

RESOLUTION OR CORRECTIVE ACTION

1. QAIRG records review required reinspection of 67% of tube track. No other rejectable conditions were found.
2. Calculated stress levels imposed on the weld were conservatively established, taking credit for only 50% of the specified weld length and assuming design basis earthquake.

12. NCR W3-6165

(a) NRC CONCERN

1. There is no indication of measures taken to preclude recurrence.

RESOLUTION OR CORRECTIVE ACTION

1. A review of filler metal requisitions and T&B time sheets indicates that welder R-7 not R-1 made the weld concerned, and R-1 was not employed during the time the weld was made, therefore, measures taken to preclude recurrence was not necessary.

(b) LP&L IDENTIFIED CONCERNS

1. Documented verification that welder R-1 was not on site should be included.

RESOLUTION OR CORRECTIVE ACTION

1. Review attached to NCR indicating welder R-1 not on site during the time period weld was made.

13. NCR W3-6221

(a) NRC CONCERN

1. Weld control records signed off by Level I Inspector.
2. Letter of designation based on revision of QA Manual not if effect at the time of letter issuance.

RESOLUTION OR CORRECTIVE ACTION

1. LP&L QA evaluated inspectors experience, education, and training and determined the inspector was qualified to perform the designated activities.

14. NCR W3-6511

(a) NRC CONCERNS

1. The NCR only addressed the fact that the maximum gap was violated, should have included undersize weld; lack of fusion; arc strikes and undercut.
2. There are no records of rework or reinspection.

RESOLUTION OR CORRECTIVE ACTION

1. Support was reinspected by Ebasco QC and as-built data supplied to ESSE. ESSE accepted support "as-is".
2. Documentation posted to Mercury installation package to assure update to as-built installation documentation.

15. NCR W3-6597 (Mercury #2870)

(a) NRC CONCERNS

1. NCR exceeded the closure time requirements of ASP-III-7, section 6.1.3.a.

RESOLUTION OR CORRECTIVE ACTION

1. The closure time requirement is generically addressed in Issue #6 report.

(b) LP&L IDENTIFIED CONCERNS

1. No traceability for installed bolt, nut and lockwasher.
2. No torquing for the bolting above.
3. DCN not referenced on drawing.
4. Were new Hilti's installed?
   If this was a re-verification of torque, where is original torque documentation?

RESOLUTION OR CORRECTIVE ACTION

1. None required - purchased commercial grade with C of C provided by supplier.
2. No torque value required.
3. DCN was incorporated on drawing.
4. New Hilti's were not installed. This was the original torque inspection.

16. NCR W3-6623

(a) NRC CONCERNS

1. What actions were done to assure that no additional heat numbers were falsified?
2. Identity of the person who forged the signature and entered the incorrect heat numbers on the Quality Records.

RESOLUTION OR CORRECTIVE ACTION

1. A review of all installed process tubing records back to their applicable CMTR was performed by Ebasco QAIRG.
2. Identity of person is unknown and cannot be ascertained since contractor is no longer on site.

(b) LP&L IDENTIFIED CONCERNS

1. Evidence that the "untraceable" material was returned to the warehouse or scrapped.
2. Evidence that a search for additional falsified records was performed with regard to the Mercury program.

RESOLUTION OR CORRECTIVE ACTION

1. Warehouse records were researched no evidence of return was found.
2. QAIRG and LP&L turnover review found no other cases of falsification.

17. NCR W3-6723

(a) NRC CONCERNS

F&M procedure QC-309 violated ANSI N45.2 Section 13, because it did not require the tension tester serial number, pressure gage number or calibration date to be recorded.

RESOLUTION OR CORRECTIVE ACTION

During the time frame involved there were only two (2) pressure gauges/tension testers that were utilized sitewide, QC 4.2.1 & QC 4.2.2. These gauges were maintained under Ebasco's M&TE procedure WQC-4. Copies of the calibration records are attached to NCR-W3-7184.

18. NCR W3-6786

(a) NRC CONCERN

1. Possible heat numbers not recorded on the as-built drawings.
2. NCR did not address where the required heat numbers were recorded.
3. NCR did not address how traceability was maintained.

RESOLUTION OR CORRECTIVE ACTION

1. NCR-W3-4593 was reopened and addressed the following:

   a. Verified that any tubing purchased non-safety was not used in a safety application or was replaced.
   b. Site procedure required material purchased non-safety to be identified (i.e. painting, marking, etc.)
   c. NCR-W3-4593 S/1 was referer -d in all Mercury P2 and P3 OCR packages where dir ' traceability is not documented.
   d. A list of manufacturers and heat numbers for tubing is attached to NCR-W3-6786 and 4593.

(b) LP&L IDENTIFIED CONCERNS

1. Heat numbers not posted to "As-Built" drawings.
2. NCR did not adequately address if the "PAB" (Preliminary As Built) Program.
3. The NCR did not determine if all possible heat numbers were traceable to the safety/non-safety installations and/or to the applicable P.O.

RESOLUTION OR CORRECTIVE ACTION

1,2&3 NCR-W3-4593 was re-opened, redispositioned and addressed the concerns as stated above for NCR-W3-6786. NCR-W3-4593 S/1 with attachments addressing heat numbers added to NCR-W3-6786.

19. NCR W3-7099

(a) NRC CONCERNS

1. No documentation to adequately support the NCR Disposition.

RESOLUTION OR CORRECTIVE ACTION

1. Stress calculations utilized as a basis for disposition have been attached to the NCR.

19. NCR W3-7099 (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. Cracks in heat affected zone of cabinets 48A & B.
2. Smaller than design embed plates.
3. Flare bevel in lieu of fillet welds.

RESOLUTION OR CORRECTIVE ACTION

1. Cracks evaluated and accepted by ESSE based on low stress.
2. Embed plates are the correct size; cabinet 48A requires a split 4"x4"x3/8 tube steel (which leaves 3" wide exposure) and cabinet 48B required a 4" wide plate.
3. Flare bevels, fillets and lengths accepted by ESSE based on design calculations indicating low stresses in weld.

20. NCR W3-7139

(a) NRC CONCERNS

QC data in NCR was incorrect for 2 of 3 radiation monitors.

RESOLUTION OR CORRECTIVE ACTION

NCR re-opened and letter of clarification and inspection report added to NCR.

(b) LP&L IDENTIFIED CONCERNS

F&M Inspection Report #303-71-624 contains only sheet 1 of 3 and does not include a list of the discrepant supports.

RESOLUTION OR CORRECTIVE ACTION

Sheets 2 and 3 of Inspection Report added.

21. NCR W3-7140

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

21. NCR W3-7140 (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. Traceability of rework materials not recorded.

RESOLUTION OR CORRECTIVE ACTION

1. Rework consisted of additional welding only, filler metal requisition form enclosed in documentation of NCR.

22. NCR W3-7177

(a) NRC CONCERNS

1. No calibration of pressure gauge used on expansion anchor tension tester.
2. Requirement that three additional anchors be tested after failure of one not adhered to.

RESOLUTION OR CORRECTIVE ACTION

1. Inspectors signature attests that tension testing was performed per governing specification.
2. Subsequent retests were performed with acceptable results.

23. NCR W3-7179

(a) NRC CONCERN

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

NCR is acceptable

RESOLUTION OR CORRECTIVE ACTION

None required.

24. NCR W3-7180

(a) NRC CONCERNS

F&M procedure QC-309 violated ANSI N45.2 Section 13, because it did not require the tension tester serial number, pressure gage number or calibration date to be recorded.

RESOLUTION OR CORRECTIVE ACTION

During the time frame involved there were only two (2) pressure gauges/tension testers that were utilized sitewide, QC 4.2.1 & QC 4.2.2. These gauges were maintained under Ebasco's M&TE procedure WQC-4. Copies of the calibration records are attached to NCR-W3-7184.

25. NCR W3-7181

(a) NRC CONCERNS

F&M procedure QC-309 violated ANSI N45.2 Section 13, because it did not require the tension tester serial number, pressure gage number or calibration date to be recorded.

RESOLUTION OR CORRECTIVE ACTION

During the time frame involved there were only two (2) pressure gauges/tension testers that were utilized sitewide, QC 4.2.1 & QC 4.2.2. These gauges were maintained under Ebasco's M&TE procedure WQC-4. Copies of the calibration records are attached to NCR-W3-7184.

26. NCR W3-7182

(a) NRC CONCERNS

F&M procedure QC-309 violated ANSI N45.2 Section 13, because it did not require the tension tester serial number, pressure gage number or calibration date to be recorded.

RESOLUTION OR CORRECTIVE ACTION

During the time frame involved there were only two (2) pressure gauges/tension testers that were utilized sitewide, QC 4.2.1 & QC 4.2.2. These gauges were maintained under Ebasco's M&TE procedure WQC-4. Copies of the calibration records are attached to NCR-W3-7184.

27. NCR W3-7184

(a) NRC CONCERNS

F&M procedure QC-309 violated ANSI N45.2 Section 13, because it did not require the tension tester serial number, pressure gage number or calibration date to be recorded.

RESOLUTION OR CORRECTIVE ACTION

During the time frame involved there were only two (2) pressure gauges/tension testers that were utilized sitewide, QC 4.2.1 & QC 4.2.2. These gauges were maintained under Ebasco's M&TE procedure WQC-4. Copies of the calibration records are attached to NCR-W3-7184.

28. NCR W3-7432

(a) NRC CONCERNS

1. Concrete preplacement & post-placement documentation could not be matched.
2. No specific references were used for voiding the NCR.
3. QA Engineer approved the recommended disposition and then voided the NCR.

RESOLUTION OR CORRECTIVE ACTION

1. NCR-W3-7431 R1 addressed curing violations. NCR-W3-7435 addressed the placement documentation.
2. Late entry added to NCR-W3-7432 referencing NCR's W3 7431 R1 & W3-7435.
3. Not a procedural violation per ASP-III-7 Rev. 5. The recommended disposition was approved 11/23/83; NCR was voided 1/16/84.

29. NCR W3-7533

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

NCR is acceptable.

RESOLUTION OR CORRECTIVE ACTION

None required.

30. NCR W3-7547

(a) NRC CONCERNS

1. Improper engineering evaluation is demonstrated with an accept-as-is disposition based on an acceptable hydrostatic test.

RESOLUTION OR CORRECTIVE ACTION

The disposition was based on prior acceptance of fit-up and final weld inspection and that the pressure boundary had not been violated therefore no hydrostatic test is required.

(b) LP&L IDENTIFIED CONCERNS:

1. Is the fit-up of FW-5 acceptable?

RESOLUTION OR CORRECTIVE ACTION

1. Radiographic examination of FW-5 was performed and fit-up gap engagement requirements were met.

B. Ebasco NCR'S Identified in Supplement 7 to the SSER

The following Ebasco NCR's were identified by the NRC in Supplement 7 to the Safety Evaluation Report published October 1, 1984.

1. NCR W3-3947

a) NRC CONCERN

Fit-up inspection was by-passed and the support had been completely welded out with only the welder's identification number.

RESOLUTION OR CORRECTIVE ACTION

Inspection revealed an acceptable heat number (15537) of ¼" angle and filler metal withdrawal authorization slip furnished for hanger. An additional visual inspection revealed an acceptable final weld.

2. NCR W3-4593

a) NRC CONCERN

Disposition inadequate.

RESOLUTION OR CORRECTIVE ACTION

NCR was re-opened as Supplement 1 (S/1) since original disposition of NCR-W3-4593 had not been correctly implemented. Mercury's material control program was analyzed based on purchase of materials, material identification and dimensional verification.

In April, 1984, NCR-W3-4593 S/1 was closed. Based on this analysis, it can be shown that safety-related tubing of correct size and wall thickness was installed by Mercury. Therefore, having addressed the requirements of a material control program and identified and corrected deficiencies noted, direct heat traceability is not required for Mercury tubing installation.

In addition, NCR-W3-4593 S/1 was referenced in all of Mercury's P2 and P3 OCR packages where direct traceability was not documented, and a document was attached, which provided a list of manufacturers of tubing, and heat numbers furnished.

3. NCR W3-5819

a) NRC CONCERN

Identified the problem of instrumentation supports being painted prior to final weld visual inspection. Disposition had been to inspect the welds through paint which was unacceptable.

RESOLUTION AND CORRECTIVE ACTION

NCR supplemented with ESSE evaluation "Reinspection of Welds through Paint for Size and Profile" for additional justification.

4. NCR W3-5973

a) NRC CONCERN

None were identified in the Allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

4. NCR W3-5973 (Continued)

b) LP&L CONCERN

NCR is acceptable.

RESOLUTION OR CORRECTIVE ACTION

None required.

5. NCR W3-5974

a) NRC CONCERNS

The NCR's disposition is questionable as the problem still existed in that safety and non-safety grade material could have been mixed.

RESOLUTION OR CORRECTIVE ACTION

The attachments added to NCR as a result of corrective action were the back-up data used in verifying whether or not the material was safety related. Each Seismic I hanger/piping system component was verified by the QAIRG group as being safety related. Those items which were found to be non-safety were removed and safety material installed.

6. NCR W3-6514

a) NRC CONCERN

Mercury installed supports without material traceability.

RESOLUTION OR CORRECTIVE ACTION

Bergen Patterson designed supports, other than ASME NF supports, do not require traceability. The structural members were supplied by Bergen Patterson and were received with a certificate of compliance.

b) LP&L CONCERN

Attachment No. 6, Item 1 is not justification for closure of NCR.

RESOLUTION OR CORRECTIVE ACTION

A late entry note added to Attachment No. 6 provided an expanded discussion on the use and acceptance of letter F-61147E. The statement (Item 1) of Attachment No. 6, in conjunction with Items 2 and 3 of the Attachment, were the basis for closing this NCR.

7. NCR W3-6719

a) NRC CONCERNS

The hydrostatic test conditions were assumed by Ebasco to be the "worst case" and therefore that "all" other hydrostatic tests performed by Mercury were deemed satisfactory. This was not the case, since only one test was reviewed by Ebasco.

RESOLUTION OR CORRECTIVE ACTION

Attachment No. 17 written by ESSE clarifying justification of selection of worst case condition and providing support calculations.

ATTACHMENT 2

MERCURY NONCONFORMANCE REPORTS IDENTIFIED BY THE NRC

The following is a list of Mercury Nonconformance Reports (NCR's) identified by the NRC in Issue No. 6 and in Supplement 7 to the Safety Evaluation Report (SSER). The list identifies the NRC concerns with each NCR and the Resolution or Corrective Action. The list also summarizes any additional concerns identified as a result of the LP&L Review and the Resolution or Corrective Action. It should be noted that dispositioned NCR's were reviewed for reportability under 10CFR50.55(e) and 10CFR21 and none were found to be reportable.

A. Mercury NCR's Identified in Issue No. 6

1. NCR-180 (Ebasco NCR W3-6839)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

1. No objective evidence provided for "as-built" condition of the discrepant Hilti's for the Engineering Evaluation.

RESOLUTION OR CORRECTIVE ACTION

1. Testing was performed on bolts with an embedment of 3" where field installation procedures required 3½". Results of re-inspection of Hilti bolts under records review and NI instrument walkdowns have found the as-built conditions to be generally acceptable. Any Hilti bolts without letter designation were ultrasonicly tested for length to determine proper embedment.

2. NCR-255

(a) NRC CONCERN

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

The documentation of the corrective action was not available for eight of the fourteen supports requiring retorque.

RESOLUTION OR CORRECTIVE ACTION

The supports identified as having misplaced documentation were reinspected. This action has been completed with acceptable results and attached within the N.C.R. package.

3. Mercury NCR-268

(a) NRC CONCERN

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

1. This NCR is not a rework as stated, it is a "use-as-is" since as-built information is to be redlined.
2. Should have been up-graded to an Ebasco NCR.
3. No objective evidence Ebasco Engineering has approved the as-built conditions.
4. All deficiencies identified in the description are not addressed in the disposition completed section of the NCR.
5. There is not objective evidence to indicate that all existing field conditions have been incorporated into the redline drawing.
6. NCR was written 1/26/82 and closed 12/22/82. Training records supplied for corrective action are dated 11/29/82 (due to updated revision of five procedures released this date) and 6/17/84 (due to Ebasco audit) there is no evidence of timely retraining of personnel per disposition of NCR.

RESOLUTION OR CORRECTIVE ACTION

1. The NCR represents a procedural violation for failure to redline the drawing prior to the installation of the supports. There was no physical rework due to the actual installation being acceptable. This NCR was written as an in-process deficiency due to the inspector's findings during walkdown inspection.
2. The NCR was not used to accept a deviation from design requirements, thus, did not require upgrading to an Ebasco NCR.
3. As-built conditions were in accordance with Ebasco guidelines provided to Mercury in the specifications and drawings.
4. The deficiencies identified were addressed by redlining the drawing and requiring the training to address the procedural violation.
5. Copy of the drawing is attached.
6. No specific training records could be located for this NCR. However, as a result of SCD #57, all Mercury personnel were retrained. This training addressed redlining.

4. NCR-363

(a) NRC CONCERN

An Authorized Nuclear Inspector (ANI) review was not performed for installation of strongback support lugs to ASME process pipe.

RESOLUTION OR CORRECTIVE ACTION

ASME process pipe is class 3 and does not require ANI review.

(b) LP&L IDENTIFIED CONCERNS

1. Mercury NCR should have been upgraded to an Ebasco NCR.
2. Mercury Project Engineer did not verify similar installations for like condition.

RESOLUTION OR CORRECTIVE ACTION

1. ESSE approved the existing condition by issuance of an DCN.
2. Ebasco QA reviewed similar installations and the review results were placed with the Mercury NCR File.

5. NCR-380 (Ebasco NCR-W3-4015)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

1. Three sets of weld data records for support 604-70 are attached to the NCR. Unable to determine which record is being used as a basis for acceptability.
2. Mercury documentation cannot be found for welding performed by welder M-229.

RESOLUTION OR CORRECTIVE ACTION

1. NCR-W3-4015 was revised to NCR-W3-4015 R-1 for clarification of this discrepancy.
2. Research by Ebasco revealed that welder M-229 was qualified to perform the welding on the anchor plates.

6. NCR-420 (Ebasco NCR W3-4137)

See Ebasco NCR W3-4137 - (Attachment 1, Item A.5)

7. NCR-429 (Ebasco NCR W3-3965)

   (a) NCR CONCERNS

   None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

   (b) LP&L IDENTIFIED CONCERNS

   NCR is acceptable.

   RESOLUTION OR CORRECTIVE ACTION

   None required.

8. NCR-438 (Ebasco NCR W3-4013)

   (a) NRC CONCERN

   None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

   (b) LP&L IDENTIFIED CONCERNS

   1. The disposition did not address the action taken to preclude the use of the angle iron that was removed from the Mercury support.

   RESOLUTION OR CORRECTIVE ACTION

   The piece of angle was removed from the Mercury support, thereby resolving the nonconforming condition. Maintaining traceability of non-safety material (angle) is not required.

9. NCR-487 (Ebasco NCR W3-4044)

   (a) NRC CONCERNS

   None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

   (b) LP&L IDENTIFIED CONCERNS

   1. Item No. 15 - Attachment #3 - Evaluation does not provide evidence that drawing has been redlined to reflect field conditions. Calculations should also be attached to verify additional loads for the attachment steel.
   2. Per field verification, tubing for pressure indicator PI-SI-7140 has reverse slope and loose clamp.

9. NCR-487 (Ebasco NCR W3-4044) (Continued)

RESOLUTION OR CORRECTIVE ACTION

1. The referenced item conforms to the hanger detail, therefore, Mercury drawing 160-T-033A does not require redlining. Calculations for the attachment steel have been attached to the NCR.
2. Additional engineering evaluation has been added to address the reverse slope and the loose clamp has been corrected.

10. NCR-491 (Ebasco NCR W3-4088)

See Ebasco NCR W3-4088 - (Attachment 1, Item A.4)

11. MERCURY NCR-528 (Ebasco NCR W3-4824)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

1. No statement or documentation was attached to the NCR to resolve traceability of heat #M2245.
2. Disposition of NCR fails to state whether the correct ID# was etched on the plate.
3. No documentation was attached to the NCR to verify corrective action taken.

RESOLUTION OR CORRECTIVE ACTION

1 & 3. Attached a copy of MRR-77-11206 to NCR, indicating heat code MZ-245 (M2245), and associated supplier C of C.
2. Field verified heat number 7428779 on anchor plate.

12. NCR-540

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

12. NCR-540 (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. Documentation not attached to NCR for replacement of support locator #31.
2. Documentation not attached to NCR for replacement of tubing that had cold spring.

RESOLUTION OR CORRECTIVE ACTION

1. Mercury documentation was attached to NCR for replacement of support locator #31 with an acceptable support locator #33.
2. Mercury documentation was attached to NCR for replacement of tubing with cold spring.

13. NCR-554

(a) NRC CONCERNS

No documented evidence of corrective action for hanger deficiencies identified during walkdown.

RESOLUTION OR CORRECTIVE ACTION

Documentation search and re-inspection established rework was accomplished.

(b) LP&L IDENTIFIED CONCERNS

1. No welding documentation for repair of supports.
2. No inspection documentation for repair of supports.
3. Inadequate documentation of corrective action to correct elongated holes in tube track.

RESOLUTION OR CORRECTIVE ACTION

1 & 2. Documentation search and reinspection established rework was accomplished.

3. Reinspection established rework was accomplished.

14. NCR-560 (Ebasco NCR W3-5428)

(a) NRC CONCERNS

None identified in the allegation associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

14.. NCR-560 (Ebasco NCR W3-5428) (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. The NCR was closed without the appropriate documentation being attached to verify revision of drawing #163-L-003A and Support Inspection Reports.

RESOLUTION OR CORRECTIVE ACTION

1. A review of drawing #163-L-003A revealed the required revision to reflect locators 3, 4, and 5 to be 000-H-150-N. A copy of the drawing has been attached.
2. Copies of the Support Inspection Reports for each support locator 3, 4, and 5 have been attached.
3. CIWA 011645 was issued for reverification of the torque on Hilti bolts for supports 3 and 4.

15. NCR-565 (Ebasco NCR W3-4730)

(a) NRC CONCERNS

None identified in the allegation associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

The review of Mercury NCR-3243 which was issued to resolve items #1 and 2 of NCR-565 fails to provide adequate documentation to determine resolution.

RESOLUTION OR CORRECTIVE ACTION

The required documentation has been obtained from Mercury files and added to the NCR to resolve comments.

16. NCR-568 (Ebasco NCR-W3-4730)

(a) NRC CONCERNS

No documentation was attached to the NCR as objective evidence for corrective action taken.

(b) LP&L IDENTIFIED CONCERNS

The disposition of items #2, 3, 4, and 5 fail to provide adequate engineering basis for accept-as-is.

16. NCR-568 (Ebasco NCR-W3-4730) (Continued)

RESOLUTION OR CORRECTIVE ACTION

Items #2, 3, 4, and 5 were inspected for compliance to FCR-IC-579 (basis for accept-as-is of elongated holes). Items 3, 4, and 5 were acceptable. Item 2 was acceptable after evaluation by Design Engineering.

17. NCR-591 (Ebasco NCR-W3-4206)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

1. The analysis conducted for this NCR was not attached, including ESSE concurrence.

RESOLUTIONS OR CORRECTIVE ACTION

1. Calculations were performed by ESSE to substantiate analysis described in NCR. Analysis was attached to the NCR.

18. NCR-594 (Ebasco NCR-W3-5557)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

No documentation that drawing has been redlined.

RESOLUTION OR CORRECTIVE ACTION

Support in question is a typical detail and therefore not red-lined. Deviation is referenced appropriately in OCR package.

19. NCR-595 (Ebasco NCR-W3-4197)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

19. NCR-595 (Ebasco NCR-W3-4197) (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. Several supports installed which are not per an approved installation detail.

RESOLUTION OR CORRECTIVE ACTION

1. Description of NCR incorrectly written as Locator "5" was actually installed as Locator "23".
2. The anchor plate installation for Locator "23" is acceptable per the general notes section of the B-430 series detail drawings.
3. Attachments to NCR were made to clarify installation details.

20. NCR-614 (Ebasco NCR W3-4219)

See Ebasco NCR W3-4219 - (Attachment 1, Item A.6)

21. NCR-625 (Ebasco NCR-W3-5282)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

(b) LP&L IDENTIFIED CONCERNS

1. One weld sign-off for two welds.
2. Reason for voiding installation and location information.

RESOLUTION OR CORRECTIVE ACTION

1. Inspection reports identify welder of both joints.
2. Information voided due to redline #6.

22. NCR-656 (Ebasco NCR-W3-4303)

(a) NRC CONCERNS

None were identified in the allegations associated with this issue in Supplement 7 to the Safety Evaluation Report (SSER).

22. NCR-656 (Ebasco NCR-W3-4303) (Continued)

(b) LP&L IDENTIFIED CONCERNS

1. Process tubing supports installed without approved installation details.

RESOLUTION OR CORRECTIVE ACTION

1. Design Engineering reevaluated to accept-as-is per notation on installation detail of supports.
2. The current as-built condition was reverified by Ebasco QA Surveillance Engineering.

23. MERCURY NCR-658

(a) NRC CONCERNS

No documentation was attached to the NCR as objective evidence for corrective action taken.

RESOLUTION OR CORRECTIVE ACTION

1. A field verification by EBASCO revealed that corrective action per the NCR's disposition had been correctly performed.
2. Found and attached to the NCR, a Mercury anchor inspection report for retorquing of Hilti bolts.

(b) LP&L IDENTIFIED CONCERNS

No documentation was attached to the NCR as objective evidence for corrective action taken.

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco field verification revealed that corrective action per the NCR's recommended disposition had been properly performed (see Ebasco General Inspection report SW-913).

2. Found and attached to the NCR, a Mercury anchor inspection report for retorquing of Hilti bolts.

B. MERCURY NCR's IN SUPPLEMENT 7 TO THE SSER

The following Mercury NCR's were identified by the NRC in Supplement 7 to the Safety Evaluation Report (SSER) published October 1, 1934. Mercury NCRs 888 and 889 were determined to have been administratively closed and accordingly are addressed in the response to Issue 13.

1. NCR-313

(a) NRC CONCERNS

Identified seven ½ inch stainless steel lines for P2 instruments that were damaged by weld spatter. The NCR stated that the lines were replaced and documented as such in operational control record (OCR) 995 and OCR 1020, but it could not be ascertained from these rework packages that the repair and reinspection was either started or completed. There was no documentation with these NCR's to prove that corrective action was completed.

(b) LP&L IDENTIFIED CONCERNS

The documentation of the corrective action was not included in the Mercury NCR package.

RESOLUTION OR CORRECTIVE ACTION

1. Documentation was copied from the referenced OCR packages, reviewed and added to the NCR package.

2. A reinspection was performed by Ebasco QC Inspector and the satisfactory QC Inspection Report was added to the NCR package.

2. NCR-322

(a) NRC CONCERNS

Identified seven ½ inch stainless steel lines for P2 instruments that were damaged by weld spatter. The NCR stated that the lines were replaced and documented as such in operational control record (OCR) 995 and OCR 1020, but it could not be ascertained from these rework packages that the repair and reinspection was either started or completed. There was no documentation with these NCR's to proved that corrective action was completed.

(b) LP&L IDENTIFIED CONCERNS

The NCR package was lacking documentation to support closure of the NCR.

2. NCR-322 (Continued)

RESOLUTION OR CORRECTIVE ACTION

1. Documentation was retrieved from the referenced OCR package and added to the NCR package.

2. A reinspection was performed by Ebasco QC Inspector and the satisfactory QC Inspection Report was added to the NCR package.

3. NCR-337

(a) NRC CONCERNS

Identified seven ½ inch stainless steel lines for P2 instruments that were damaged by weld spatter. The NCR stated that the lines were replaced and documented as such in operational control record (OCR) 995 and OCR 1020, but it could not be ascertained from these rework packages that the repair and reinspection was either started or completed. There was no documentation with these NCR's to proved that corrective action was completed.

(b) LP&L IDENTIFIED CONCERNS

The NCR package was lacking documentation to support closure of the NCR.

RESOLUTION OR CORRECTIVE ACTION

1. The referenced OCR package was researched and records needed to support closure of the NCR were reviewed and found to be acceptable.

2. An inspection was performed by Ebasco QC Inspector with satisfactory results. QC Inspection Report was added to the NCR package.

4. NCR-572

(a) NRC CONCERNS

Noted that the weld on support locator #26 was undersized. The NCR stated that the weld was reworked and weld metal added to bring weld to sufficient size. There was no reference as to what OCR was issued to perform this rework or traceability of weld metal used in the performance of this job. Also, there were no inspection reports identified or contained in the package.

4. NCR-572 (Continued)

RESOLUTION OR CORRECTIVE ACTION

1. Support No. 26 was redesignated as support No. 1714-33 by Redline No. 6 of Drawing No. 163-T-013-A.

2. A copy of documentation for weld build up was located and placed in file.

5. NCR-673

(a) NRC CONCERNS

Identified problems with instrument tubing installed by OCR #723.

(b) LP&L IDENTIFIED CONCERNS

The lines identified by Mercury NCR-673 were identified as P7N3 class lines and are covered by the requirements of ANSI B31.1. The corrective action was to be tracked and resolved by Mercury Co. Engineering Department. Documentation was not in NCR folder to show that the problem was tracked and resolved.

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco re-inspected these lines on 8/2/84 and found that the discrepancies noted in this NCR had been corrected, and the condition no longer existed.

2. Copies of documentation to verify the re-inspection were placed in the NCR folder.

6. NCR-674

(a) NRC CONCERNS

Identified problems with the electromagnetic control panel worked by OCR #1246.

(b) LP&L IDENTIFIED CONCERNS

Documentation was missing from NCR folder to support disposition and closure of NCR.

6. NCR-674 (Continued)

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco reinspected the supports and tubing addressed on this NCR, and ESSE accepted the installation as-is.

2. Copies of the inspection and evaluation were placed in the NCR folder for support documentation to justify disposition and closure of this NCR.

7. NCR-675

(a) NRC CONCERNS

Identified problems with instrument tubing installed by OCR #720.

(b) LP&L IDENTIFIED CONCERNS

Documentation was not in NCR folder to support disposition and closure of the NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Documentation was located to show that Ebasco performed an inspection and copy of the inspection report was placed in the NCR folder.

8. NCR-676

(a) NRC CONCERNS

Identified problems with instrument tubing installed by OCR #720.

(b) LP&L IDENTIFIED CONCERNS

Documentation was not in the NCR folder to justify closure of this NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco inspected the tubing and found that the minor bow would not affect the applicable pressure switch. ESSE concurred and accepted the installation as-is.

2. Copies of the evaluation have been placed in the NCR folder to support closure of the NCR.

9. NCR-677

(a) NCR CONCERNS

Identified problems with instrument tubing installed by OCR #1332.

(b) LP&L IDENTIFIED CONCERNS

Documentation not available in NCR folder to support disposition and closure of this NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco re-inspected the tubing addressed by this NCR and ESSE accepted the installation as-is.

2. Copies of the inspection and evaluation have been placed in the NCR folder to support disposition and closure of this NCR.

10. NCR-678

(a) NRC CONCERNS

Identified problems with instrument tubing installed by OCR #723.

(b) LP&L IDENTIFIED CONCERNS

Sufficient documentation not in NCR folder to support disposition and closure of NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Ebasco re-inspected the tubing addressed in this NCR, and the results were evaluated by ESSE to use-as-is.

2. Copies of the inspection and evaluation have been placed in the NCR folder to support disposition and closure of this NCR.

11. NCR-806 (Ebasco NCR W3-7547)

(a) NRC CONCERNS

Ebasco NCR W3-7547 noted discrepancies against OCR#1830 and Mercury NCR-806. The disposition of this NCR is unsatisfactory due to the system passing a hydrostatic test is used as the basis for accountability of fit-up discrepancy.

11. NCR-806 (Ebasco NCR W3-7547) (Continued)

RESOLUTION OR CORRECTIVE ACTION

See Attachment 1, Item A.30 (Ebasco NCR W3-7547).

12. NCR-2234 (Ebasco NCR W3-4593)

(a) NRC CONCERNS

Stated that no heat numbers could be verified between FW13 and FW13R. This is for OCR#666, System 52B. The recommended disposition was per Attachment #4 of NCR W3-4593.

(b) LP&L IDENTIFIED CONCERNS

Documentation not available is NCR folder to support disposition and closure of NCR.

RESOLUTION OR CORRECTIVE ACTION

1. Copies of the referenced attachment of Ebasco NCR W3-4593 were placed in this NCR package.

2. Documentation necessary to support closure of this NCR was added to the package as supplemental information.

13. NCR-3149

(a) NRC CONCERNS

Indicated that there was no documented indications that welder M-343 was qualified to welding procedure specification D (WPS-D). Disposition of this problem was by use of a weld test coupon subsequently found on April 27, 1983, but no longer available. No documentation existed on the qualification of this welder or on his retest. Thus, all welds made by this welder were suspect.

(b) LP&L IDENTIFIED CONCERNS

Documentation was not available in NCR folder to support justification and closure of this NCR.

RESOLUTION OR CORRECTIVE ACTION

The welder's (M-343) certification records were located and placed in the NCR folder.

RESPONSE

ITEM NO: 7 (Final)

TITLE: BACKFILL SOIL DENSITIES

NRC DESCRIPTION OF CONCERN:

The staff found that records are missing for the in-place density test of backfill in Area 5 (first 5' starting at Elevation -41.25'). These documents are important because the seismic response of the plant is a function of the soil densities.

LP&L shall (1) Conduct a review of all soil packages for completeness and technical adequacy and locate all records and provide closure on technical questions, or (2) conduct a review of all soil packages for completeness and technical adequacy and where soil volumes cannot be verified by records as meeting criteria, perform and document actual soil conditions by utilizing penetration tests or other methods, or (3) Justify by analysis that the soil volumes with missing records, or technical problems as defined after the records review, are not critical in the structural capability of the plant under seismic loads.

DISCUSSION:

LP&L has reviewed all soils packages for completeness and technical adequacy, has located the items found missing by the staff, has identified those soil volumes for which complete records were not found, and has justified by analysis that the structural capability of the plant under seismic loads is assured. A detailed engineering report has been prepared and attached to this response describing the review and analysis of the soil backfill densities, which reconfirms the adequacy of the backfill. This was also repeatedly demonstrated in the seven (7) statistical studies of backfill densities performed during the construction period, which showed good control of the work was achieved and specification requirements generally exceeded.

The following discussion is a summary of the findings of the attached report.

The design criterion for the backfill was to obtain a liquefaction free material at 75% relative density. To confirm compliance with this design criterion, a detailed three stage program was implemented to perform a review for completeness and analysis of backfill soil density and inspection reports for technical adequacy which verifies the structural capability of the plant under seismic loading conditions.

The program effort was conducted under the direction of the Ebasco Site Soils Engineer who was present during the performance of the majority of the actual backfilling operations. Two basic sets of evaluations were performed, the first on soil backfill test records, and the second on the corresponding inspection Reports.

During the Stage I effort, a detailed search was made of all locations containing soil backfill data. Additional test records and inspection reports were obtained from contractor and laboratory files and also Engineering, Laboratory and Quality Control indices and tabulations were retrieved.

Once the packages of soil data were located and collected, Stage II activities concentrated on a review of the documents for completeness and a compilation of the data into a format amenable to review of the NRC concerns.

Included in the review were each type of Inspection Report and each type of test record in the soil packages. It was determined that the complete set of test records and a nearly complete set of inspection reports had been located.

In direct response to the first paragraph of the Description of the NRC Concern, the data for the 34 in-place density tests performed in the first 5.5' of Class A fill placed in Fill Area #5 from Elevation -41.75 to EL -36.25, has been located.

Stage III activities consisted of engineering evaluation of the data gathered and organized in Stages I and II. The results of the Stage II and III evaluations for completeness and technical adequacy for both the test records and inspection reports are summarized as follows:

(A) EVALUATION OF TEST RECORDS

Test records deal with quantitative attributes of the fill such as density, moisture content and gradation. The test most indicative of quality is density, since it relates directly to liquefaction potential, however, the other attributes were also reviewed for acceptability.

Utilizing the complete package of final backfill test records, totalling approximately 3100 tests, overlay plots of relative density were constructed at each one foot interval of elevation and laboratory test data were tabulated during the Stage II effort. These documents represent a graphical plot of density test frequency and distribution, and tabulate and display the final insitu relative densities.

The Stage III review and evaluation of the technical adequacy of the Class A backfill to provide structural stability of the plant under seismic loadings was based upon a comparison of the design requirements as stated in the Ebasco Specification LOU-1564.482 with existing documentation and with the relative density plots prepared in this review. These plots are available in the Site Quality Assurance Records Vault. These plots demonstrate satisfaction of requirements for test frequency and distribution throughout the fill volume.

The evaluation included each type of test record required by the governing specifications and procedures and analyzed:

- The completeness of all test records
- The testing frequency and distribution of in place density tests
- The frequency of laboratory control tests
- The performance of statistical studies
- The Class A Backfill relative density

The results of these analyses are as follows:

(1) The Class A backfill soil testing records are complete.

(2) Field density and laboratory density and gradation tests were generally performed in accordance with the specified frequencies.

In less than 8% of the cases reviewed, the laboratory control tests were run at intervals slightly larger than the specified (one control set per ten field density tests) criteria. The backfill placed during these periods was randomly located throughout the fills and the relative densities obtained during these intervals were found to be in compliance with the specification requirements. This variance was therefore evaluated to be acceptable.

(3) Field tests were located in accordance with the specified random distribution. In less than 5% of the tests reviewed, the location coordinates of the inplace density tests were found to be in error. These tests were still a valid indicator of the relative density of the backfill at a random spot at a known elevation in a known fill area and were therefore deemed to be acceptable tests.

(4) Statistical studies of relative density were performed in accordance with the specification requirements.

(5) The Class A backfill soil densities are in accordance with the specification requirements and will provide the required design structural capability to the plant under seismic loads.

(B) EVALUATION OF INSPECTION REPORTS

Inspection records generally deal with qualitative attributes of the fill such as proper preparation of the fill surface and cleanliness of fill received. Production-related quantitative information such as fill location, elevation and area are also provided.

During the Stage II review activity, the total file of inspection reports for Class A backfill was inventoried and combined into compatible soil packages. Included in the inventory were approximately 12,000 inspection reports ranging from EL -44 to EL+20 throughout all seven fill areas. The reports were grouped and compiled by fill location, elevation and placement date for each of the five types of inspection forms and summarized in several tabulations.

The evaluation of these inspection reports was divided into two phases: the evaluation of the inspection reports to determine their overall completeness, and the evaluation of the frequency and distribution of inspection reports to determine their content.

Two comparative analyses were performed to determine the relative completeness of the inspection documentation. The first analysis performed was a comparison of the quantity of inspection packages to testing packages throughout the fills, while the second compared the documented surface area of inspection to the total surface areas of the fill placement.

Once completeness of inspections was established, an additional analysis was performed to define the magnitude, the distribution and significance of the documentation found to be missing. This analysis evaluated the distribution of each type of inspection report by fill location and elevation, and determined types of missing documentation and the amounts of backfill by volume affected. The results of this analysis are as follows:

(1) The distribution of the existing inspection documentation throughout the backfill is essentially identical to the distribution of the field testing effort in that where inspection reports are found for a given fill area and elevation, a density test report is also found, thus indicating a one to one relationship between inspection and testing activities. This is an expected trend since the inspection activity included ordering tests performed. It is therefore concluded that the inspection activity took place whenever tests are found and that missing inspection reports are not indicative of lack of inspection activity.

(2) Eighty percent of the volume of the backfill has a sufficient quantity of each type of inspection report to fulfill the requirements of the specification and inspection procedures.

(3) For the 20% of the volume of the backfill which was missing some of the required inspection reports, 16% has an average of 81% of the reports required, 3.8% has one or more type of inspection missing, and 0.2% consisting of six one foot lifts in four fills have no inspection reports at all.

For details, see the Report, Section 4.B. and Table No. 2.

The effect on each of these types of deficiencies was evaluated based upon the quantity and type of inspection documentation existing above, below and around the affected fill areas, the relative density results in the affected areas and the relatively small volume of fill affected. It was concluded that the deficiencies found in the inspection documentation are most probably due to lost folders, are not indicative of a lack of inspection effort, and will have no effect on the structural capability of the plant under seismic loads.

CAUSE:

The cause of this concern was the fact that some of the field inspection and laboratory test records for the Class A backfill were still in the contractor's QA records vaults. This contractor is still active on site and had not initiated the transfer of documentation to the LP&L-Ebasco Quality Assurance Vault. All available soil records are now permanently stored in this vault.

GENERIC IMPLICATIONS:

Based upon the results of the detailed review and analysis of backfill soil densities and corresponding inspection reports described in the discussion above, the Class A backfill was found to be sufficiently in compliance with the specification requirements.

The large effort required to establish the completeness of the records is due to the intrinsic difficulty of scoping a bulk process such as backfill in the absence of an administrative control tool, such as a logbook of inspections, which was not required by the implementing procedures. This scoping problem is believed to be unique to the soils/backfill effort.

Difficulty in establishing records completeness also was due to incomplete records turnover from the onsite contractor involved. Therefore, a generic concern exists as to the extent to which there has been incomplete records turnover on the part of remaining site contractors. This is addressed in the CORRECTIVE ACTION PLAN below.

SAFETY SIGNIFICANCE:

Test records and inspection reports were located and analyzed demonstrating compliance with the specification. Therefore, the Class A backfill will perform its function with respect to structural design capability under seismic loads. LP&L therefore believes that this issue is of no safety significance with respect to fuel load, power ascension or operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

The complete set of laboratory test records, along with the attached report and corresponding documents, has been transmitted to the LP&L-Ebasco Quality Assurance Records Vault.

The remaining site subcontractor records for completed work have also been transferred to Ebasco. Records for the minimal construction and testing activities are being turned over as work is completed. This will assure accessibility and retrievability of subcontractor records and ultimate turnover to LP&L in accordance with the established records turnover program.

ATTACHMENTS:

"Report on the Review and Analysis of Soil Backfill Densities" - NRC Concern No. 7.

REPORT ON THE REVIEW AND ANALYSIS

OF SOIL BACKFILL DENSITIES

IN RESPONSE TO

NRC CONCERN

NO. 7

FOR

LOUISIANA POWER & LIGHT COMPANY
WATERFORD STEAM ELECTRIC STATION
UNIT #3

EBASCO SERVICES INCORPORATED

AUGUST, 1984

REVISION 1

NOVEMBER, 1984

REVIEW AND ANALYSIS OF SOIL
BACKFILL DENSITIES
NRC CONCERN NO. 7

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1. INTRODUCTION

In the NRC letter of June 13, 1984, the following Concern No. 7 was expressed relative to the Soil Backfill Densities:

ITEM NO: 7

TITLE: BACKFILL SOIL DENSITIES

NRC DESCRIPTION OF CONCERN:

The staff found that records are missing for the in-place density test of backfill in Area 5 (first 5' starting at Elevation -41.25'). These documents are important because the seismic response of the plant is a function of the soil densities.

LP&L shall (1) conduct a review of all soil packages for completeness and technical adequacy and locate all records and provide closure on technical questions, or (2) conduct a review of all soil packages for completeness and technical adequacy and where soil volume cannot be verified by records as meeting criteria, perform and document actual soil conditions by utilizing penetration tests or other methods, or (3) justify by analysis that the soil volumes with missing records, or technical problems as defined after the records review, are not critical in the structural capability of the plant under seismic loads.

In response to the above stated concern, the Ebasco Civil ESSE Department implemented a three stage program to resolve this concern. The review and evaluation of soil test records was conducted in accordance with approach (1) of the concern while the review and evaluation of inspection reports was conducted in accordance with approach (3) of the concern.

The study plan depicted in Table 1 and described herein, was implemented to determine if the deficiencies that do exist in the soil packages will critically effect the structural capacity of the plant under seismic loadings.

Stage I of the program consisted of a data acquisition effort. After the data was located and collected, the Stage II effort consisted of a review for completeness and data compilation. Finally, the Stage III activity consisted of an overall review and evaluation of the soil packages for technical adequacy and specification compliance.

The program effort was conducted under the direction of M. Temchin, the Resident Sr. Site Soils Engineer, who was present during the performance of the majority of the actual backfilling operations.

2. SUMMARY AND CONCLUSIONS

As a result of the study program described herein, it has been concluded that:

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A. Test Records

(1) The Class A Backfill soil test records are complete.

(2) Field and laboratory tests were performed in accordance with the specified frequencies. In less than 8% of the cases reviewed, the laboratory control tests were run at intervals slightly larger than the specified, one set per ten inplace density test criteria. The backfill placed during these periods was randomly located throughout the fills and the relative densities obtained during these intervals were found to be acceptable when compared to the specification requirements.

(3) Field tests were located in accordance with the specified random distribution. In less than 5% of the tests reviewed, the location coordinates of the inplace density tests were found to be in error. These tests were still a valid indicator of the relative density of the backfill at a random spot at a known elevation in a known fill area and were therefore found to be acceptable tests.

(4) Statistical studies of relative density were performed in accordance with the specification requirements.

(5) The Class A backfill soil densities are in accordance with the specification requirements and will provide the design structural capability to the plant under seismic loads.

B. Inspection Reports

(1) The distribution of the existing documentation throughout the backfill is essentially identical to the distribution of the field testing effort, thus indicating a one to one relationship between inspection and testing activities. Since the field testing activity is known to be complete, the inspection activity is also believed to be complete.

The majority of the missing inspection reports are therefore believed to be misplaced. Inspection trends based upon evaluation of inspection frequency and distribution indicate that the majority of the missing inspections were performed.

(2) 80% of the volume of the backfill has a sufficient quantity of each type of inspection report to fulfill the requirements of the specification and inspection procedures.

(3) For the remainder of the volume of the backfill which has missing inspection reports:

(a) 16.0% of the volume of the backfill has an average of 81% of the quantity of inspection reports required with at least one of each type of inspection report on each fill at each elevation in its volume.

(b) 3.8% of the volume of the backfill has a partially complete representation of inspection reports with one or more type of inspection missing on each fill at each elevation in its volume.

(c) 0.2% of the volume of the backfill has no inspection reports at the fill locations and elevations included in this volume.

The effect on each of these types of deficiencies has been evaluated and found to have no effect on the structural capability of the plant under seismic loads.

3. STAGE I - LOCATION OF EXISTING DATA

The primary emphasis of the Stage I activity was the collection of soils data which in addition to specifications and procedures, includes test records and inspection reports. To accomplish this task, a detailed review was performed of the following data locations:

- Ebasco Quality Assurance Records Vault
- Ebasco Engineering Files
- Ebasco Warehouse
- On-Site Laboratory Files (G.E.O.)
- Contractor Quality Assurance Records Vault (J. A. Jones)

As a result of this effort, several key document packages were located and are attached to this report for permanent storage. A brief description of each of these document packages is presented below. The hierachy of the documents is depicted in the Study Plan Flow Chart, Table No.1 attached.

DOCUMENT 1 - Ebasco Specification LOU-1564.482, R7 Filter and Backfill.

This is the latest revision of the specification under which all soil backfill was selected, placed, compacted and tested. The document presents the design requirements of the backfill activity and served as the basis for the development of the two Quality Inspection Procedures summarized below.

DOCUMENT 2 - Ebasco Quality Control Inspection Procedures, QCIP-2, RH and WQC-1, RA

These are the Ebasco Quality Control Inspection Procedures under which the soil backfill material was selected, placed, compacted, tested, documented and approved.

DOCUMENT 3 - J. A. Jones Site Inspection and Test Procedure for Backfill and Compaction, W-SITP-12, R8

This is the latest revision of the Contractor's Quality Verification procedure under which all soil backfill material was selected, placed, compacted, tested and documented.

Each of these documents required the performance of routine field and laboratory testing of the backfill material. The actual soil testing was performed by an onsite laboratory in accordance with these requirements. The following control documents were generated by the soils laboratory in addition to the standard set of test reports.

DOCUMENT 4 - Soils Laboratory - Class A Backfill Test Index

This index was developed by the test laboratory as a working record of each Class A test performed. This hardcover, bound notebook lists the test number, location coordinate, elevation date and type of test performed. It was developed as a system of assigning numbers to and documenting the completion of all Class A tests.

DOCUMENT 5 - Soils Laboratory - Class A Backfill Field and Laboratory Test Summary

This summary was developed by the soil testing laboratory as a daily tabulation of the results of soil testing performed. Contained in this document are the lab test number, fill number, test location, field density, lab density, grain size and relative density test results for each day of work, recorded on a single page for supervisory review and study.

Utilizing these records, Ebasco performed the required periodic statistical studies of insitu relative density of the backfill as described in brief in Document 6 below.

DOCUMENT 6 - Ebasco Statistical Studies of Class A Backfill Relative Densities

This document contains all of the seven statistical studies performed on the Class A backfill relative densities which document the backfills overall acceptability. It also contains letters to the earthwork contractors regulating the percent compaction criteria based upon the results of these studies.

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DOCUMENT 7 - Class A Backfill Inspection Reports

In order to review the large quantity of inspection reports which make up the soil packages in the files, nine basic types of forms were identified. Document 7 contains samples of the typical forms found in each of the soil packages in the vault. These forms are discussed in detail in Stage II of the report.

After locating and collecting the data, Stage II activities concentrated on a review of the documents for completeness and on compiling the data into a format compatible for review of NRC Concerns.

In order to perform this task, the 17,000 existing soil documents were divided into the following two types:

(1) Soil Inspection Reports (Forms 1-5)
(2) Soil Test Records (Forms 6-9)

Since the test records provide a direct measure of the capability of the backfill to provide the required structural support to the plant island under seismic loadings, they were the first records to be reviewed. The remaining inspection reports were reviewed after the completion of the test record study. The details of these activities are presented below.

4. STAGE II - REVIEW OF SOIL PACKAGES FOR COMPLETENESS

A. Test Records

The first step in the review of the documentation was a detailed review of all soils laboratory documentation on site for completeness. Included in the review were:

- In-Place Density Tests - ASTM 2167 Form 6
- Proctor Tests - ASTM 1557 Form 7
- Moisture Content Tests - ASTM D2216 Form 8
- Sieve Tests - ASTM D422 Form 9
- Relative Density Tests - ASTM D2049 (Off Site Lab)

By comparing the Class A Backfill Test Index (Document 4) and the Field and Laboratory Soil Test Summary (Document 5) to the actual files of soil test data at the onsite laboratory, a complete set of field and laboratory test records was found to exist.

In direct response to the first paragraph of the NRC Concern No. 7, attached in Appendix "A" are copies of the 34 in-place density tests performed in the first 5.5' of fill placed in Fill Area #5 from Elevation -41.75 to EL -36.25. In addition to the density tests records, Table A-1 summarizes the elevation of the test, the test coordinate, the test number, the date the test was performed and, documents the number of the reference proctor and grain size lab tests used to determine specification compliance. Each test location and relative density are plotted on the corresponding overlay plots in Document 9 of this report.

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Utilizing the complete set of backfill density test records and the Class A Backfill Field and Laboratory Test Summary (Document No. 5), and keeping in mind the goals of completeness and technical adequacy, two new documents were developed for subsequent evaluation. A brief description of each of these documents and methodology used to prepare the documents is presented below.

DOCUMENT 8 - Class A Backfill Test Index by Fill Number in Ascending Elevation

This document is a complete listing of all Class A density tests categorized by fill area in order of ascending elevation. It lists for each fill area, the field density test location, number and date of performance in order of ascending elevation.

This tabulation served as the basis for the preparation of the overlays of relative density by elevation, Document 9 discussed below.

DOCUMENT 9 - Class A Backfill Relative Density Overlay Plots By Elevation

In order to evaluate the frequency and distribution of field test and relative density, the following procedure was used to construct the overlay plots:

(1) All Class A density tests were regrouped by fill number in order of ascending elevation (Document No. 8).

(2) A key plan drawing of the plant island excavation was constructed containing the soil backfill grid system. One original sheet was used for each one foot interval of backfill. Relative density overlay plots were then constructed from EL -44 to Elevation +20 to encompass all Class A backfill density tests.

(3) Using Document 8, each density test was plotted on the form using the test coordinates and elevation. A different symbol was used for each respective fill number. The test number was recorded adjacent to each data plot. It should be noted that the boundaries of each fill area are not represented. This is because the boundaries were somewhat arbitrary and changed in exact location at different elevations in the fill. In addition, backfill activities typically involved areas smaller than the numbered fill area, and in some cases, was carried across fill boundaries.

(4) The test number was then recorded in the test schedule on the side of the overlay along with the relative density value for each test found from the Class A backfill Test Summary (Document 5).

(5) For Class A backfill placed above Elevation +13 (See Statistical Study No. 7, Document 6), the percent compaction value for each field test was found in the Class A Backfill Field and Laboratory Test Summary (Document 5) and recorded in the test schedule with as asterisk.

(6) Once the data was plotted and tabulated, the theoretical surface boundaries of the backfill were approximated utilizing the fill boundaries and the Nuclear Plant Island exterior walls. The surface area of the backfill at each elevation was then calculated with a planimeter and recorded on the overlay.

(7) In cases where the actual distribution of the plotted density tests indicated backfill placement outside of the theoretical boundaries, the fill boundary was extended to include that material.

(8) By dividing the surface area by 20,000 ft^2, the minimum number of density tests required by the Specification LOU-1564.482 was calculated and recorded on the overlay.

(9) Finally, the actual number of density tests performed at each elevation was recorded, completing the overlay.

The completed overlay plots are a graphical presentation of the density test frequency and distribution, and most importantly, they tabulate and display the final insitu relative densities and/or percent compaction of the backfill.

These plots were utilized in the review and evaluation of Test Records for technical adequacy and specification compliance in the Stage III-A of the Study Program.

B. Inspection Reports

In the review and evaluation of the completeness of the inspection documentation, the following factors were considered:

- The requirements of the Quality Control Inspection Procedure in force at the time the work was done. Three different Ebasco procedures and one Contractor procedure existed during the eight years of placement. Each procedure was revised numerous times. Therefore, different inspection report forms were in use at different times during backfilling operations.

- The location and elevation of the fill. Some forms were used to document inspections of activities which were not common to all fill placements. Therefore all forms were not required in all packages.

- The frequency of inspection. Some backfilling activities required 100% Ebasco inspection and others not. Since the work was done by a contractor that had an acceptable quality assurance program, Ebasco inspection was designated as "once per day, by Checklist, when work is in progress." (QCIP-2, Section 8.4.2 - Document 2).

(1) Description of Inspection Forms

Considering these variations in procedures, fill locations and inspection frequencies, the following basic inspection report forms were found to exist, samples of which are found in Document 7:

- Form #1 - J. A. Jones Daily Backfill Inspection Reports
  W-SITP-12 (R1-R8)

  These forms summarized the overall acceptability of the daily backfill operation including material acceptability, excavation, backfill placement and compaction, and field testing. They were completed by the contractor on a daily basis for each backfill area of major earthwork.

- Form #2 - Ebasco Borrow Material Inspection Reports
  QCIP-2-1/WQC-1-9

  These forms summarized the acceptability of the borrow material used for Class A backfill including the material source, moisture content and gradation check test results. This inspection was performed by Ebasco daily.

- Form #3 - Ebasco Excavation and Stripping Inspection Reports
  QCIP-2-2/WQC-1-17

  These forms summarized the acceptability of the activities performed in preparing the fill area for the new backfill placement. Included on this form are drainage conditions, stripping, excavation, cleanup and moisture and density testing of exposed materials. The form was primarily utilized for excavation stripping and grubbing when the Class A backfill abutted and joined the natural clay slopes (below EL -5). Above this elevation, the use of this form was up to the discretion of the Ebasco Inspector.

- Form #4 - Ebasco Daily Backfill Inspection Reports
  QCIP-2-3/WQC-18

  These forms summarized the acceptability of the daily backfill operation emphasizing the backfill placement, compaction and field testing. It is very similar to the Form #1 completed daily by the J. A. Jones, quality verification inspection force and was utilized daily by Ebasco for all major Class A backfills.

- Form #5 - Ebasco Backfill Acceptance Report
  QCIP-2-4

  This form summarized the findings of the Ebasco inspection report forms #2, 3 & 4 and the soil laboratory test results resulting in the overall acceptance of a particular fill. The form was discontinued in revision H of QCIP-2 (12/6/77).

(2) Completeness and Distribution of Inspections

During the Stage II review activity, the total file of inspection reports for Class A backfill was inventoried and combined into compatible soil packages as exemplified in Document 7. Included in the inventory were approximately 12,000 inspection reports ranging from EL -44 to EL +20 throughout all seven fill areas. The reports were grouped and compiled by fill location, elevation and placement date for each of the five types of inspection forms summarized above. The resulting inventory of inspection reports is presented in Table No. 2 and discussed below.

The evaluation of these inspection reports was further divided into two phases; the evaluation of the inspection reports to determine their overall completeness and the evaluation of the frequency and distribution of inspection reports to determine their content. The following discussions summarize the results of these evaluations:

a. Completeness of Inspections

In the evaluation of the completeness of the inspection documentation, it must be noted that the exact numbers of inspection documentation required by the governing procedures cannot be reconstructed. Certain of the five types of inspections were required on a daily basis (100% coverage - Forms 1, 2 & 4) while others were required on a partial coverage basis (Form 3 & 5). For this reason several comparitive analyses were performed to evaluate relative completeness of the documentation.

When evaluating the total number of forms existing for each type of inspection (Table 2), it is found that Forms 2 and 4, which are representative of the required 100% inspection, number an average of 2900 each, and that Forms 3 and 5, which are representative of a partial inspection, number as average of 2000 each inspections. The Form 1 inspection (J. A. Jones Daily Inspection Report) which was performed at a 100% coverage and thus should have resulted in approximately 2900 forms, appears to be incomplete. It must be noted, however, that the Form 1 daily inspections by J. A. Jones and the Form 4, Daily Inspections by Ebasco, were duplicate inspections of the same placement and compaction activities. Since the missing Form 1 data is found on the duplicate Form 4 Inspection Reports, which appear to be complete, the missing Form 1 Reports constitute no loss of quality documentation and have no further significance to the inspection report evaluation unless the corresponding Form 4 is missing. Thus the existing inspection documentation would indicate that 100% inspection coverage consists of 2900 inspections.

In order to evaluate the validity of this number, consideration was given to the complete set of field density test records presented in Table No. 5 (which will be discussed in more detail in the evaluation discussions of density testing). This table indicates that 3076 Class A density tests were performed when only 858 tests were required based upon the one test per 20,000 ft^2 specified frequency. Thus approximately three times as many tests were performed as the fill surface area would require. Since the specification also requires one test for each area less than 20,000 ft^2 placed in any one day, the existence of so many extra tests would indicate that the large majority of fills placed were less than 20,000 ft^2 and that the testing frequency was governed by the less than 20,000 ft^2 placed in any one day criterion. This is further substantiated by a review of the density overlay plots (Document 9) which clearly indicate small fill placements at the upper elevations and around specific construction items. This being the case, since each small fill area of less than 20,000 ft^2 worked required a test, it would also require a set of inspections for the same fill area. Noting that the 3076 field density tests constitute a complete set of test records and considering the correlation developed above it is reasonable to conclude that the total number of inspection report packages for 100% coverage should also number around 3076. Taking into account that a small percentage of fills had more than one density test per fill, because their surface areas exceeded 20,000 ft^2, the number of required inspection packages should be slightly less. By comparing the 2900 existing inspections that represent the 100% inspection frequency to the 3076(-) packages which should have existed. It is concluded that based on this comparison, the inspection documentation files are substantially complete.

To further evaluate and better define the completeness of the inspection reports, a comparative analysis was performed of the surface area indicated on the Inspection Reports to the total surface area of the fill areas.

In this analysis, the surface area recorded in each of the daily inspection report packages (Form 1 or 4) was totalled and compared to the total surface area of the backfill at each elevation as calculated on the overlay plots (Document 9). By comparing the actual surface area of backfill inspected to the total surface area of backfill placed, the percentage of inspection coverage was calculated. The results of this analysis are summarized in Table No. 3 and discussed below:

(1) The actual inspected surface area in some cases was larger than the theoretical surface area (overlay plots). This is because many fill areas were constructed on more than one day, thus generating two reports for the same area.

(2) Evaluation of the percent of inspection coverage column of Table 3 indicates that for 80% of the volume of the backfill, there exists a sufficient quantity of each type of inspection to document the acceptability of the backfill represented by the inspected surface area.

(3) For the remaining 20% of the volume of the backfill which was found to have missing inspection reports, the average percent of inspection coverage was found to be 81%.

As a result of these analyses of the completeness of the inspection documentation, it is concluded that the documentation is basically complete with 80% of the volume of the backfill documented with complete soil packages and the remaining 20% of the backfill containing partial deficiencies in the inspection reports.

b. Distribution of Inspections

As part of the evaluation of the significance of the missing inspection reports, the distribution of the existing inspection documentation was evaluated.

To consider the distribution of the existing inspection reports throughout the fill area, Table No. 4 was developed. It compares the distribution of the inspection effort to the distribution of the field testing effort which is known to be complete. By comparing the percent of inspections on each fill area to the percent of field density testing on each fill area, it is found that both the inspection and testing activities have essentially identical distributions of effort. This observation further supports the correlation that approximately one inspection report should exist for each density test and strengthens the conclusions that the inspection report documentation is basically complete.

In the further evaluation and definition of the distribution of the types of inspection reports shown in Table No. 2, two distinct trends are immediately apparent, with the division in trend at elevation -25.00.

(a) Between elevation -25 and the bottom of the excavation, there exist 52 fills with partial distribution of inspection report documentation, or none at all. Of these 52 fills:

- 25 fill areas have some types of inspections by both the Contractor and Ebasco. These fills constitute 6.3% of the total number of fills constructed and account for 1.8% of the total volume of Class A backfill constructed.

- 21 fill areas have inspection documentation only by the Contractor. These fills constitute 5.3% of the total number of fills constructed and account for 2.0% of the total volume of Class A backfill constructed.

- 6 fill areas have no inspection documentation. These fills constitute 1.5% of the total number of fills constructed and account for only 0.2% of the total volume of backfill constructed.

(b) For the remainder of the fill placements between elevation -25 and plant grade with minor exception, the data in Table 2 indicates that each type of inspection was performed at least once on each fill area at each elevation. In some cases, as many as 60 inspections of a particular type were performed on one fill at one elevation (Fill #6, EL 13.00 - 13.99).

Thus, a review of the distribution of the types of inspection reports that are missing indicates that the 52 fill areas with an incomplete distribution of inspection documentation are concentrated in 13.1% of the total number of fill areas constructed and account for only 4% of the total volume of backfill placed.

The impact of these findings on the evaluation of the technical adequacy of the inspection reports is discussed in Stage III-B of this report.

4. STAGE III - REVIEW AND EVALUATION OF SOIL PACKAGES FOR TECHNICAL ADEQUACY AND SPECIFICATION COMPLIANCE

A. Test Records

The review and evaluation of the technical adequacy of the Class A backfill to provide structural capability of the plant under seismic loadings was based upon the design requirements as stated in the Ebasco Specification LOU-1564.482. Those sections pertinent to the Class A backfill soil density are as follows:

" In-Place Density and Testing

Sand materials and clam shell to be used as Class A backfill shall have an in-place relative density of 75 percent. The variation for Class A fill from the above specified degrees of compaction shall be a maximum of one standard deviation less than the specified relative density. The numerical value of the standard deviation from Class A fill will be established by a series of field tests to be conducted during the initial compaction operations and will be reported in terms of minimum allowable density required.

The minimum allowable density for the basis of field control at the start of work and until establishment of the standard deviation for Class A fill shall be 95 percent of Modified Proctor. The required percent compaction will be adjusted either up or down, depending upon the results of statistical studies which will be made during the backfilling operations in order to maintain the 75 percent relative density requirement.

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"Clay materials to be used for Class A backfill shall have in-place density of 90 percent of the maximum density obtained in the Modified Proctor Compaction Test. All materials to be used for Class B backfill shall have an in-place density of 90 percent of the maximum density obtained in the Modified Proctor Compaction Test. The variation from the above specified degrees of compaction shall be a maximum of 10 percent of the density test results falling a maximum of 5 percent less than the specified density in a random distribution as determined by the Engineer.

.1 Control tests of densities and moisture contents shall be made by the Engineer as the work progresses, to assure that required densities and moisture contents are being achieved.

.2 The in-place density shall be tested in accordance with ASTM-D1556, ASTM-D2167, ASTM-D2922 and any other method suitable in the judgment of the Engineer to insure that the backfill has been properly compacted. One test shall be made in each layer for every 20,000 sq.ft. of compacted Class A fill area and one test for every area of less than 20,000 sq. ft. placed in one day.

.3 The optimum conditions for both moisture and density will be determined by the Engineer for the fill materials. One laboratory density test (ASTM-D1557) and one mechanical gradation test (ASTM-D422) shall be performed on samples taken from in-place density test holes for each ten in-place density tests performed. The results of these tests made during the backfilling operation shall be made available to the Contractor."

In summary, the basic criterion of the specification were to:

- Obtain 75% relative density in the Class A fill.
- To check the compaction of the fill with field in-place density and moisture tests and laboratory density and gradation tests at specified frequencies.
- To perform periodic statistical studies of the Class A backfill relative density in order to evaluate the results.

Compliance with these requirements is discussed in the following sections.

(1) Test Frequency and Distribution of In-Place Densities

By using the completed density overlay plots (Document 9), the frequency of Class A in-place density tests (ASTM D-2167) performed for each one foot elevation of backfill was compared to the backfill specification criteria stated above. Since each in-place density test includes a moisture test, verification of moisture tests was simultaneously developed with the density review.

In addition to this criteria, inherent in the requirement for the performance of statistical studies is the need to demonstrate a random distribution of test data. By studying the location of tests on each fill, an evaluation of the random distribution of the test pattern was also performed.

Table No. 5 and Document 9, the overlay plots present a summary of the results of these reviews. The minimum number of field density tests required for each fill was tabulated along with the actual number of tests performed and the distribution of those tests by fill number.

Since the relative density overlay plots were constructed at even one foot intervals and the backfill was placed in 15" lifts, density tests at an elevation one foot above and below each plot were reviewed to determine specification compliance. In addition, backfill placed in adjacent fills was also evaluated since each test represents 20,000 ft^2 of backfill. Thus, by superimposing three overlay sheets (36" of compacted fill), a three dimension test distribution was reviewed for each lift of backfill.

The results of a simultaneous review of Table No. 5 and the overlay plots indicates the following:

(a) A comparison of the total volume of the Class A backfill shown on the overlays to the neatline quantity shown on the design drawing (LOU-1564-G-497S01, R6) indicates that the overlay Class A soil volume is 33% larger than the design quantity. This is due to the actual expansion of the Class A fill boundaries into Class B fill areas at the higher elevations during construction (as shown on the overlays as indicated by actual test locations). Taking the expanded backfill boundaries into account, the following evaluations were made:

(b) Based on the testing frequency of one field density test per 20,000 ft^2 of fill, 2794 in-place density tests were performed in fill areas requiring 858 tests. Thus, approximately three times as many density tests were run as the surface area of the fills required. This was due to the placement of numerous smaller fills each day at the higher elevations, as described in Section 4.B.2.a above.

(c) On only one fill of the 385 fills studied, was there an inadequate number of density tests performed in the 3 foot wedge of backfill reviewed (Fill #2, EL -19). In this case, the size of the fill was small and the relative densities of the fills on both sides and above and below this fill all met the specification requirements. Therefore, it is concluded that this deficiency will have no significance on the stability of the Plant Island under the event of seismic loadings.

(d) Visual analysis of the location of the density tests shows them to be completely random and distributed without pattern throughout the backfill. It should be noted that some test locations on the lab forms were found to be in error (approximately 5%) when plotted on the overlays. This is certainly due to the inaccuracies of visually locating ones position in the field off of sign posts hundreds of feet away and tens of feet above the actual test elevation. Since these test locations were still indicative of the relative density at a random spot on the fill, the density values were accepted as valid and included in the density analyses.

Taking these factors into consideration, it has been determined that the specification requirements for in-place test frequency and distribution have been complied with.

(2) Frequency of Laboratory Control Tests

By using the Class A Backfill Test Index (Document 4) and the Field and Laboratory Soil Test Summary (Document 5), the frequency of the laboratory density control tests performed (ASTM D1557) and the mechanical gradation control tests performed (ASTM D-422) was compared to the specification requirements.

Table No. 6 presents the results of a detailed review of the laboratory testing frequency compared to the number of in-place density tests performed between laboratory check tests. Using the specification requirement of one set of control tests per ten in-place density tests, all nonconforming test intervals were tabulated in Table No. 7.

An evaluation of the data presented in these tables indicates the following:

(a) From the start of Class A backfilling operation in January, 1976 to the present date, a total of 3137 Class A in-place density tests have been performed. Of these 2794 tests are in backfill subject to potential liquefaction while the remaining 282 test are above this zone. During the same period of time, 361 sets of control tests (Proctor, Sieve and Moisture Tests) have been performed, thus averaging one set of tests per 8.6 in-place density tests compared to one set per 10 in-place density tests as required in the specification.

(b) During the performance of the 361 sets of control tests, in only 27 instances were the tests performed at intervals larger than the specification requirements. Thus, the control test frequency was adhered to 92.5% of the time in the last eight and one half years of backfilling activity.

(c) Analysis of the nonconforming intervals indicates that in 20 of the 27 cases, the test interval was extended from 10 to a maximum of 13 field tests per set of control tests. Since in each of these cases, the extra in-place density tests included in the extended interval were in material on the same fills, already tested in the allowable 10 density tests, the intent of the specification was complied with in these cases. By accepting these intervals, the intent of the specification requirement on control test frequency was adhered to 99.8% of the time.

(d) In the remaining seven cases, where the control test interval was extended from 15 to a maximum of 29, a review of the test locations and relative density test results presented in Table No. 8 indicates that the test intervals are completely random through the fill as a whole and that the relative densities obtained during these intervals are all acceptable within the statistical tolerance of the specification.

Taking these factors into consideration, it has been determined that the specification requirements for the performance of laboratory control tests relative to Class A backfill in-place density testing, has been complied with.

(3) <u>Performance of Statistical Studies</u>

Document 6 presents copies of all seven statistical studies performed during the actual backfilling operation, in addition to letters to the backfilling contractors informing them of the results. In addition, Table No. 9 presents the schedule of relative density correlation testing showing the periodic updating of these correlation curves during the major period of backfilling operations.

From these documents it has been concluded that:

(a) The specification requirements for the periodic performance of statistical studies during the backfilling operations has been complied with and that;

(b) The value of the field control (percent compaction) was adjusted either up or down, depending on the results of the statistical studies.

Taking these factors into consideration, it has been concluded that the statistical review of the relative densities of the Class A backfill was performed during the backfilling operations in accordance with the specification requirements.

(4) Class A Backfill Relative Density

In analyzing the relative density of the compacted Class A backfill as a whole, the following statistical approach was adopted to comply with the specification requirements.

The specification required the in-place compacted Class A backfill to have a relative density of 75 percent. The allowable variation for the Class A fill less than the specified density was a maximum of one standard deviation. The numerical value of the standard deviation for this material was periodically established by conducting a series of studies on field tests and was reported in terms of minimum allowable proctor density required to yield the required relative density.

During the performance of these statistical studies, the field densities were converted to relative densities by the use of the correlation curves. The correlation curves were constructed using cumulative test data from random samples taken from the fill. The following procedure was used to develop these curves.

For each family of materials:

(a) A representative 300 lb. sample was obtained from the fill for every 200 to 250 in-place density tests performed.

(b) A 100 lb sample was sent to the field lab and a 200 lb sample was sent to the home office lab (Peabody Testing) for parallel testing to determine a modified proctor compaction curve and percent finer than a #200 sieve.

(c) The parallel results were compared. The Proctor densities were found to agree within ±2 pcf and the percents finer than the #200 sieve within ±3 percent. Therefore, the home office lab proceeded to perform maximum (γ max) and minimum (γ min) density determinations on the material.

(d) The following equation was used to plot the correlation curves.

$$\text{Dry Density} = \frac{(\gamma_{max.}) \times (\gamma_{min})}{\gamma_{max.} - Dr\,(\gamma_{max.} - \gamma_{min})}.$$

Where:

Dry Density = field dry density

Dr = relative density

γ max, γ min. = measured in the home lab for this material type.

Each curve was established by assuming various D_r values and calculating Dry Densities.

Cumulative Statistical Study No. 6 (Document No. 6) was performed in August of 1978, and represented all Class A backfill placed to that date. Statistical Study No. 7 was performed in July, 1984 and includes the remainder of Class A tests in the backfill subject to potential liquefaction. For both studies, correlation curves of field density to proctor density were developed for three family of materials. The results of these studies are summarized as follows:

Study No. 6

Based upon the standard properties of the normal bell curve, the cumulative Study No. 6 was performed on 2499 Class A backfill tests. The density values of the original failing Class A density tests (that were retested) were not included in this study since those tests did not represent the final density of the backfill which formed the seismic support of the Plant Island.

The study determined that the standard deviation for all Class A backfill was 12.4%. The specification tolerances were then defined by this standard deviation (in a three standard deviation universe) as:

(a) 13% of the Class A backfill tests could have relative densities ranging from 62.6% to 75.0% and

(b) 3% of the Class A backfill tests could have relative densities ranging from 50.2% to 62.6%.

Using these definitions, cumulative Study No. 6 concluded that the Class A backfill was constructed in accordance with the 75% relative density requirement. In addition, those tests which fell below 75%, were found to be within the specification tolerances when compared to an allowable tolerances of 16%. Therefore, the backfill was found to be in compliance with the specification requirements.

Study No. 7

Study No. 7 consisted of 251 in-place density tests taken in backfill placed since August 1978 up to elevation +13.00 (the upper boundary above which liquefaction will not occur, see Study No. 7, Document 6). The results of this study indicate a mean relative density of 91.7% with a standard deviation of 18.6%.

The mean relative density is well above the specification requirements and is somewhat higher than the mean relative density from study No. 6 (83.8%). The standard deviation for the current work is larger than for previous studies. This is certainly not surprising considering the large variation in compaction techniques utilized to construct backfill in the six years of operations included in this study.

The actual number (12.4%) and values of in-place density tests in Study No. 7 which fell below the minimum density of 75% was found to be within the 16% allowable tolerance.

In summary, the backfill included in Study No. 7 was found to be in conformance with the specification requirements. Taking this into account and considering that:

(1) All the backfilled placed prior to this study also was in compliance with the specification requirements; and

(2) Study No. 7 completes the series of studies on backfill subject to potential liquefaction;

it is concluded that all backfill was placed in compliance with the specification requirements and that the final insitu soil densities will provide the required design structural capacity to the plant under seismic loadings.

B. Inspection Reports

The results of the Stage II evaluations on completeness and distribution of the existing inspection documentation, determined the following:

(1) Completeness of Inspections

Although no exact method exists for determining the quantity of inspections that were required during the backfill operations, two comparative analyses were performed to evaluate the relative completeness of the inspection documentation. These analyses concluded that the existing documentation is basically complete and that 80% of the volume of the backfill is documented with complete inspection packages while the remaining 20% of the backfill has some deficiency in the inspection packages.

(2) Distribution of Inspections

The distribution of the existing inspection documentation throughout the backfill is essentially identical to the distribution of the field testing effort by fill location, thus confirming a one to one relationship between inspection and testing activities.

For the 20% of the inspection packages found to be incomplete, three distinct types of discrepancies were found to exist. The following discussions and conclusions are presented relative to the effect of these discrepancies on the technical adequacy of the inspections.

(a) 16.0% of the volume of the backfill has an average of 82% of the quantity of inspection reports required with at least one of each type of inspection report on each fill at each elevation in this volume.

For example, although there are 28 existing Form 2 Inspection Reports, in the vault for Fill No. 3 at elevation +12 (Table No. 3), 6 Form 2 inspection reports are believed to be missing. In all these cases however, the 81% of existing documentation of each type of inspection clearly establishes that the Quality Control and Quality Verification processes were implemented during the construction process. In addition, the backfill relative density study documents that the required density tests were performed and resulting relative density for the fills included in this 16% volume were found to be within specification requirements. Thus the existing inspection reports coupled with the satisfactory density records indicate that this deficiency will have no significance on the stability of the Plant Island under seismic loadings.

(b) 3.8% of the volume of the backfill has a partially complete representation of inspection reports with one or more type of inspection missing on each fill at each elevation in this volume. Included in this volume of backfill are:

- 25 fills which have inspection records from both the Contractor and Ebasco. Although some of the five required inspection reports are missing, there exists a sufficient quantity of data on the existing reports to determine that the Quality Control and Quality Verification processes were implemented during the construction of each of these fill areas. In addition, the design specified relative densities were achieved within the specified tolerances (Section IIIA) for all the fills affected. Therefore, it has been concluded that this deficiency, which effects 1.8% of the backfill, will have no significance on the stability of the Plant Island under the event of seismic loading.

- Also, included in these fill areas are 21 fills which have documentation of inspections by either Ebasco or the Contractor. Since Ebasco did a 100% duplicate inspection of the contractors inspection, the fact that contractor inspection reports are missing does not necessarily lead to a loss in the documentation of quality. As stated before, the existing inspections on these fills clearly establish that the quality control process was implemented during the construction process. In addition, it should be noted that in accordance with the Quality Control procedures (Document 2 & 3), the in-place density tests performed on each of these fills were ordered by and directed by the Ebasco Q.C. Inspector. He witnessed and evaluated each field test for specification compliance while the test was being performed in the field. If the percent compaction was not in compliance with the specified minimum, the Ebasco QC Inspector directed the Contractor's QC Inspector to implement rework (recompaction). The rework was witnessed by the Ebasco Inspector and at its completion, retests were taken at his direction. Thus, the existing inspection documentation, coupled with the complete file of test records for each fill involved (indicating acceptable relative density and quality control involvement) indicate that this deficiency, which effects 2.0% of the backfill, will have no significance on the stability of the Plant Island under the event of seismic loadings.

(c) 0.2% of the volume of the backfill has no inspection reports at the fill locations and elevations included in this volume.

For these 6 fill areas, there was no inspection documentation found onsite. The material in these fills is found to be concentrated below elevation -37 in small drainage ditches and trenches which have very little volume or in fills. As stated above, the complete record of density testing testifies to the total involvement of the quality control inspectors and to the achievement of the relative density. The fact that the majority of the missing reports are clustered together in groups on three fills indicates a high probability of lost folders of soil packages. Thus, even if the records are lost, the acceptability of the relative density, the indication of Q.C. involvement, and the fact that the affected fills account for for only 0.2% of the backfill placed provides sufficient evidence to conclude that this deficiency will have no significance on the stability of the Plant Island under the event of seismic loadings.

Considering the discussions above, it has been concluded that the deficiencies found to exist ~~in the~~ inspection documentation are of minor significance and will have no effect on the structural capability of the plant under seismic loads.

TABLES

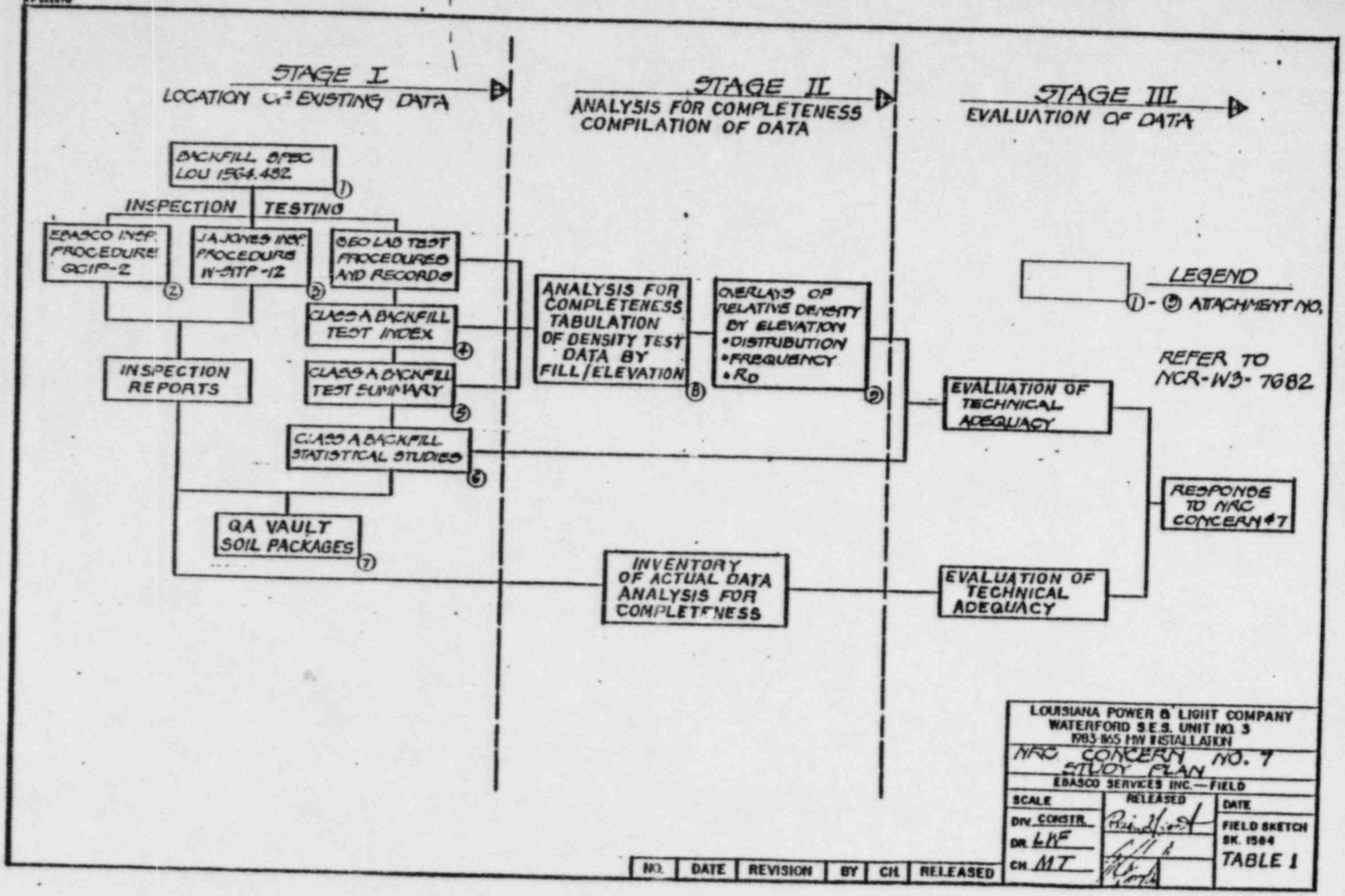

STAGE I
LOCATION OF EXISTING DATA
STAGE II
ANALYSIS FOR COMPLETENESS
COMPILATION OF DATA
STAGE III
EVALUATION OF DATA
BACKFILL SPEC
LOU 1564.482
1
INSPECTION
TESTING
EBASCO INSP. PROCEDURE GCIP-2
2
J.A.JONES INSP. PROCEDURE W-SITP-12
3
GEO LAB TEST PROCEDURES AND RECORDS
CLASS A BACKFILL TEST INDEX
4
INSPECTION REPORTS
CLASS A BACKFILL TEST SUMMARY
5
CLASS A BACKFILL STATISTICAL STUDIES
6
QA VAULT SOIL PACKAGES
7
ANALYSIS FOR COMPLETENESS TABULATION OF DENSITY TEST DATA BY FILL/ELEVATION
8
OVERLAYS OF RELATIVE DENSITY BY ELEVATION
•DISTRIBUTION
•FREQUENCY
•R_D
9
INVENTORY OF ACTUAL DATA ANALYSIS FOR COMPLETENESS
EVALUATION OF TECHNICAL ADEQUACY
EVALUATION OF TECHNICAL ADEQUACY
RESPONSE TO NRC CONCERN #7
LEGEND
1 - 9 ATTACHMENT NO.
REFER TO NCR-W3-7682
LOUISIANA POWER & LIGHT COMPANY
WATERFORD S.E.S. UNIT NO. 3
1983-1165 MW INSTALLATION
NRC CONCERN NO. 7
STUDY PLAN
EBASCO SERVICES INC.—FIELD
SCALE
RELEASED
DATE
DIV. CONSTR.
DR. LHF
CH. MT
FIELD SKETCH
SK. 1564
TABLE 1
NO.
DATE
REVISION
BY
CH.
RELEASED

TABLE NO.2
NRC CONCERN NO.7
ANALYSIS OF SOIL INSPECTION REPORTS

ELEVATION	FILL 1					FILL 2					FILL 3					FILL 4					FILL 5					FILL 6					FILL 7					TOTALS					COMMENTS
	FORM NO					FORM NO					FORM NO					FORM NO					FORM NO					FORM NO					FORM NO					FORM NO					
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
-44.00 - -43.01			*		*			*		*			*		*			*		*			*		*	1					*		*		*	1	0	0	0	0	* NOT REQUIRED
-43.00 - -42.01			*		*			*		*			*		*			*		*			*		*	5	6	6	4	8	1					6	6	6	4	8	
-42.00 - -41.01			*		*			*		*						2	1	2	1	1			*		*	10	10	10	4	16	1					13	11	12	5	17	
-41.00 - -40.01								*		*	1			1		4	2	2	4				*		*	9	7	6	5	5	1					15	9	8	10	5	
-40.00 - -39.01	1			1				*		*	2	1	2	2	1	1			1							17	10	11	11	14	1					22	11	13	15	15	
-39.00 - -38.01	5	1	1	3	2						3	1	2	3	1	4	3	3	4	3						11	9	7	9	8	2		1	2		25	14	14	21	14	
-38.00 - -37.01	3			3	2						6	5	6	6	5	2	2	2	4	2	2	2	2	2	1	19	5	7	7	6	22			22		54	14	17	44	16	
-37.00 - -36.01	3	2	2	2	3	1	1	1	1	1	7	5	7	6	6	6	3	3	4	3	6	4	5	5	6	18	13	19	16	14	3	1	1	2	1	44	29	38	36	34	
-36.00 - -35.01	2	2	2	2	2	1					9	9	11	10	10	2			1		4	2	2	4	1	9	5	5	6	5	3		1	2		30	18	21	25	18	
-35.00 - -34.01	1					2	1	1	1	1	3	4	5	4	4	1	1	2	1	1	1	1	1	1	1	5	6	12	7	8	4		3	1		17	13	24	15	15	
-34.00 - -33.01	1					2	1	1	1	1	4	2	4	2	2	1	1		1	1	2	2	2	2	3	2	4	4	4	4	4	1	4	1	1	16	11	15	11	12	
-33.00 - -32.01	1	1	1	1	1	1	1	1	1	1	4	3	5	3	2	1				1	1				2	3	4	5	4	4	3	1	4	1	1	14	10	16	10	12	
-32.00 - -31.01	1	2	2	1	3	2					4	4	4	4	3	1				1	1				1	2	2	2	2	2	4		3			15	8	11	7	10	
-31.00 - -30.01	1	1	1		2	2					4	5	8	5	4	1				1	1					4	5	5	5	5	3		3			16	11	17	10	12	
-30.00 - -29.01	1					2	1	1	1	1	8	9	9	9	10	1					1				1	1	4	4	2	5	3		3	2		17	14	17	14	17	
-29.00 - -28.01	1	1	1		2	2	1	1	1	1	4	4	6	4	4	1					1					1	4	4	4	4	5	1	4	2	1	15	11	16	11	12	
-28.00 - -27.01	1	1	1	1	1	1			1		5	4	9	4	4	1					1					4	4	4	4	4	3		3			16	9	17	10	9	
-27.00 - -26.01	1	1	1	1	1	1			1		2	2	5	2	2	1					1					3	4	4	3	4	4	1	4	2	1	13	8	14	9	8	
-26.00 - -25.01	1	1	1	1	1	2	2	2	2	2	3	2	3	2	2	1					1					7	7	7	7	6	5	1	5	1	1	20	13	18	13	12	
-25.00 - -24.01	2	1	1	2	2	1	1	1	1	1	7	5	7	5	5	1		1	1		1	1	1	2	1	6	6	6	6	6	4	2	5	2	2	22	16	22	19	17	
-24.00 - -23.01	4	1	1	1		2	1	1	1	1	7	4	6	3	4	2	2	1	3	2	3	2	3	2	2	9	5	5	5	5	7	4	7	4	4	34	19	24	19	18	
-23.00 - -22.01	3	1	1	1	1	3	3	3	3	3	5	3	6	4	3	4	4	4	4	4	8	2	2	4	2	5	5	4	5	5	5	2	6	2	3	33	20	26	23	21	
-22.00 - -21.01	4	3	3	3	3	4	4	4	4	4	3	3	3	3	3	6	7	6	6	6	6	5	5	4	5	5	4	4	4	4	5	3	6	3	3	33	29	31	27	28	
-21.00 - -20.01	4	2	2	2	2	3	2	2	2	2	3	3	3	3	3	2	1	2	2	2	5	5	5	6	5	5	4	4	4	4	2	3	3	3	3	24	20	21	22	21	
-20.00 - -19.01	5	2	2	2	3	3	2	2	2	2	2	2	2	2	2	4	4	4	4	4	3	3	3	2	2	7	5	5	5	5	3	3	3	3	3	27	21	21	20	21	
-19.00 - -18.01	4	2	2	3	2	3	2	2	2	2	3	3	4	3	3	4	4	4	4	4	4	4	4	4	4	6	4	4	4	4	4	4	4	4	4	28	23	27	24	25	
-18.00 - -17.01	3	2	2	2	2	3	3	3	3	3	3	3	4	3	3	6	6	6	8	6	5	5	5	5	6	8	7	7	7	7	3	3	3	3	3	31	29	30	31	30	
-17.00 - -16.01	2	4	3	4	3	3	3	3	3	3	3	3	3	3	3	5	5	5	5	5	4	4	4	4	4	6	5	5	5	5	3	3	3	3	3	26	27	26	27	30	
-16.00 - -15.01	2	1	2	2	2	2	2	2	2	2	4	4	5	4	4	3	3	3	3	3	3	3	3	3	3	6	4	5	5	4	4	3	3	3	3	24	20	23	22	21	
-15.00 - -14.01	2	2	2	1	2	1	1	1	1	1	5	5	5	6	5	4	4	4	4	4	5	5	5	6	5	6	3	3	5	3	5	4	4	5	4	28	24	24	28	24	
-14.00 - -13.01	3	3	2	2	2	5	5	5	5	5	4	4	4	3	5	5	4	4	4	4	8	8	8	7	8	4	4	4	4	4	4	4	5	4	4	33	32	32	29	32	
-13.00 - -12.01	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8	8	8	7	8	8	9	9	12	9	4	4	4	4	4	4	3	3	3	3	30	30	30	32	30	

REVISED

TABLE NO. 2
NRC CONCERN NO. 7
ANALYSIS OF SOIL INSPECTION REPORTS

ELEVATION	FILL 1 FORM NO					FILL 2 FORM NO					FILL 3 FORM NO					FILL 4 FORM NO					FILL 5 FORM NO					FILL 6 FORM NO					FILL 7 FORM NO					TOTALS FORM NO					COMMENTS
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
-12.00 ~ -11.01	3	3	3	2	3	1	1	1	1	1	8	8	8	8	9	6	7	7	7	7	7	6	6	5	6	3	3	3	3	3	7	7	7	6	7	35	35	35	32	36	
-11.00 ~ -10.01	3	3	3	3	3	3	1	2	2	2	3	3	3	3	4	16	11	12	10	11	5	5	5	8	5	6	7	7	7	7	3	4	4	5	6	39	34	36	33	38	* NOT REQUIRED
-10.00 ~ -9.01	3	3	3	3	3	2	2	2	2	2	8	9	10	9	9	5	9	14	12	11	6	6	6	5	6	5	5	5	5	5	3	8	8	8	8	32	42	48	44	44	
-9.00 ~ -8.01	2	2	2	2	1	4	4	4	4	4	6	5	6	5	5	8	9	9	9	8	4	4	4	4	4	7	7	9	7	7	1	7	5	7	7	32	38	39	38	36	
-8.00 ~ -7.01	6	8	9	8	9	2	2	2	2	2	6	7	6	8	6	12	10	11	12	12	4	5	5	4	5	4	4	4	5	4	1	4	5	5	4	35	40	42	44	42	
-7.00 ~ -6.01	4	4	3	4	4	4	4	4	4	4	7	11	13	11	11	3	4	4	4	4	6	2	2	2	2	6	8	8	8	7	2	5	4	4	5	32	38	38	37	37	
-6.00 ~ -5.01	6	6	6	5	6	5	5	5	3	5	10	10	10	10	10	10	11	11	11	10	5	4	4	4	4	7	7	7	7	6	4	5	7	5	5	47	48	50	45	46	
-5.00 ~ -4.01	2	2	3	4	3	3	5	4	4	3	8	8	8	8	9	15	14	14	14	14	7	8	6	4	8	7	10	9	11	10	3	10	12	10	9	45	57	56	51	56	
-4.00 ~ -3.01	4	5	5	4	5	2	4	4	4	4	6	10	10	10	10	12	12	12	15	14	4	3	4	3	4	7	12	10	13	12	7	12	11	14	12	42	58	56	63	61	
-3.00 ~ -2.01	5	5	5	4	5	5	5	5	5	4	8	18	17	17	17	8	10	10	10	9	3	3	3	3	3	6	9	7	8	9	4	15	13	15	10	39	65	60	62	57	
-2.00 ~ -1.01	7	7	7	7	7	4	4	4	4	3	7	20	20	21	21	7	9	10	10	11	4	4	4	4	4	7	10	8	13	10	2	13	7	13	11	38	67	60	72	67	
-1.00 ~ -0.01	10	11	11	11	11	5	5	5	5	5	7	17	18	16	18	12	13	12	11	12	6	6	6	7	6	7	10	8	10	10	2	14	12	14	12	49	76	72	74	74	
0.00 ~ +0.99	4	6	6	6	6	3	2	2	2	2	3	18	14	16	16	3	4	2	4	4	9	7	8	7	8	7	12	8	14	11	2	12	8	13	7	31	61	49	62	54	
1.00 ~ +1.99	10	10	10	13	11	7	6	6	6	6	10	17	15	19	15	7	9	9	9	9	12	11	10	10	10	8	14	11	15	15	2	15	11	14	10	56	82	72	86	76	
2.00 ~ 2.99	7	9	9	9	9	4	3	3	5	3	8	16	18	18	17	7	9	6	6	7	5	5	5	5	6	9	16	13	17	14	2	13	7	12	10	42	71	61	78	66	
3.00 ~ 3.99	8	9	9	8	9	5	5	5	5	5	7	28	24	23	23	7	8	8	9	7	8	8	8	8	7	10	15	11	20	18		15	7	14	12	45	86	72	87	81	
4.00 ~ 4.99	8	10	11	9	8	4	4	4	4	4	16	14	15	15	13	7	6	6	7	6	11	10	11	11	10	8	16	11	17	12	1	16	8	16	12	55	76	66	79	65	
5.00 ~ 5.99	5	5	5	5	5	4	3	3	3	3	4	17	17	17	16	9	9	8	9	8	8	7	7	7	7	8	20	12	21	17		12	11	19	9	38	80	63	31	65	
6.00 ~ 6.99	9	11	11	12	9	3	4	3	4	3	2	20	19	21	17	4	4	4	4	4	10	4	3	6	4	13	21	11	24	16		20	11	20	12	41	84	61	91	65	
7.00 ~ 7.99	5	7	5	9	4	5	4	3	6	4	6	21	17	22	16	6	4	4	4	4	7	4	3	6	3	16	28	14	28	12		22	9	21	8	45	90	55	96	51	
8.00 ~ 8.99	4	6	5	6	4	5	5	1	5	1	4	21	15	20	13	6	7	6	7	6	6	7	6	10	6	20	28	13	21	8		24	6	23	5	45	98	52	98	43	
9.00 ~ 9.99	5	5	5	6	3	4	4	2	4	*	5	28	19	29	15	7	6	6	7	4	7	12	6	9	8	21	36	15	36	8		21	6	22	6	49	112	59	113	44	
10.00 ~ 10.99	7	7	2	8	2	4	5	2	4	*	5	30	19	29	14	7	7	4	7	5	2	10	5	10	4	27	44	12	43	7		32	8	33	4	52	135	52	134	36	
11.00 ~ 11.99	7	9	4	9	2	8	9	3	9	*	5	25	13	25	8	7	13	8	12	9	4	9	3	8	3	32	58	14	58	5	2	43	8	44	2	65	166	53	165	29	
12.00 ~ 12.99	5	8	6	8	3	5	8	2	8	*	8	28	12	27	6	6	15	10	16	6	6	10	5	13	3	25	61	10	50	3	4	57	4	30	*	59	167	49	161	21	
13.00 ~ 13.99	5	10	2	10	2	4	11	2	12	*	6	22	5	20	2	3	17	7	12	5	3	6	4	6	3	25	66	7	66	2	3	27	3	27		49	159	30	160	14	
14.00 ~ 14.99	6	11	2	13	1	7	13	4	10	2	5	12	5	11	1	6	11	6	13	5	7	10	6	10	4	17	38	3	38	2	*	2	*	2	*	48	97	26	97	15	
15.00 ~ 15.99	6	14	7	14	1	7	13	2	11	1	6	9	9	9	*	7	20	5	20	5	3	7	2	7		12	28	3	34	2	*		*		*	48	91	16	89	9	
16.00 ~ 16.99	3	10	2	10	2	2	3	2	1	1	6	7	3	7	*	2	13	4	12	3	2	6	1	6		9	17	2	16	2	*		*		*	24	56	14	52	8	
17.00 ~ 17.99		2	1		*	2	2	2		1	*		*		*			*		*			*		*	3	7	2	8	2			*		*	5	11	5	8	3	
18.00 ~ 18.99			*		*			*		*			*		*			*		*			*		*			*		*			*		*						
19.00 ~ 19.99			*		*			*		*			*		*			*		*			*		*			*		*			*		*						
20.00 ~ 20.99			*		*			*		*			*		*			*		*			*		*			*		*			*		*						
SUB TOTAL	223	247	194	255	187	177	165	132	160	114	310	557	501	565	426	300	346	295	366	286	257	256	217	262	215	557	780	439	605	434	180	469	296	492	241	2004	2850	2074	2225	1903	
TOTAL	1106					788					2359					1593					1207					3025					1678					11756					

TABLE NO. 3
NRC CONCERN NO. 7
ANALYSIS OF SOIL-INSPECTION REPORTS BY FILL SURFACE AREA (FT^2)

ELEVATION	FILL NO.							TOTAL SURFACE AREA (FT^2)		% COVERAGE BY	COMMENTS
	1	2	3	4	5	6	7	INSPECTION REPORTS	DENSITY OVERLAYS	INSPECTION REPORTS	
-44.00 ~ -43.01	*	*	*	*	*	*	*		N/A	—	
-43.00 ~ -42.01	*	*	*	*	*	4700	100	4800	N/A	—	* NOT REQUIRED
-42.00 ~ -41.01	*	*	Δ	200	*	3500	100	3800	N/A	—	
-41.00 ~ -40.01	Δ	*	25800	200	*	2450	100	28550	N/A	—	Δ APPROPRIATE INSPECTION REPORTS MISSING.
-40.00 ~ -39.01	6800	*	25800	10800	Δ	5900	14600	63900	55000	116	
-39.00 ~ -38.01	6800	Δ	26100	300	Δ	10050	48700	91950	65000	141	
-38.00 ~ -37.01	300	Δ	30500	10300	500	2200	45600	89400	71800	125	
-37.00 ~ -36.01	1550	300	27700	10600	850	5400	60900	107300	80000	134	
-36.00 ~ -35.01	16350	1700	84600	1000	1500	19200	61300	185650	94000	198	
-35.00 ~ -34.01	32000	7700	48000	400	500	8000	42200	138800	108000	129	
-34.00 ~ -33.01	16000	7700	29500	5000	7150	33700	61500	160550	99000	162	
-33.00 ~ -32.01	2000	2300	29000	5000	18000	33000	70000	159300	108000	148	
-32.00 ~ -31.01	16000	7700	30500	8450	17500	21000	50500	151650	114000	133	
-31.00 ~ -30.01	15000	16700	50000	5000	17500	4000	60500	168700	131800	128	
-30.00 ~ -29.01	15000	16700	41000	8500	17500	62000	60500	215200	146000	147	
-29.00 ~ -28.01	16000	25700	43000	5000	35000	35000	51500	211200	133000	159	
-28.00 ~ -27.01	16000	9000	77200	9700	35000	21000	14500	182400	158000	115	
-27.00 ~ -26.01	16000	9000	54000	5000	35000	35750	73500	228250	163000	140	
-26.00 ~ -25.01	16000	9000	47500	9850	18000	17728	68500	186578	168000	111	
-25.00 ~ -24.01	2100	9900	52000	5000	69500	39928	72500	250928	181000	139	
-24.00 ~ -23.01	3000	2950	95100	70600	68250	70000	57000	366900	183000	200	
-23.00 ~ -22.01	4100	5600	54000	47100	33750	58000	57000	259550	197300	132	
-22.00 ~ -21.01	5000	5600	52500	41000	67500	34200	57000	262800	219800	120	
-21.00 ~ -20.01	5000	4800	62000	37500	101500	12300	57000	270100	238500	113	
-20.00 ~ -19.01	4600	3700	52500	36300	71500	3000	57000	228600	247900	92	
-19.00 ~ -18.01	2600	3700	52600	43800	35150	39700	40000	218050	265700	82	
-18.00 ~ -17.01	3700	3700	52500	36500	37700	14900	58200	207200	261500	79	
-17.00 ~ -16.01	7600	3700	112000	41000	35700	11600	15000	226600	275400	82	
-16.00 ~ -15.01	2600	3700	112000	37000	35700	39100	47000	277100	304100	91	
-15.00 ~ -14.01	2000	2800	96950	38100	57000	12800	14300	223950	293500	76	
-14.00 ~ -13.01	46500	10000	69500	51000	50500	40000	47800	315300	298000	106	
-13.00 ~ -12.01	21300	16500	69500	47000	10000	60000	25700	250000	316500	79	

REVISED
PAGE 2 OF 2

TABLE NO. 3
NRC CONCERN NO. 7
ANALYSIS OF SOIL-INSPECTION REPORTS BY FILL SURFACE AREA (FT^2)

ELEVATION	FILL NO.							TOTAL SURFACE AREA (FT^2)		% COVERAGE BY	COMMENTS
	1	2	3	4	5	6	7	INSPECTION REPORTS	DENSITY OVERLAYS	INSPECTION REPORTS	
-12.00 ~ -11.01	4500	30000	49500	56000	38000	35000	55700	268700	461000	58	
-11.00 ~ -10.01	3800	18000	77500	69400	38000	64000	66000	336700	369000	91	
-10.00 ~ -9.01	57000	18000	88500	79800	37500	104500	92000	477300	326500	146	
-9.00 ~ -8.01	32000	18000	128500	79000	37500	94000	103000	492000	327000	150	
-8.00 ~ -7.01	19000	27000	109000	138000	19500	63000	68000	437500	325500	134	
-7.00 ~ -6.01	35000	41000	86500	113700	14100	78000	96500	464800	332000	140	
-6.00 ~ -5.01	34000	39000	114800	95000	38000	136000	48500	505300	415500	122	
-5.00 ~ -4.01	70500	18500	110200	85300	10000	136350	108600	539450	421500	128	
-4.00 ~ -3.01	81500	8500	73950	105100	10500	140850	87600	508000	427800	119	
-3.00 ~ -2.01	72000	21500	89300	94900	10500	162050	71900	528150	439500	120	
-2.00 ~ -1.01	78000	9500	94450	110500	13100	98350	81000	484900	444000	109	
-1.00 ~ -0.01	16000	20500	96100	139300	46200	119250	47000	484350	469800	103	
0.00 ~ 0.99	138000	44100	131500	108800	47200	128300	75900	673800	484600	139	
1.00 ~ 1.99	137800	34500	131050	146000	47200	187400	65300	749250	484000	155	
2.00 ~ 2.99	117700	32600	148650	148700	40900	128600	77300	694450	456800	152	
3.00 ~ 3.99	118400	14600	168150	151000	48000	187700	85000	772850	429800	180	
4.00 ~ 4.99	35800	11400	167800	130100	56900	80150	46300	529050	458000	116	
5.00 ~ 5.99	41000	24400	226900	88600	69500	95150	90700	636250	464500	137	
6.00 ~ 6.99	32900	64600	219000	113600	88500	103500	80200	702300	451700	155	
7.00 ~ 7.99	36700	55800	148200	116000	48850	152550	41900	600000	445100	135	
8.00 ~ 8.99	46800	92500	142300	104500	58150	140950	119700	704900	397200	177	
9.00 ~ 9.99	106200	86000	147600	145500	22800	151350	76200	735650	361700	203	
10.00 ~ 10.99	126800	174000	82200	136000	26600	133950	104100	783650	342700	229	
11.00 ~ 11.99	133100	134000	98600	126600	29100	191850	83800	797050	397700	200	
12.00 ~ 12.99	101000	142500	78100	69000	22000	159900	93400	665900	319700	208	
13.00 ~ 13.99	279100	146250	61300	150900	33000	250000	93100	1013650	556900	182	
14.00 ~ 14.99	75800	74400	66100	28400	8000	82450	73000	408150	303500	134	
15.00 ~ 15.99	84000	77050	36900	90400	8500	101450	*	398300	275000	145	
16.00 ~ 16.99	56750	51500	28800	16450	8500	53400	*	215400	281300	77	
17.00 ~ 17.99	*	*	*	*	*	*	*	37650	N/A	-	
18.00 ~ 18.99	*	*	*	*	*	*	*	N/A	N/A	-	
19.00 ~ 20.99	*	*	*	*	*	*	*	N/A	N/A	-	
SUB TOTAL	2413050	1725850	4794700	3657750	1854550	4520706	3515800	22342806	16646100	134	

TABLE NO. 4

NRC CONCERN NO. 7

RELATIVE DISTRIBUTION OF INSPECTION REPORTS TO DENSITY TESTS

FILL NO	NO. OF INSPECTIONS	% OF TOTAL INSPECTIONS	NO OF DENSITY TESTS	% OF TOTAL DENSITY TESTS	COMPARATIVE %	
					INSPECTIONS	TESTS
1	1097	9.3	246	8.0	9.3	8.0
2	785	6.7	178	5.8	6.7	5.8
3	2360	20.1	570	18.5	20.1	18.5
4	1592	13.5	375	12.2	13.5	12,2
5	1198	10.2	336	10.9	10.2	10.9
6	3026	25.8	826	26.9	25.8	26.9
7	1694	14.4	545	17.7	14.4	17.7
TOTAL	11752	100.0	3076	100.0	100.0	100.0

TABLE NO 5
NRC CONCERN NO 7
COMPARISON OF IN-PLACE DENSITY TEST FREQUENCY AND DISTRIBUTION

ELEVATION	FREQUENCY			DISTRIBUTION							NOTES
	SURFACE AREA	NO. OF TESTS		FILL NO							
		REQ'D	ACTUAL	1	2	3	4	5	6	7	
-44.00 - -40.01	N/A	N/A	(56)*	CLASS A FILL IN TRENCHES AND SUMP.							
-40.00 - -39.01	55,000	3	32	5	0	2	1	4	18	2	
-39.00 - -38.01	65,000	4	44	5	0	7	5	7	13	7	
-38.00 ~ -37.01	71,800	4	75	7	6	7	4	9	16	26	
-37.00 ~ -36.01	80,000	4	49	6	3	6	6	9	12	7	
36.00 ~ -35.01	94,000	5	38	2	2	9	3	6	11	5	
-35.00 ~ -34.01	108,000	6	18	1	1	5	1	4	3	3	
-34.00 ~ -33.01	99,000	5	13	0	1	2	1	2	3	4	
-33.00 ~ -32.01	108,000	6	17	1	1	3	1	2	4	5	
-32.00 ~ -31.01	114,000	6	18	1	2	4	1	2	2	6	
-31.00 ~ -30.01	131,800	7	21	1	0	4	1	5	6	4	
-30.00 ~ -29.01	146,000	8	21	0	1	9	1	2	5	3	
-29.00 ~ -28.01	133,000	7	15	1	1	2	1	1	4	5	
[illegible]8.00 ~ -27.01	158,000	8	14	1	1	2	1	3	4	2	
27.00 ~ -26.01	163,000	9	17	1	1	3	1	2	4	5	
-26.00 ~ -25.01	168,000	9	16	1	2	2	0	0	7	4	
-25.00 ~ -24.01	181,000	10	15	1	1	4	1	1	5	2	
-24.00 ~ -23.01	183,000	10	17	1	1	4	2	3	3	3	
-23.00 ~ -22.01	197,300	10	23	1	1	3	3	8	4	3	
-22.00 ~ -21.01	219,800	11	24	4	2	3	3	6	3	3	
-21.00 ~ -20.01	238,500	12	19	2	1	2	3	5	3	3	
-20.00 ~ -19.01	247,900	13	20	2	1	3	3	4	4	3	
-19.00 ~ -18.01	265,700	14	22	1	1	3	5	5	3	4	
-18.00 ~ -17.01	261,500	14	26	2	1	3	5	6	6	3	
-17.00 ~ -16.01	275,400	14	25	3	3	3	5	4	4	3	
-16.00 ~ -15.01	304,100	16	22	2	1	4	3	5	4	3	
-15.00 ~ -14.01	293,500	15	28	3	1	6	4	6	4	4	
-14.00 ~ -13.01	298,000	15	29	0	3	4	6	8	4	4	
-13.00 ~ -12.01	316,500	16	27	2	2	2	8	7	4	2	
-12.00 ~ -11.01	461,000	24	36	3	1	8	8	6	3	7	
[illegible]00 ~ -10.01	369,000	19	36	3	2	3	9	8	10	1	
-10.00 ~ -9.01	326,500	17	43	2	2	9	10	6	6	8	
9.00 ~ -8.01	327,000	17	38	3	4	6	8	3	7	7	
8.00 ~ -7.01	325,500	17	40	6	2	6	12	5	5	4	
-7.00 ~ -6.01	332,000	17	40	4	2	10	6	6	7	5	

TABLE NO 5
NRC CONCERN NO 7
COMPARISON OF "IN PLACE" DENSITY TEST FREQUENCY AND DISTRIBUTION

ELEVATION	FREQUENCY			DISTRIBUTION							NOTES
	SURFACE AREA	NO. OF TESTS		FILL NO							
		REQ'D	ACTUAL	1	2	3	4	5	6	7	
-6.00 - -5.01	415,500	21	48	6	4	9	8	5	9	7	
-5.00 ~ -4.01	421,500	22	60	4	3	12	15	5	10	11	
-4.00 - 3.01	427,800	22	53	3	3	11	12	4	10	13	
-3.00 - 2.01	439,500	22	65	6	3	20	10	5	10	11	
-2.00 - 1.01	444,000	23	61	7	4	18	10	1	9	12	
-1.00 - -0.01	469,800	24	79	14	5	17	12	10	10	11	
0.00 - +0.99	484,600	25	73	8	5	16	9	10	11	14	
+1.00 ~ +1.99	484,000	25	72	8	4	20	9	6	11	14	
+2.00 ~ +2.99	456,800	23	93	9	3	26	9	8	20	18	
+3.00 ~ +3.99	429,800	22	80	7	5	14	5	11	21	17	
+4.00 ~ +4.99	458,000	23	82	5	4	16	10	8	23	16	
+5.00 ~ +5.99	464,500	24	80	7	2	17	5	9	21	19	
+6.00 ~ +6.99	451,700	23	83	6	5	22	8	7	19	16	
[illegible].00 ~ +7.99	446,100	23	86	7	3	18	6	5	28	19	
+8.00 ~ +8.99	397,200	20	96	3	4	23	8	7	27	24	
+9.00 ~ +9.99	361,700	19	111	4	5	26	8	9	40	19	
+10.00 ~ +10.99	342,700	18	133	7	5	24	10	10	43	34	
+11.00 ~ +11.99	397,700	20	156	7	8	24	12	10	57	38	
+12.00 ~ +12.99	319,700	16	174	7	8	22	15	9	71	42	
+13.00 ~ +13.99	256,900	13	78/92 *	9	11	22	19	11	71	27	
+14.00 ~ +14.99	303,600	16	37/60 *	12	12	13	13	6	38	3	
+15.00 ~ +15.99	275,000	14	36/64 *	14	15	13	17	10	31	0	
+16.00 ~ +16.99	281,300	15	22/43 *	8	2	10	13	10	22	0	
+17.00 ~ +17.99	240,000	13	3/18 *	0	1	4	0	3	13	0	
+18.00 ~ +21.00	N/A	N/A	5 *								
SUB-TOTALS	6,581,200 ft²	858	2794/282	246	178	570	375	336	826	545	
VOL. OVERRUN	614,300 YD³	EL -44 - -40	56			3076					
VOL. DESIGN DWG	462,000	EL +18 → 21	5								
	133%										
TOTALS	—	858	3137								

*-% COMPACTION - NOT - PART OF STATISTICAL STUDY - SEE STATISTICAL STUDY NO. 7 FOR DETAILS

TABLE NO 6
NRC CONCERN NO 7

FREQUENCY CHECK - PROCTORS/SIEVES TO DENSITIES

PROCTOR CURVE NO	LAB TEST NO.	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO. OF DEN TESTS BETW PROCTORS
1	LRWE 717, 718, 719	17	37	106	10	71	→ B0041M	
2	768	22	38	117	9	72	397	8
6	788	5	39	129	11	73	408	8
3	809	12	40	139	9	74	419	8
3A	815	4	41	149	9	75	429	8
7	817	1	42	161	12	76	439	8
5	935	29	44	170	8	77	443	3
11	945	8	43	172	1	78	444 (INDY)	0
12	952	6	45	184 (CLAY)	11	79	452	7
13	959	6	46	184 (SAND)	0	82	465	9
14	971	11	47	196	10	84	476	10
15	985	4	48	210	13	86	494	15
16	1002	11	49	220	9	87	500	4
17	1014	10	50	231	10	90	520	17
18	1021	6	51	251	19	91	526	5
19	1032	11	52	255 COARSE/MUD	3	92	532	4
19A	1039	5	53	256 INDY	0	93	533 INDY	0
INDY	1040	0	54	266	9	94	543	7
22	B0005A	4	55	271	4	97	556	11
26	15	9	56	272	0	98	566	7
27	22	6	58	281	8	100	579	11
INDY	23	0	59	291	9	102	585	5
28	31	5	60	302	10	105	595	9
29	42	10	61	312	8	106	605	8
30	47	5	63	326	10	108	613	6
INDY	50	2	64	335	8	109	620	6
31	52	1	65	346	6	110	621 INDY	0
32	62	9	66	356	5	112	633	10
33	69	5	67	366	7	113	643	8
34	77	7	67A	374	2	115	653	9
INDY	78	0	68	376	1	117	663	9
35	87	8	69	377 INDY	0	118	673	6
36	94	6	70	387	7	120	683	9

TABLE NO 6
NRC CONCERN NO 7

FREQUENCY CHECK - PROCTORS/SIEVES TO DENSITIES

PROCTOR CURVE NO	LAB TEST NO.	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO OF DEN TESTS BETW PROCTORS
122	694	9	164	1052	10	206	1429	10
123	701	5	165	1063	9	207	1441	10
125	713	10	166	1076	10	208	1453	10
127	723	8	167	1087A	9	190	1465	10
128	737	9	200	1087AA	7 (INDY.)	191	1476	9
130	746	8	168	1100	3	209	1482	4
131	759	10	172	1148	12	193	1488	5
132	770	9	173	1160	10	210	1500	10
133	781	10	174	1173	10	191	1512	10
134	793	10	175	1186	8	211	1524	10
135	804	10	177	1197	9	212	1538	10
137	816	10	178	1211	10	213	1550	11
138	826	8	180	1223	10	214	1562	10
139	837	10	183	1234	10	215	1574	10
140	848	9	184	1246	9	217	1588	10
141	855 INDY	6	185	1259	10	218	1601	10
142	856 (CORRELATION)	0	186	1270	10	219	1613	10
144	867	9	187	1283	10	220	1625	8
146	878	9	188	1294	10	222	1639	9
148	891	9	189	1305	10	223	1651	10
149	904	10	190	1311	3	224	1663	10
150	915	9	191	1312	0	226	1677	10
151	927	10	195	1319	6	227	1689	7
152	940	10	192	1321	1 (INDY)	228	1701	9
153	953	10	193	1322	0 (COORELATION)	229	1712	10
154	961	7	196	1332	9	231	1724	10
155	973	9	197	1344	10	232	1735	9
156	983	9	198	1357	10	233	1747	10
157	996	9	199	1370	10	235	1758	9
158	1007	10	201	1382	10	236	1784	0 (COORELATION
159	1016	8	202	1393	10	237	1771	10
160	1027	9	203	1405	10	238	1782	10
163	1040	10	205	1417	10	239	1796	10

TABLE NO 6
NRC CONCERN NO 7

FREQUENCY CHECK- PROCTORS/SIEVES TO DENSITIES

PROCTOR CURVE NO	LAB TEST NO.	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO OF DEN TESTS BETW PROCTORS
240	1807	10	275	2181	10	326	2548	10
241	1819	10	277	2194	10	328	2561	10
243	1831	9	278	2206	10	329	2573	10
244	1842	10	280	2219	10	330	2578	3
245	1853	10	283	231	10	331	2586	7
246	1865	10	285	2245	10	333	2598	10
247	1877	10	287	2258	9	334	2610	10
248	1889	10	288	2263	3	336	2623	10
249	1901	10	289	2268	3	337	2635	10
250	1912	10	290	2273	3 (CORRELATION	341	2648	9
251	1922	9	291	2274	0 (INDY)	342	2659	10
252	1934	10	292	2286	10	344	2671	10
253	1945	10	293	2287	0 (INDY)	346	2683	10
254	1957	10	295	2300	10	347	2695	10
255	1968	10	296	2312	10	349	2706	10
256	1980	10	297	2324	10	350	2717	10
257	1991	10	299	2336	10	351	2730	10
258	2004	10	300	2350	10	353	2742	10
259	2015	10 (CORRELATION)	301	2364	9	354	2754	10
260	2026	10 (INDY)	305	2379	8	356	2767	10
261	2027	0	307	2392	10	357	2779	10
262	2038	10	309	2405	10	358	2791	10 (CORRELATION)
263	2050	10	314	2418	10	359	2792	0 (INDY)
264	2063	11	316	2430	10	361	2805	10
265	2074	9	317	2443	10	362	2818	10
266	2086	10	318	2456	10	365	2831	10
267	2098	10	319	2468	10	367	2843	10
268	2109	10	320	2481	10	369	2855	10
269	2121	10	321	2493	10	372	2867	10
270	2132	10	322	2506	10	373	2879	10
271	2144	8	323	2519	10	375	2892	10
273	2156	10	324	2534	10	376	2904	10
274	2169	10	325	2535	0 (CORRELATION INDY)	379	2917	10

TABLE NO 6
NRC CONCERN NO 7

FREQUENCY CHECK - PROCTORS/SIEVES TO DENSITIES

PROCTOR CURVE NO	LAB TEST NO.	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO. OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO OF DEN TESTS BETW PROCTORS
380	2929	10	449	3341	10	—		
382	2941	10	451	3352	10	—		
383	2953	10	452	3363	10	—		
386	2967	11	453	3374	10	—		
391	2978	9	454	3385	10	—		
392	2996	10	455	3396	10	—		
393	3002	10	456	3407	10	-		
396	3014	10	457	3418	10			
397	3027	10	459	3430	11	—		
400	3053	24 (CORRELATION TO INDY)	460	3443	12	--		
404	3065	10	471	3454	10			
405	3076	6	473	3464	9	—		
409	3088	10	474	3474	9			
410	3099	10	475	3482	7			
412	3110	10	481	3493	10			
415	3121	10	485	3506	10			
416	3154	10/10/19 DRILLED MATL	488	3509	3			
418	3165	10	488A	3522	12			
421	3176	10	490	3538	13			
422	3187	10	493	3547	5			
423	3198	10	493	3548	0			
425	3209	0	498	3556	6			
426	3220	10	499	3569	7			
428	3231	10	500	3576	4			
429	3242	10	503	3581	3			
430	3253	10	504	3582	11			
431	3264	10	505	3589	4			
432	3275	10	506	3592	12			
434	3286	10	507	3600	10			
439	3297	10 (MEMPHIS)	508	3601	10			
441	3308	10	509	3628	8			
445	3319	10		END				
447	3330	10						

TABLE NO. 7
NRC CONCERN NO. 7

NONCONFORMING INTERVALS · PROCTOR/SIEVE TO FIELD DENSITY

PROCTOR CURVE NO	LAB TEST NO.	NO OF DEN TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO OF DEN-TESTS BETW PROCTORS	PROCTOR CURVE NO	LAB TEST NO	NO OF DEN. TESTS BETW. PROCTORS
14	LRWE 271	11	42	B0161A	12	1	LRWE 717,718,719	17
16	1002	11	172	1148	12	2	768	22
19	1032	11	460	3443	12	5	935	29
39	B0129A	11	488A	3552	12	51	B0251A	19
45	184	11	506	3592	12	86	494	15
97	556	11	3	LRWE 809	12	90	526	17
100	579	11				400	3053	24
213	1550	11	48	B0210A	13			
386	2967	11	490	3538	13			
459	3430	11						
504	3582	11						
264	2063	11						

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIV. DENSITY
1	LRWE 699	F4 45W ON	5B	-41.6	1-21-76	78
	700	F4 80W 28S	5B	-39.6	1-21-76	72
	701	F4 44W 21S	5B	-40.3	1-21-76	74
	702	F4 40W 16N	5B	-39.0	1-21-76	84
	703	F4 70W 17N	5B	-38.3	1-21-76	79
	704	F4 43W 10S	5B	-37.7	1-21-76	78
	705	F4 42W 10N	5B	-36.4	1-22-76	78
	706	F4 78W 5S	5B	-36.4	1-22-76	66
	707	E2 6E 14S	4	-36.4	1-22-76	66
	708	D2 10W 16S	4	-35.1	1-22-76	75
	711	F4 5N 80W	5B	-35.1	1-22-76	68
	710	F4 9S 57W	5B	-35.1	1-22-76	87
	712	E2 15S 7E	4	-41.25	1-23-76	72
	713	E2 6W 5S	4	-41.25	1-23-76	73
	714	F4 45N 44W	5B	-34.75	1-23-76	72
	715	F4 49W 3N	5B	-34.75	1-23-76	82
	716	F4 61W 12S	5B	-34.75	1-23-76	68

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIVE DENSITY
2	LRWE 720	C2 20E 13S	1	-39.75	1-26-76	62.5
	721	F4 45N 38W	5A	-41.75	1-26-76	81
	723	D2 13W 13S	4	-38.50	1-26-76	79
	724	F4 62N 43W	5A	-40.50	1-26-76	79
	725	F3 7N 43W	5A	-39.20	1-26-76	79
	726	F4 40W 53N	5A	-39.20	1-27-76	77
	727	E6 35S 68E	3B	-42.50	1-27-76	81
	731	E6 78N 68E	3B	-42.50	1-27-76	97
	733	E6 22S 30W	3B	-41.50	1-28-76	74
	734	E5 7N 32W	3B	-41.50	1-28-76	81
	736	F5 20S 33W	3B	-41.50	1-28-76	85
	754	B3 20E 30S	6B	-43.25	2-11-76	72
	755	B4 20E 31S	6B	-42.25	2-11-76	72
	757	B4 30N 35E	2	-38.00	2-12-76	97
	758	B4 0N 55E	2	-38.00	2-12-76	95
	759	B4 37S 53E	6B	-38.00	2-12-76	92
	760	B4 22S 33E	6B	-36.75	2-12-76	73
	761	B4 7N 52E	2	-36.50	2-12-76	68
	762	B4 18S 56E	6B	-36.75	2-12-76	68
	763	B4 10S 37E	6B	-35.50	2-12-76	84
	766	B4 29S 55E	6B	-35.50	2-13-76	88
	767	B4 0N 50E	2	-35.50	2-13-76	84

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIV. DENSITY
5	LRWE 818	F4 80W 85S	5A	-37.25	2.26.76	90
	819	E5 20N 30E	3B	-38.25	3.1.76	64
	820	C6 35S 10W	6A	-40.25	3.1.76	79
	821	E5 25N 32E	3B	-37.25	3.1.76	57
	822	E5 30N 30E	3B	-36.25	3.1.76	69
	848	C6 40S 35E	7	-38.25	3.17.76	71
	866	C2 37S 15W	1	-39.75	4.23.76	65
	865	B2 68S 42E	1	-39.75	4.23.76	55
	863	RETEST				71
	867	C2 15S 15E	1	-39.75	4.23.76	69
	869	C2 10S 8E	1	-38.75	4.26.76	80
	873	B2 53S 40E	1	-38.75	4.26.76	68
	875	B2 90E 50S	1	-37.50	4.27.76	59 *
	878	B2 40E 80S	1	-37.50	4.27.76	-
	911	E3 50N 5W	4	-40.25	5.18.76	69
	912	E3 54N 20W	4	-40.25	5.18.76	62 *
	913	E3 80N 30W	4	-39.25	5.19.76	69
	915	E3 51N 80W	4	-37.00	5.19.76	66
	917	E3 40N 81W	4	-37.00	5.19.76	91
	918	E3 25S 50E	4	-37.25	5.20.76	80
	919	E3 27S 48W	4	-37.25	5.20.76	70
	920	D3 87N 30E	4	-35.75	5.20.76	61
	921	E3 37E 24N	5A	-36.25	5.20.76	84
	922	E3 25E 24N	5A	-36.25	5.20.76	60 *
	923	E3 60E 15N	5A	-35.25	5.21.76	88
	924	E3 28E 15N	5A	-35.25	5.21.76	84
	932	C6 35N 30W	6A	-39.25	6.2.76	65
	931	C6 47W 30N	6A	-39.25	6.2.76	74
	933	C6 52N 50W	6A	-38.25	6.3.76	60 *
	934	C6 0N 45W	6A	-37.25	6.3.76	61 *

* Accepted As Part Of Statistical Tolerance

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIVE DENSITY
51	B0232ARR	B6 91N 65E	6	-44.00	11-5-76	84.5
	233A	B6 94N 68E	6	-42.75	11-5-76	96.0
	234A	B6 97N 62E	6	-41.50	11-5-76	84.0
	235ARR	B6 91N 54E	6	-42.05	11-5-76	94.0
	236A	B5 3N 65E	6	-40.75	11-6-76	116.5
	237A	B5 6N 63E	6	-40.00	11-6-76	108.0
	238A	B6 90N 63E	6	-39.50	11-6-76	131.5
	239A	B6 93N 58E	6	-41.25	11-6-76	99.5
	240A	B6 93N 64E	6	-39.00	11-6-76	151.5
	241ARR	B5 4N 55E	6	-40.25	11-6-76	140.5
	242A	B6 98N 63E	6	-37.75	11-6-76	124.0
	243A	B6 93N 64E	6	-37.25	11-7-76	112.5
	244AR	B6 96N 55E	6	-39.50	11-7-76	92.0
	245AR	B5 3N 53E	6	-38.50	11-7-76	86.5
	246A	B6 94N 57E	6	-37.00	11-7-76	87.5
	247A	B5 18N 66E	6	-36.50	11-7-76	90.5
	248A	B6 45N 63E	6	-35.50	11-7-76	148.0
	249A	B5 3N 56E	6	-36.00	11-8-76	105.0
	250AR	B5 66N 65E	6	-37.25	11-8-76	92.5

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIV. DENSITY
9?	B0477A	E7 80N 96E	3	- 27.30	3.16.77	88.5
	478A	E7 90N 25E	7	- 30.30	3.16.77	68.5
	479A	F7 48N 0E	3	- 26.30	3.17.77	88.0
	480A	E6 30N 55E	3	- 26.30	3.17.77	79.0
	481A	E7 15S 15E	7	- 29.30	3.17.77	77.0
	482A	E8 91N 33E	7	- 28.30	3.17.77	72.0
	483A	D8 70N 62E	7	- 32.30	3.17.77	67.5
	484A	D7 30S 12E	7C	- 32.30	3.18.77	81.0
	485A	E7 0N 5E	7A	- 26.30	3.18.77	93.5
	486A	E8 80N 33E	3B	- 25.30	3.18.77	87.0
	487A	E7 55N 43E	7A	- 25.30	3.18.77	79.0
	489A	D7 45S 24E	7C	- 31.30	3.19.77	65.5
	490A	D7 25N 70E	7C	- 29.30	3.19.77	70.0
	492A	C7 30N 10E	7E	- 38.30	3.21.77	75.0
	493A	D7 11N 81E	7C	- 28.30	3.21.77	-

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIV. DENSITY
90	B0501A	C7 32N 67E	7E	-34.25	3-22-77	75.0
	502A	D7 12S 75W	7	-34.30	3-23-77	85.5
	503A	D7 0N 0E	7	-33.30	3-23-77	99.0
	504A	C7 18N 96E	7	-32.30	3-23-77	97.0
	505A	C7 35N 51E	7	-31.30	3-23-77	83.0
	506A	C8 0N 0E	7F	-31.05	3-24-77	—
	507A	C7 8S 0E	7F	-30.30	3-24-77	81.5
	508A	D7 60W 0N	7E	-30.30	3-24-77	74.5
	509A	B7 37N 96E	7E	-29.30	3-24-77	79.0
	510A	C8 92N 95E	7	-28.30	3-24-77	79.0
	511A	C7 2N 33E	7E	-27.30	3-25-77	74.0
	512A	D7 31N 11E	7E	-26.30	3-25-77	87.0
	513A	B6 90N 5E	6	-38.30	3-26-77	75.0
	515A	C8 95N 0E	7E	-25.30	3-28-77	91.5
	516A	B7 62N 38E	6A	-34.25	3-28-77	77.0
	517A	B7 53N 38E	6A	-33.25	3-28-77	112.0
	519A	B7 72N 20E	6	-33.30	3-29-77	66.0

TABLE NO 8

NRC CONCERN NO. 7

ANALYSIS OF NONCONFORMING CONTROL TEST FREQUENCIES

PROCTOR CURVE	LAB TEST NO	LOCATION	FILL NO	TEST ELEV	DATE	RELATIV DENSITY
400	B 3029A	F8 8N 18E	3	+12.50	8-1-78	102.5
	3030A	F8 5N 17E	3	+13.50	8-1-78	108.5
	3031A	F8 55N 5E	3	+14.00	8-1-78	106.0
	3032A	F8 2N 15E	3	+14.50	8-1-78	100.5
	3033A	F7 35N 25E	3	+13.00	8-2-78	104.5
	3034A	F7 20N 30E	3	+14.00	8-2-78	103.0
	3035A	B8 5N 5E	6	+10.00	8-9-78	113.0
	3036A	B8 40N 10E	6	+12.00	8-9-78	104.0
	3037A	B8 8N 5E	6	+11.00	8-9-78	106.0
	3038A	B8 45N 10E	6	+13.00	8-10-78	116.0
	3039A	B8 5N 0E	6	+12.00	8-10-78	101.5
	3040A	B8 48N 5E	6	+14.00	8-10-78	107.0
	3041A	B8 0N 4E	6	+13.00	8-10-78	106.0
	3042A	B8 30N 25E	6	+11.00	8-10-78	106.5
	3043A	B8 5N 6E	6	+14.00	8-10-78	102.5
	3044A	B8 30N 35E	6	+12.00	8-10-78	102.5
	3045A	B8 38N 28E	6	+13.00	8-11-78	112.0
	3046A	B8 38N 35E	6	+14.00	8-11-78	101.0
	3047A	B8 25N 5E	6	+6.00	8-11-78	102.5
	3048A	B8 20N 8E	6	+7.00	8-11-78	100.0
	3049A	B8 18N 3E	6	+8.00	8-11-78	102.5
	3050A	B8 15N 9E	6	+9.00	8-12-78	106.0
	3051A	B8 17N 2E	6	+10.00	8-12-78	97.5
	3052A	B8 12N 5E	6	+11.00	8-12-78	101.5

TABLE NO. 9
NRC CONCERN NO. 7
SCHEDULE OF RELATIVE DENSITY
CORRELATION TESTING

TEST NUMBER	TEST DATE
LRWE 815	2/25/76
1040	8/12/76
B 0023A	9/9/76
50A	9/22/76
78A	10/8/76
256A	11/9/76
271A	12/15/76
377A	2/2/77
444A	2/23/77
532A	4/1/77
621A	4/22/77
835A	5/31/77
1087A	7/7/77
1321A	8/5/77
1482A	8/19/77
1500A	8/20/77
1784A	9/28/77
2015A	10/18/77
2026A	10/18/77
2274A	11/17/77
2287A	11/22/77
2535A	2/23/78
2792A	5/23/78
3053A	8/21/78
3297A	2-16-79
1197B	12/17/79

REVIEW AND ANALYSIS OF SOIL
BACKFIL'. DENSITIES
NRC CONCERN NO. 7

APPENDIX A

IN-PLACE DENSITY TESTS FILL 5

EL -41.75 to EL -36.25

TABLE A-1

IN-PLACE DENSITY TESTS - FILL #5
EL -41.75 TO EL -36.25

TEST EVALUATION	TEST LOCATION	TEST NUMBER	TEST DATE	PROCTOR TEST CURVE NO.
-41.75	F4 45N 38W	LRWE721	1/26/76	1
-41.60	F4 ON 45W	LRWE699	1/21/76	1
-40.50	F4 62N 43W	LRWE724	1/26/76	1
-40.30	F4 21S 44W	LRWE701	1/21/76	1
-39.60	F4 28S 80W	LRWE700	1/21/76	1
-39.25	F4 20N 80W	LRWE808	2/24/76	6
-39.25	F4 18N 20W	LRWE807	2/24/76	6
-39.20	F4 53N 40W	LRWE726	1/27/76	1
-39.20	F3 7N 43W	LRWE725	1/26/76	1
-39.00	E3 30N 33E	LRW1031	8/12/76	15/18
-39.00	F4 16N 40W	LRWE702	1/21/76	1
-38.75	E4 10N 33E	LRW1036	8/12/76	15/18
-38.30	F4 17N 70W	LRWE703	1/21/76	1
-38.25	F4 30N 50W	LRWE811	2/25/76	3
-38.25	F4 35N 43W	LRWE812	2/25/76	3
-38.25	E4 10N 31E	LRW1037	8/12/76	15/18
-38.00	E3 31N 32E	LRW1033	8/12/76	15/18
-37.75	E3 31N 34E	LRW1035	8/12/76	15/18
-37.70	F4 10S 43W	LRWE704	1/21/76	1
-37.50	E4 11N 32E	LRW1038	8/12/76	15/18
-37.50	E4 69N 27E	BO102A	10/13/76	34
-37.25	F3 80S 70W	LRWE 813	2/26/76	6
-37.25	F4 80S 84W	LRWE 816	2/26/76	6
-37.25	F4 85S 80W	LRWE 818	2/26/76	6
-37.25	E5 40N 27E	BO089A	10/11/76	34
-37.00	E4 60N 27E	BO101AR9	10/14/76	34/36
-36.76	E4 60N 28E	BO110AR4	10/14/76	36
-36.75	E5 42N 32E	BO090AR2	10/12/76	34
-36.40	F4 15S 78W	LRWE706	1/22/76	1
-36.40	F4 10N 42W	LRWE705	1/22/76	1
-36.25	E4 45N 27E	BO116AR	10/15/76	36
-36.25	E3 24N 25E	LRWE922	5/20/76	7
-36.25	E3 24N 37E	LRWE921	5/20/76	2
-36.25	E5 58N 27E	BO097AR	10/12/76	34

NOTE: Actual In-Place Density Test sheets are available at the Waterford 3 Site

RESPONSE

ITEM NO.: 8 (Final)

TITLE: Visual Examination of Shop Welds During Hydrostatic Testing

NRC DESCRIPTION OF CONCERN:

The staff's review of hydrostatic tests conducted by Tompkins-Beckwith (T-B) for their installed ASME Class 1 and Class 2 piping systems found a lack of proof of the visual inspection of all shop welds during the tests. Inspection of all welds for leakage is required by the ASME Code and is essential to ensure the structural integrity of the piping system. LP&L shall provide documented evidence that shop welds were indeed inspected during the hydro tests. If the appropriate inspection documents do not exist or cannot be located, LP&L shall submit a statement attesting to shop weld inspection by the responsible personnel of LP&L or Ebasco who had witnessed the hydro tests.

DISCUSSION:

All ASME Class 1 and 2 piping and welds, including shop welds in piping sub-assemblies that were manufactured by Dravo Corporation, were hydrostatically tested in accordance with Code requirements by the installation contractor, Tompkins-Beckwith (ASME NA Certificate holder), and were inspected and accepted during the test by the Tompkins-Beckwith QC inspectors, the Tompkins-Beckwith Authorized Nuclear Inspector (ANI) and the Tompkins-Beckwith test and start-up coordinator.

Attachment 1 is a copy of the pertinent documentation generated from a typical T-B hydrostatic test for ASME Class piping. On page two of the attachment, the signatures of the six personnel witnessing and accepting the test are shown. Hydrostatic test documentation records for all ASME and ANSI testing are maintained as permanent records, in accordance with ANSI N45.2.9, and are available for inspection.

Although Dravo (shop) welds were not specifically listed in the hydrostatic test package, they were inspected. As evidence of this inspection, LP&L submits the following:

1. Attachment 2 is Tompkins-Beckwith letter QA-1360, dated June 30, 1983, to Ebasco Services Incorporated. This letter has attached to it a hand written report, dated June 28, 1983, concerning the subject of Hydrostatic testing of Dravo (shop) welds, from the Hartford Steam Boiler Inspection and Insurance Company ANI, Thomas J. Dragon, to Tompkins - Beckwith's Quality Assurance Supervisor, Larry Richardson.

   The following excerpts from the ANI report substantiate LP&L's position that shop welds were hydrostatically tested and inspected:

   A. "There are no code requirements which mandate a manufacturer/installer to specifically list each weld to be examined during the hydrostatic test. During the hydrostatic test, an examination is made of all joints, connections, and regions of high stress on all areas of the piping system regardless of whether these items were fabricated by Tompkins-Beckwith or Dravo, which were included in the test boundary."

B. "Although these welds are not specifically listed on Tompkins - Beckwith's hydrostatic test package, they are examined in accordance with NX-6215. Certification of this is indicated by the installer listing the piping sub-assemblies on the N-5 data report and listing the applicable hydrostatic pressure that was conducted on the piping system."

C. "Your attention is directed to NA-8231 (a),'Application of Stamp', which briefly states that the Inspector authorizes application of the Code Symbol Stamp after all required tests, examination, and inspections have been performed. This specifically includes the required hydrostatic test."

2. In addition to the above, the manner in which the hydrostatic tests were conducted would assure that shop welds were inspected during the testing. Hydrostatic test inspection of the piping and welds was performed by the inspectors (Tompkins-Beckwith Engineering, Q.C., and ANI) utilizing a marked piping flow diagram to indicate the boundaries of the test (see test boundary description on page two of Attachment 1).

   Piping flow diagrams do not indicate or show any welds, therefore, an inspector using these drawings to conduct the inspection walkdown would not have been able to exclude shop welds from inspection during the test. By using these drawings, an inspector would had to have examined all piping and all welds in the test boundary prior to acceptance of the hydrostatic test.

3. The tests were conducted in accordance with the ASME Codes. The requirements for examination for leakage (NX-6215) include "all joints, connections and all regions of high stress" and also that the welded joints be left uninsulated and exposed (NX-6121) during the test. Shop welds, as required by the Code, like regions of high stress, were inspected and accepted, although they were not specifically listed in the test documentation. These requirements were complied with in accordance with Site Procedure ASP-IV-63 during the hydrostatic testing performed by Tompkins-Beckwith.

   Attachment 3 is a copy of an ASME N-5 Code Data Report. All ASME N-5 code data reports (including Attachment 3) completed by Tompkins-Beckwith for code stamped piping systems contain the following statement in section 7(b), "Description of Installation Performed", of the code report.

   > "Hydrostatic test of shop fabricated welds contained in piping subassemblies listed in item 6 above."

   This statement also substantiates LP&L's position that shop welds were tested and inspected. It should be noted that this statement was on the N-5 data reports at time of initial signing by the ANI.

   The signature of the third party inspector (ANI) on both the hydrostatic test and the N-5 report, attests the ASME Code requirements were fulfilled.

4. Further, it should be noted that this issue was throughly evaluated and resolved by Ebasco in July of 1983. The issue was raised during the Ebasco QA records review of Tompkins-Beckwith's Hydrostatic test packages. Attachment No. 4 documents the satisfactory resolution of the issue raised in Attachment 5.

5. Attachment 6 is submitted as the statement confirming to shop weld inspection by the responsible organization (Tompkins-Beckwith's Authorized Nuclear Inspection Agency) that witnessed the hydrostatic testing. This letter confirms Items 1 through 4 above, and also reaffirms LP&L's position that shop welds were tested and inspected.

CAUSE:

No deficiency exists.

GENERIC IMPLICATIONS:

As discussed above, shop welds were hydrostatically tested and inspected as noted by the Tompkins-Beckwith ANI's report and letter, by the statement on the N-5 report, and by the method in which the test was conducted.

SAFETY SIGNIFICANCE:

LP&L believes that this issue is of no safety significance to fuel load or power operation since no deficiency exist.

CORRECTIVE ACTION PLAN/SCHEDULE:

None.

ATTACHMENTS:

1. Tompkins-Beckwith Hydrostatic test, T-B 60C-4, Rev. 0.

2. Tompkins-Beckwith Inc. letter (L.W. Richardson), QA-1360 dated June 30, 1983 to Ebasco Services, Inc. (Mr. H.J. Kunis Jr.).

3. N-5 Data Report for Safety Injection System (ASME Code Class 2 Portion)

4. Interoffice Correspondence W3QA-25549 from H. Kunis to J. Tompeck, dated July 1, 1983.

5. Memorandum D.M.McCorkle to R.J. Chinnici dated June 15, 1983.

6. The Hartford Steam Boiler Inspection and Insurance Co. letter (B.K.Bobo), dated July 9, 1984, to Ebasco Services, Inc. (M.K.Yates)

REFERENCES:

None.

ATTACHMENT 1

RECEIVED ... 11-3 82

GP-723-103

Cover Sheet

HYDROSTATIC/PNEUMATIC TEST INSTRUCTIONS

Test Number: T-B 60C-4 Rev. 0 System: Safety Injection

Code: ASME, Section III, Division I, Subsection NB, 1974-Summer'76 Addenda

Equipment Required: 2 each 0-5000psi Gauges 1 each 0-2000 psi Gauge.

1 each Relief Valve set @ 3250 psig.

Hydro-pump and Test Gauge header

Prerequisites: A. All valves must be tagged with "LP&L DO NOT OPERATE" tags.

B. Valve line-up to be verified by T-B Quailty Control

C. Ebasco Safety Dept. notified 24 hrs. prior to test.

D.

Inspection Method: Hold test pressure for a minimum of 10 minutes, then lower the pressure to 2505±20 and maintain while examining all permanent field welds, joints and connections.

Acceptance Criteria: No leakage from any permanent field weld, joint or connection.

Attachments: A. Hydrostatic/Pneumatic Test Data Sheet

B. Boundary Drawing

C. Valve Line-up List

D. Weld List

E. Sequence Of Test

F. Hydro-pump and Test Gauge Connection

RECEIVED NOV 4 1982 T-B QA RECORDS

TOMPKINS - BECKWITH, INC. CONTROLLED DOCUMENT MAY 20 1982 Document Accountable & Return. Control Number 5-7

EBASCO QA Records REVIEWED WATERFORD 3 9

Test Instruction Approval:

NAME	COMPANY	DATE
[signature]	T-B Test & Start-up Coordinator	5-17-82
[signature]	T-B Project Engineer	5/17/82
[signature]	T-B QA Supervisor	5/17/82
[signature]	Ebasco	5-19-82
[signature]	LP & L	5/18/82

TCI ... Waterford 3 Project

Form GP-723-18
Rev.4 Attachment A

HYDROSTATIC/PNEUMATIC TEST DATA SHEET

TEST NUMBER TE60C-4
Rev.0

SYSTEM/COMPONENT Safety Injection

DRAWING (S) LOU-1564-G-167 SH.2 Rev.12

TEST BOUNDARIES: Shown in yellow on the above flow diagram.

Test Medium: (A) Potable Water [ ] Disposal Method Water to be retained

(B) Demineralized Water [X] in the system.

(C) Other

Design Pressure 2485 psig Test Pressure 3130 +20 psig Min. Test Temp. 30 + (As specified by Ebasco)

(Maximum Component-Media Temperature Differential 25oF)

Engineering Verification of System Ready for Hydro or Pneumatic Test:

Piping: Ron Jones Title PCB Lead Field Engineer Date 6-17-82

Hangers: R. Wilham Title Lead Hgr Engr. Date 6/17/82

Test Performance:

Temp: Metal 32°F Media 32°F Time System Held At Test Pressure 13 min.

Static Pressure 0 Gauge #1 N/A Gauge #2 N/A

Visual Examination: [✓] Satisfactory [N/A] Exceptions (see below)

Retest Necessary: [✓] No [N/A] Yes (see below)

Exceptions, comments and/or definitions of sections requiring retest:

Test Change Notice Attached [✓] YES [ ] NO

Test Gauge No.: 454 Calibration Date: 6-17-82 Location: test Header

Test Gauge No.: 455 Calibration Date: 6-17-82 Location: test Header

Test Gauge No.: N/A Calibration Date: N/A Location: N/A

WITNESSED BY:

[signature] 6-17-82
EBASCO

[signature] 6-17-82
LP & L START-UP REP.

[signature] 6-17-82
OTHER WITNESSES

ACCEPTED BY:

[signature] 6-17-82
QC INSPECTOR DATE

[signature] 10/22/82
ANI DATE

[signature] 6-17-82
TEST AND STARTUP COORDINATOR, DATE

QA RECORDS REVIEWED 19 WATERFORD 3

ATTACHMENT C

VALVE LINEUP LIST

Where Attachment B

TEST NUMBER T260C-4

GE NUMBER 1

REVISION NUM. 0

LVE NO.	VALVE DESCRIPTION	TEST POSITION	VERIFIED BY INITIAL/ DATE	POST TEST POSITION	VERIFIED BY INITIAL/ DATE
SI-V1595TK1A	Hydro-pump & Test 1"Globe Gauge Conn.	OPEN	HEB 6/17/82	CLOSE	6/17/82 HEB
SI-V1510TK1A	12"Check Boundary	NA	HEB 6/17/82	NA	6/17/82 HEB
SI-V1505TK1A	12"Gate Boundary	CLOSE	HEB 6/17/82	CLOSE	6/17/82 HEB

T.B.Q. RKWO REVIEWED 19 WATERFORD 3

EBASCO/EBASCO-BECKWITH, INC.
…-123-105
Rev. 1
Attachment D

Attachment D

TEST NUMBER TB 60C-4

REVISION NUMBER 0

TEST CHANGE NOTICE NO. 1

PAGE 1 OF 1

WELD CHECK-OFF LIST

LINE NO.	DRAWING AND REVISION	NO. OF WELDS INSPECTED	SATISFACTORY Q/C	SATISFACTORY ANI	FAILURE/ WELD
SI1-314 TK1A	E-2803-IC-53 EFR-4	FW# 3,4,16 SW# 6,7,8,9,10	[illegible]	[illegible] 8/28/82	

LS QA Records REVIEWED 19 WATERFORD 3

ATTACHMENT E

SEQUENCE OF TEST T-B 60C-4 REV.0

Connect the Hydro-pump, Test Gauge header and information gauge as indicated on Attachment F.

2. Verify the valve line-up.

3. Fill the system through the Hydro-pump using the dump valve provided on the Test Gauge header. If possible vent the system through the vent valve provided with the Hydro-pump/Test Gauge header.

4. Once the system is free of air and a hard system has been established, pressurize the system to 300 psig and HOLD!

5. Observe the information gauge for the remainder of the Test to insure that the Safety Injection Tank is not pressurized.

6. While holding at 300 psig examine the system for leaks. When the system is proven to be free of leaks continue sequence.

SAFETY NOTE:

A) Prior to exceeding 300psig, notify T-B Safety Dept.

B) If a leak occurs above 300 psig, lower the pressure to the previously achieved pressure and make the necessary adjustments. After the corrections are made, resume the sequence.

19

WATERFORD 3

Pressurize the system in 100 psi increments with 2 minute intervals to design pressure (2485 psig) and HOLD!

While holding at design pressure, examine the system for leaks. When the system is proven to be free of leaks, notify all Test Parties.

When all Test Parties are present, pressurize the system in 100 psig increments with 2 minute intervals, to test pressure (3130 ±20 psig). Maintain the test presssure for a minimum of 10 minutes. Then lower the pressure to 2505±20 psig and maintain while examining all permanent field welds, joints and connections.

0. When the Test is completed, relieve the pressure at the Hydro-pump, th[illegible] close valve 1SI-V1595TK1A and remove the Hydro-pump and Te[illegible]uge header.

1. R[illegible] vstem to post-test configuration.

ATTACHMENT 2

AREA 504, 464-3159, 464-3160
TELEX 58202

TOMPKINS-BECKWITH, Inc.

MECHANICAL CONTRACTORS

INDUSTRIAL-COMMERCIAL / PIPE FABRICATORS

P.O. BOX 390/ HAHNVILLE, LOUISIANA 70057

Home Office:
P.O. BOX 2486
JACKSONVILLE, FLA. 32203
PHONE (904) 354-4545

Affiliate:
ROWLAND TOMPKINS CORP
HAWTHORNE, N.Y. 10532
(914) 769-3300

June 30, 1983
QA-1360

Ebasco Services, Inc.
P.O. Box 70
Killona, Louisiana 70066

Attention: Mr. E. J. Kurtis, Jr.
QA Site Supervisor

RE: Louisiana Power & Light Company
Waterford Steam Electric Station
1983-1165 MW Installation - Unit #3
Erection of Plant Process Piping Systems
Contract No. W3-NY-11

Ref: Hydrostatic Testing of Dravo Welds

Gentlemen:

Tompkins-Beckwith, Inc. Third Party Inspection Agency has provided (see attached) written clarification concerning the examination of Dravo Welds not identified under Tompkins-Beckwith, Inc. Hydrostatic/Pneumatic Test Instruction.

Please advise should you have any questions concerning this matter.

Yours Truly,

TOMPKINS-BECKWITH, INC.

L. N. Richardson
QA Supervisor

LNR/adm
Attachment

CC: C. Cason
J. B. Gore
J. K. Tompeck (Ebasco QAIRG)
T. Dragon (ANI)

SIS REPORT

THE HARTFORD STEAM BOILER INSPECTION and INSURANCE COMPANY
HARTFORD, CONNECTICUT 06102

TO: Larry Richardson QA Supervisor	DATE 6/28/83	SHEET 1	OF 1
FROM: Thomas J. Dragan ANI/NO	BRANCH OFFICE NO		

ORGANIZATION: Tompkins-Beckwith

LOCATION: Waterford 3 | STREET: Taft La. | CITY | COUNTY | STATE | ZIP CODE

PERSON CONTACTED (GIVE NAME AND OFFICIAL TITLE): Larry Richardson QA Supervisor | ~~CONTRACT~~ P.O. NO. 25-1-C-723-HR[illegible]

REASON FOR VISIT: Hydrostatic Test of Dravo Welds

COPIES SENT TO: ☐ H.O. Eng Claim, SIS ☐ Chief Inspector ☑ Regional Manager, SIS ☑ Other (Specify): Gerry Botes ARM/AT & QA/I [illegible]

Per our conversation of 6/28/83 the following information is offered concerning the hydrostatic testing of Dravo manufactured welds.

There are no Code requirements which dictate a manufacturer/installer to specifically list each weld to be examined during the hydrostatic test. During the hydrostatic test an examination is made of all joints, connections and regions of high stress on all areas of the piping system regardless of whether these items were fabricated by T-B or Dravo, which were included in the test boundary.

In the case of modifications performed by T-B to Dravo spools, the back of the NPP-1 form is completed listing the modifications and the application of a field hydrostatic test. These items are certified by the Installer and the Installer's ANI on this form.

☑ OVER

SIGNED: Thomas J Dragan ANI

REV. 12-72 (5151)

As allowed by the Code in NX-6114(a) "the Component or appurtenance hydrostatic test when conducted in accordance with the requirements of NX-6221(a) shall be acceptable as a test for certified piping subassemblies.

Although these welds are not specifically listed on T-B's hydrostatic test package; they are examined in accordance with NX-6215. Certification of this is indicated by the Installer listing the piping subassemblies on the N-5 data report and listing the applicable hydrostatic pressure that was conducted on the piping system. These items are certified by the Installer/Manufacturer and the Installer/Manufacturer's ANI by signing the appropriate space on the N-5 signifying that all Code related requirements have been met at one point in time.

Your attention is directed to NA-8231(a). "Application of Stamp" which briefly states that the Inspector authorizes application of the Code Symbol Stamp after all required tests, examinations and inspections have been performed. This specifically includes the required hydrostatic test.

If I can be of any further service in this regard [illegible] do not hesitate to contact me.

ATTACHMENT 3

FORM N-5 DATA REPORT FOR INSTALLATION OR SHOP ASSEMBLY OF NUCLEAR POWER PLANT COMPONENTS, COMPONENT SUPPORTS, AND APPURTENANCES*

As Required by the Provisions of the ASME Code Rules, Section III, Division 1

1. Installed by Tompkins-Beckwith, Inc., 2160 McCoys Blvd., Jacksonville, Florida 32203
(Name and address of installer of component, component supports or appurtenances)
2. Installed for Louisiana Power & Light Company, Taft, Louisiana
(Name and address of purchaser or owner)
3. N Certificate Holder having overall responsibility Ebasco Services, Inc.
4. Location of Installation Waterford Steam Electric Station #3
5. System Identification SI (Mfr. Serial No.) N/A (CPN) See Margin (Drawing No.) Nat'l Bd. No. N/A Year Installed 1982
6. Nuclear Components and Appurtenances Installed in the Field by Welding (List each item and attach copies of N Certificate Holders' Data Reports and NPT Certificate Holders' Partial Data Reports)

(a) Components, or Appurtenances	(b) Name of Certificate Holder	(c) Serial No.	(d) Canadian Reg. No.	(e) National Bd. No.	(f) Year Built	
2SI-V1568-7	Yarway	7570	N/A	N/A	1977	
2SI-V1540-32	Target Rock	71L-002-3	N/A	N/A	1979	
2SI-V1568-8	Yarway	7598	N/A	N/A	1977	LW3-SI-1
2SI-V1545-31	Target Rock	71L-002-1	N/A	N/A	1979	
2SI-V1568-9	Yarway	7580	N/A	N/A	1977	
2SI-V1568-10	Yarway	7611	N/A	N/A	1977	LW3-SI-2
See Supplement Sheet #2 thru 9						

Piping System Installation

(a) Piping Subassembly	(b) Name of Certificate Holder	(c) Serial No.	(d) Canadian Reg. No.	(e) National Bd. No.	(f) Year Built	
2SI2-123RL1B-1	T-B	N/A	N/A	N/A	1982	
2SI2-123RL1B-2	T-B	N/A	N/A	N/A	1982	
2SI2-123RL1B-3	T-B	N/A	N/A	N/A	1982	
2SI2-123RL1B-4	T-B	N/A	N/A	N/A	1982	LW3-SI-1
See Supplement Sheet # 10 thru 20						

Component Support Installation

(a) Component Support No.	(b) Name of Certificate Holder	(c) Serial No.	(d) Design Rept. Load Capac. Data Sheet	(e) Canadian Reg. No.	(f) National Bd. No.	(g) Year Built

Additional Material Excluding Welding Material

(a) Name of Manufacturer	(b) Material Specification	(c) Dimensions

7. (a) Installation in Accordance with:

Procedure or Drawing No.: IBP-35 (Traveler Preparation)

Prepared by: Tompkins-Beckwith, Inc.

(b) Description of Installation Performed

Closure welds for pressure piping. Hydrostatic test of shop fabricated welds contained in piping sub assemblies listed in Item 6 above.

*0/1032/935/815/688/560/373/200 **2350/1800/625/550/415/285/60/40 ***350/300/240/120/110

(c) Hydrostatic Test * psi. System Working Pressure ** psi and Temp. *** F.

* Supplemental sheets in form of lists, sketches, or drawings may be used provided (1) size is 8-1/2 in. × 11 in., (2) information in items 1 through 5 on this Data Report is included on each sheet, and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM N-5 (Back)

CERTIFICATION OF DESIGN FOR PIPING SYSTEM INSTALLATION

Design information on file at: Ebasco Services, Inc. 2 World Trade Center, N.Y.C.

Design Report on file at: LP&L, Waterford III, Taft, LA.

** Design specifications certified by (1): Cesar Sedane PE State Louisiana

Reg. No. 16120

Design Report certified by (1): N/A PE State N/A

Reg. No. N/A

(1) Signature not required. List name only.

Design Conditions of Piping 50,160,300,440 700,650,950,2485 Pressure psi 150,250,350 400,650 Temperature F.

CERTIFICATE OF INSTALLATION COMPLIANCE

We certify that the statements made in this report are correct and that this installation conforms to the rules of construction of the ASME Code for Nuclear Power Plant Components, Section III, Division 1, 1974 Edition, Addenda Date: Summer 1976 Code Case No. N242-1,N282 N316 Class 2 and was performed in accordance with the documents listed in 7(a), above.

Our ASME Certificate of Authorization No. 1451-1 to use the NA (N, NA) Symbol expires 9-11-84 (Date)

Date [illegible] Signed Tompkins-Beckwith, Inc. (Certificate Holder) by [signature]

CERTIFICATE OF INSTALLATION INSPECTION

I, the undersigned holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the State or Province of Louisiana and employed by * of Hartford, CT have inspected the installation of the items described in this Data Report on [illegible] 19[illegible] and state that to the best of my knowledge and belief, the Certificate of Authorization Holder has performed this installation in accordance with the ASME Code for Nuclear Power Plant Components.

By signing this certificate, neither the Inspector nor his employer make any warranty, expressed or implied, concerning the installation described in this Data Report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 28 Sept 19 83 Signed William F. Fisher (Inspector) Commissions LA 624 (Nat'l Board, State, Province and No.)

CERTIFICATE OF COMPLIANCE

Following completion of the above, the Certificate of Authorization Holder accepting overall responsibility for the piping system shall complete the following statement.

We certify the statements made by this report are correct and that the piping system conforms to the rules of construction of the ASME Code Section III, Division 1.

Certificate of Authorization expires 7-23-85 Certificate of Authorization No. 1408-1 #1

Date 10/6/83 Signed Ebasco Services, Inc (N-Certificate Holder) [signature] [signature] 10/19/83

CERTIFICATE OF INSPECTION

I, the undersigned holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the State or Province of Louisiana and employed by American Motorists Ins, Co. of Long Grove, Il. have inspected the piping described in this Data Report on 10-6 19 83 and state that to the best of my knowledge and belief, the Certificate of Authorization Holder has constructed this installation in accordance with the ASME Code for Nuclear Power Plant Components.

By signing this certificate, neither the Inspector nor his employer make any warranty, express or implied, concerning the piping described in this Data Report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 10-6- 19 83

Signed [signature] (Inspector) Commissions LA 906 (Nat'l Board, State, Province and No.)

*Hartford Steam Boiler I & I Co.

** R1 - John Z. Horvath - LA PE 19331

ATTACEMENT 4

#19

G:2 Billing McCorkle Chirricci

Interoffice Correspondence

DATE July 1, 1983 FILE REF W3QA-25549

TO John Tompeck OFFICE LOCATION QAIPG

FROM Herman J. Kuris, Jr. OFFICE LOCATION Q. A. Site Supervisor

SUBJECT Hydrostatic Testing of Shop Welds

Reference: D. M. McCorkle letter to R. J. Chirricci, dated June 15, 1983

Mr. McCorkle's interpretation of the ASME code involving hydrostatic testing of shop welds is not valid. Attached please find memos from Mr. Thomas Dragan (Tompkins-Beckwith's Authorized Nuclear Inspector) and Mr. Larry Holt (our Authorized Nuclear Inspector). They both agree that the Authorized Nuclear Inspector signature N-5 Data Report is the final inspection signature for hydrostatic test of the stamped system.

Tompkins-Beckwith has been providing an individual inspection signature for each of their field welds indicating acceptance for hydrostatic test. This is more than the code requires and is admirable but not mandatory by code requirements.

The nonconformance attached to Mr. McCorkle's memo does not need to be issued. We trust this resolves Mr. McCorkle's question once and for all.

RECEIVED
JUL 5 1983
PAW
EBASCO QA

Attachments

HK:jmd

cc: L. A. Stinson
P. Burgard
C. Diz
L. Jagger
W3QA File
QAS File

Copies
Cupples
Bourgeois
Rubinskie
Foltz
PAW

SIS REPORT
THE HARTFORD STEAM BOILER INSPECTION and INSURANCE COMPANY
HARTFORD, CONNECTICUT

Larry Richardson QA Supervisor | DATE 6/29/83 | SHEET 1 | OF 1
Thomas J. Dragan ANI/NO | BRANCH OFFICE NO

ORGANIZATION
Tompkins-Beckwith

LOCATION Waterford 3 | STREET Taft La. | CITY | COUNTY | STATE | ZIP CODE

PERSON CONTACTED (GIVE NAME AND OFFICIAL TITLE)
Larry Richardson QA Supervisor | CONTRACT/P.O. NO. 25-120-723-HRT

REASON FOR VISIT
Hydrostatic Test of Dravo Welds

COPIES SENT TO:
☐ H.O. Eng Claim, SIS ☐ Chief Inspector ☑ Regional Manager, SIS ☑ Other (Specify): Gary Boles HRM/AT & ANI file

Per our conversation of 6/28/83 the following information is offered concerning the hydrostatic testing of Dravo manufactured welds.

There are no Code requirements which mandate a manufacturer/installer to specifically list each weld to be examined during the hydrostatic test. During the hydrostatic test an examination is made of all joints, connections and regions of high stress on all areas of the piping system regardless of whether these items were fabricated by T-B or Dravo, which were included in the test boundary.

In the case of modifications performed by T-B to Dravo spools, the back of the NPP-1 form is completed listing the modification and the application of a field hydrostatic test. These items are certified by the Installer and the Installer's ANI on this form.

☑ OVER

SIGNED
Thomas J Dragan ANI

As allowed by the Code in NX-6114(a) "the ... component's appurtenance hydrostatic test ... when conducted in accordance with the requirements of NX-6221(a) shall be acceptable as a test for ... and piping subassemblies.

Although these welds are not specifically listed ... T-B's hydrostatic test package; they are examined ... accordance with NX-6215. Certification of this ... indicated by the Installer listing the piping ... subassemblies on the N-5 data report and listing ... applicable hydrostatic pressure that was conducted ... the piping system. These items are certified ... the Installer/Manufacturer and the Installer/ Manufacturer's ANI by signing the appropriate ... on the N-5 signifying that all Code related ... requirements have been met at one point in time.

Your attention is directed to NA-8231(a). "Application ... Stamp" which briefly states that the Inspector authorizes ... application of the Code Symbol Stamp after all required ..., examinations and inspections have been performed ... is specifically includes the required hydrostatic test.

If I can be of any further service in this ...
[illegible]

JUNE 28, 1983

TO: L.A. STINSON Q.A. PROGRAM MANAGER

FROM: L.G. HOLT ANI

SUBJECT: ANI ACCEPTANCE OF FIELD HYDROSTATIC TESTS

THE ANI SIGNATURE ON THE BACK OF FORM NPP-1 INDICATES HIS ACCEPTANCE OF FIELD HYDROSTATIC TESTS. LINE 11 CLEARLY STATES "FIELD HYDROSTATIC TEST". THE INSTALLER SIGNS FOR THE WORK THAT HE PERFORMS, LINE 10 GIVES A DESCRIPTION OF THE WORK THAT WAS PERFORMED, AND HE IS SIGNING FOR. THE ANI BLOCK "CERTIFICATE OF FIELD - ASSEMBLY INSPECTION" IS FOR THE ANI TO INDICATE HIS ACCEPTANCE OF THE WORK PERFORMED, IT EVEN HAS A LINE TO INDICATE EXACTLY WHAT HE IS SIGNING FOR - ie - "data ITEMS 10 & 11". HIS SIGNATURE INDICATES THAT ALL CODE RELATED ACTIVITIES HAVE BEEN COMPLETED.

N-5 data REPORTS HAVE SUPPLEMENTAL SHEETS TO INDICATE WHICH, IF ANY, NPP-1 FORMS APPLY TO THAT PARTICULAR SYSTEM. THE NPP-1's ARE DESIGNATED BY MANUFACTURER NAME AND ASSIGNED SERIAL NUMBER RIGHT ON THE SUPPLEMENTAL SHEETS. THEY BECOME A PART OF THE N-5 PACKAGE, - ie - REQUIRED TO BE IN THE PACKAGE

TO SUPPORT ALL ACTIVITIES INVOLVING SHOP CONSTRUCTED ITEMS. THE N-5 PACKAGE STANDS ALONE IN SUPPORT OF "N" STAMPING. ALL CODE REQUIREMENTS HAVE BEEN MET.

IN SHORT, THIS MEMO SHOULD NOT HAVE BEEN NECESSARY. ANY FURTHER MEMOS FROM EITHER MYSELF OR MY COLLEAGUES WILL NOT BE AT ALL NECESSARY. THE N-5 PACKAGE IS ALL THAT THE ASME B & PV CODE REQUIRES.

I TRUST THAT THIS WILL RELIEVE THE MINDS OF THESE INDIVIDUALS WHO DO NOT BELIEVE THAT T & 6 IS ADEQUATELY DOCUMENTING THEIR PERFORMANCE OF INSPECTION DURING TEST OF DRAVO SPOOL PIPING.

REGARDS,

[signature]

CC: J.D. ELLIS ANIS
INSPECTOR FILE

*CORRECTED REPORT

FORM NPP-1 DATA REPORT FOR FABRICATED NUCLEAR PIPING
(As Required by the Provisions of the ASME Code Rules)

1. Fabricated by Dravo Corporation, Marietta, Ohio (Name and Address of Fabricator) Order No. E-2803

2. Fabricated for Ebasco Services, Inc., New York, NY (Name and Address) Order No. NY-403433

3. Owner Louisiana Power & Light Co. Location of Plant St. Charles, LA

4. Piping System Identification S I SHDN COOLING LINE FROM RC LOOP 2 (Brief description of intended use, Item Identification)

(a) Drawing No. E2803-443 REV 10 Prepared by Dravo Corporation

(b) National Board No. NA

5. Design Conditions of Piping 440 (Pressure) psi 400 (Temp.) °F

6. The material, design, construction, and workmanship complies with ASME Code Section III, Class 2

Edition 1971, Addenda Date Winter 1972, Case No. NA.

Remarks: Manufacturers' Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of this report: NA (Name of Part — Item Number — Manufacturer's Name, and Identifying Stamp)

*CORRECTED FIELD WELD E COUNTERBORED TO MATCH 14" OD — STD WT .375 NW

7. Shop Hydrostatic Test None psi

8. Description of piping inspected PC. MK. # 2SI14-194-4 SERIAL # 2220 (Component — Mark No. — Material Spec. — Nom. Pipe Size — Schedule or Thickness — Length — Flanges — Changes, etc.)

SEE PG 2 of 2

W.R.M.
10-16-81

CERTIFICATION OF DESIGN (Not Applicable)

Design information on file at

Stress analysis report on file at

Design specifications certified by (1) Prof. Eng. State Reg. No.

Stress analysis report certified by (1) Prof. Eng. State Reg. No.

(1) Signature not required. List name only.

We certify that the statements made in this report are correct.

Date 12/5/79 Signed Dravo Corporation (Fabricator), By R.L. Anderson
Quality Assurance Department

Certificate of Authorization Expires NI329 3-1-79

CERTIFICATE OF SHOP INSPECTION *Hartford Steam Boiler I & I Co.

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by * of Hartford, CT have inspected the piping described in this data report on 12-6 1979, and state that to the best of my knowledge and belief, the manufacturer has constructed this piping in accordance with the applicable sections of ASME Code, Section III.

By signing this certificate, neither the Inspector nor his employer make any warranty, expressed or implied, concerning the piping described in this data report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 12-6 1979

Harold E. Reel (Inspector) Commissions Ohio Comm 9A-2761 (National Board, State, Province and No.)

FORM NPP-1 (back)

10. Description of Field Fabrication:

11. Field Hydrostatic Test ________________ psi.

We certify that the field assembly of the described piping conforms with the requirements of SECTION III of the ASME BOILER AND PRESSURE VESSEL CODE. Class ________, Edition __________, Addenda Date __________, Case No. ________

Date ____________, 19 ____ Signed ________________ (Assembler) By ____________________ (Representative)

Our Certificate of Authorization to use the __________ Symbol Expires ______________ 19 _____

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ________________________________
and employed by ________________________ of ________________________
have compared the statements in this manufacturer's data report with the described piping and state that the parts referred to as data items ________________________, not included in the certificate of shop inspection have been inspected by me and that to the best of my knowledge and belief the manufacturer and/or assembler has constructed and assembled this piping in accordance with the applicable sections of the ASME CODE SECTION III.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the piping described in this manufacturer's data report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date ____________________ 19 ______

________________________ Commissions ________________________
Inspector National Board, State, Province and No.

ATTACHMENT 5

Interoffice Correspondence

DATE June 15, 1983 FILE REF. W3QAIRG-055

TO R. J. Chinnici OFFICE LOCATION Ebasco QAIRG

FROM D. M. McCorkle OFFICE LOCATION Ebasco QAIRG

SUBJECT LOUISIANA POWER & LIGHT COMPANY
WATERFORD STEAM ELECTRIC STATION
1983 - 1165 MW INSTALLATION - UNIT NO. 3
Hydrostatic Testing of Shop Welds
Manfactured by Dravo

Richard, per your request the following is a response to Mr. L. W. Jagger's speed letter dated 6/10/83.

Mr. Jagger's statement "The signing of N-5 form with N-1 forms of mfg. attached signifies that mfg. shop welds have been hydro tested and accepted by installer ANI;" is not entirely accurate. It is a true statement that the shop welds have been subjected to a hydrostatic test, but the signing of the N-5 form by the installers ANI does not signify acceptance of these welds. To substantiate this statement the following is offered as discourse on the subject of hydrostatic testing shop welds manufactured by Dravo.

The N-5 Data Report, as quoted from ASME Section III 1974 Edition through the Summer of 1976 Addenda is for "NA-8420 Report Form for field installation: field installation welds shall be verified on Data Report Form N-5." The N-5 data report will also identify and have attached the data reports of the components installed by the field installation welds noted above.

The data reports attached to the N-5 such as; NPP-1, NPV-1, N-1, N-1A, NV-1, N-6, N-7, N-2, NCS-1, NCS-2, NF-1 and NF-2 in turn signify Code compliance for the item(s) identified there on. In the case of Dravo, the NPP-1 data reports are signed off by the manufactures ANI but line number 7 (Shop Hydrostatic Test ____________ PSI) of these data reports has been completed by entering the word NONE, signifying that a shop hydrostatic test was not performed.

The condition is perfectly acceptable, because the Code allows the component or appurtenance hydrostatic test as an acceptable test for parts and piping subassemblies, Reference NB-6114. But this does not eliminate the Code requirement for "Examination for Leakage after Application of Pressure", Reference NB-6215, of the weld's manufactured in the shop.

Therefore the following condition exists:

1. We have an N-5 data report with NPP-1's attached that have no hydrostatic test documented for the shop welds.

2. We have a Tompkins-Beckwith hydrostatic test package with only the field welds documented.

3. Thus we do not have any documentation that the shop welds were examined for leakage after application of pressure. (This is a Code requirement NB-[illegible] that can not be verified by documented [illegible].)

4. The installers ANI is only responsible to the extent detailed in NA-5200 and therefore is only verifying those items detailed on the N-5 data report. The shop welds hydrostatic test are not detailed on any data report or Quality Assurance Record as required by ANSI N45.2.9, Reg. Guide 1.88 and ASME Section III Article NA-4000, Sub Article NA-4500.

The NCR generated against the subject welds would provide us with the documentation necessary to adequately resolve this issue. A closed copy could be placed into each test package to provide us with the documented evidence that this condition was identified, addressed and resolved in accordance with the Quality Assurance Program requirements.

DMM/caf

EBASCO SERVICES INCORPORATED

QUALITY ASSURANCE

NONCONFORMANCE REPORT

Distribution:
White - PCAE or Site QA Supervisor
Yellow - Organization recommending disposition
Pink - Initiator of NCR

REPORT NO.(1) ________

resolved at Cold Hydro

INSTRUCTIONS: (See back of form) MFG. NP-1 are marked N/A.

CLIENT OR PROJECT (2)		DRAWING NO./SPEC NO. (3)
Waterford Steam Electric Station		since this was exception to MFG.
SUPPLIER, CONSTRUCTION CO OR CONTRACTOR (4) Ebasco Serivces, Inc.	P.O. NO. (5) N/A	
DESCRIPTION OF COMPONENT, PART OR SYSTEM (6) Safety Related ASME Section III Piping Subassemblies		

I. DESCRIPTION OF NONCONFORMANCE (7) (Items Involved, Specification, Code or Standard to Which Items Do Not Comply. Submit Sketch if Applicable)

(I) During the review of Tompkins-Beckwith Hydrostatic Test Documentation it was revealed that the shop welds manufactured by Dravo did not receive the required "Examination for leakage after the application of pressure as required by NB-6215, NC-6215 and ND-6215, of ASME Section III, 1974 Ed. through Summer of 76 Addenda.

(2) In addition no documentation exists for the required Hydrostatic Test of the shop welds as required by ANSI N45.2.9 Appendix A.5 (Hydrostatic Pressure Test results) for shop welds.

NAME AND SIGNATURE OF PERSON REPORTING NONCONFORMANCE (8)	TITLE/COMPANY	DATE (9)
James R. McElrino		6/10/83

II. RECOMMENDED DISPOSITION (10) (Submit Sketch if Applicable).

NAME AND SIGNATURE OF PERSON RECOMMENDING DISPOSITION (11)	TITLE/COMPANY	DATE (12)

III. EVALUATION OF DISPOSITION BY EBASCO, REASON FOR DISPOSITION (13)

IV. CORRECTIVE ACTION (14) ☐ Required ☐ Not Required

BY (15) ☐ ENGINEERING	☐ QUALITY ASSURANCE	☐ CONSTRUCTION	☐ OTHER
NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)
DATE	DATE	DATE	DATE
☐ ACCEPTED ☐ REJECTED ☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED ☐ REJECTED ☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED ☐ REJECTED ☐ ACCEPTED WITH COMMENTS	☐ ACCEPTED ☐ REJECTED ☐ ACCEPTED WITH COMMENTS

VERIFICATION OF DISPOSITION ☐ REQUIRED ☐ NOT REQUIRED (16)

BY: EBASCO SERVICES INC. ENGINEERING SIGNATURE ________ TITLE ________ DATE ________

Speed Letter. 44-902 GrayLine. SNAP-A-WAY FORM

Speed Letter.

To Mr. Tompeck / J. McAlpine
OHIRE

From L.W. Jagger
RAE

Subject Hydrotest of Shop Welds by Drava

MESSAGE

The signing of N-5 form with N-1 forms of Mfg. attached signifies that mfg. shop welds have been Hydro tested and accepted by installer ANI. thus this is not a non conforming condition

Date 6-10-83 Signed LWJagger

REPLY

Mr. Jagger;

Enclosed Letter is in answer to your memo of 6-10-83.

R 6-15-83

Date Signed

son Jones Company

RECIPIENT—RETAIN WHITE COPY, RETURN PINK COPY

ATTACHMENT 6

Atlanta Office
The Hartford
Steam Boiler Inspection
and Insurance Co.
4330 Georgetown Square
Atlanta, Georgia 30338
(404) 457-0261

July 9, 1984

RECEIVED
JUL 13 1984
Ebasco Services, Inc.
Waterford 3 Field

Mr. Mike Yates, Project Manager
Ebasco Services, Inc.
Waterford III SES
P. O. Box 70
Killona, Louisiana 70066

SUBJECT: HYDROSTATIC TESTING WITNESSED BY AUTHORIZED NUCLEAR INSPECTORS

Dear Mr. Yates:

The Hartford Steam Boiler Inspection and Insurance Company, Atlanta Regional Office, received a call from Mr. Upshure Quinby, Senior Resident Engineer, Ebasco, on July 3, 1984. Mr. Quinby's inquiry was to ascertain the degree of inspections performed by the HSB Authorized Nuclear Inspector (ANI's) during hydrostatic testing of ASME Section III, Division 1, Class 1 and 2 piping systems.

Mr. Quinby's concern was that the Tompkins-Beckwith (T-B's) hydrostatic packages did not list those welds made by the piping subassembly subcontractor (Dravo).

The writer acknowledged the above and noted that it was T-B's intent to list only those welds made by T-B as the NA/NPT Certificate of Authorization Holder.

However, it was further pointed out that isometric drawings and flow diagrams were included as part of the hydrostatic test package. These documents identified hydrostatic test boundaries and were utilized for inspection during hydrostatic testing.

Also the writer noted to Mr. Quinby that inspections were not limited to welds, whether made by T-B or Dravo. ASME Code Section III, Division 1, paragraph NB/NC6215 "Examination for Leakage After Application of Pressure" requires in part that ". . . examination for leakage shall be made of all joints, connections and of all regions of high stress . . . ".

In actual practice this requirement was exceeded as the ANI's also made a complete walk-down of these systems and performed a visual inspection of test boundary surfaces and surrounding areas for evidence of leakage.

Certification by the ANI that these requirements were met is attested to in the "Certificate of Installation Inspection" block on the ASME N-5 Data Report Form for the applicable system. This certification signifies that the ANI performed the inspections required by Section III and to the best of the ANI's knowledge and belief, the Certificate Holder met all Code requirements.

Atlanta Office
The Hartford
Steam Boiler Inspection
and Insurance Co.

4330 Georgetown Square
Atlanta, Georgia 30338
(404) 457-0261

It should also be noted that a statement was included on all N-5 Data Reports confirming that the hydrostatic test included shop fabricated welds.

As Authorized Nuclear Inspector Supervisor assigned to the Waterford III Project during the majority of this testing and responsible for technical supervision of the assigned ANI's, I have complete confidence that the Authorized Nuclear Inspectors performed the required inspections in accordance with ASME Section III requirements.

Should you need further information regarding the above inspections, please do not hesitate to contact the Atlanta Regional Office.

Yours very truly,

Barry K Bobo

Barry K. Bobo
Assistant Regional Manager
SIS Division - Atlanta

BKB/je/94

RESPONSE

ITEM NO.: 9 (Final)

TITLE: Welder Certification

NRC DESCRIPTION OF CONCERN:

The staff reviewed the records for the installation of the supports for certain of the instrumentation cabinets in the Reactor Containment Building (RCB). The review included an examination of procurement records for the support material, weld rod control documents, welder certification records and QC inspection records.

Based on the staff review, it appears that documentation is missing on a number of support welds and it is not clear that the welders were certified for all of the weld positions used. Thus, the quality of the supports for the instrument cabinets are indeterminant.

LP&L shall attempt to locate the missing documents and determine if the welders were appropriately certified. If the documentation cannot be located, appropriate action must be taken to assure the quality of the cabinet supports.

DISCUSSION:

The instrument cabinet support steel of concern to the NRC was installed by the J. A. Jones Construction Company. J. A. Jones' primary construction responsibility was to install reinforcing steel and place concrete. Welding by J. A. Jones was limited in scope and incidental to their primary responsibility.

As a result of the specific NRC concern, a thorough review was conducted of the documentation associated with welding of the instrument cabinets. Reviews were also conducted to identify the remaining scope of Jones welding and the extent of available documentation. As discussed below, no cases of welding out of position were identified, and the adequacy of Jones welding was confirmed.

A) Reactor Containment Building (RCB) Instrument Cabinets

In order to determine that no welders welded out of a qualified position, a thorough review was conducted of Weld Inspection Reports (WIRs) associated with the support steel for the RCB instrument cabinets. This review determined that for 11 of the 18 instrument cabinets, the WIRs indicated the welders were all qualified.

For the remaining seven cabinets documentation was not complete. Accordingly, it could not be conclusively established that no welders welded out of a qualified position. To confirm the integrity of the welding associated with these seven cabinet supports, a complete reinspection of six cabinet supports (welds on cabinet C-2B were inaccessible) was performed. The results of this inspection are documented in Attachment 9 to NCR 7549. The inspection did document conditions requiring an engineering evaluation. However, the evaluation confirmed the capability of the support steel to perform its safety functions under design conditions including seismic loads required by the FSAR. No rework was required.

Based on the inspection results of the six cabinets, LP&L elected to reinspect the other 11 cabinets. Conditions requiring engineering evaluation were documented. The evaluations confirmed the as-built condition to be acceptable with no rework required. Based on partial documentation of welding on cabinet C-2B and the acceptable evaluation of the other 17 cabinets, no further evaluation of C-2B is necessary.

The following summarizes the conclusions reached from reinspection and evaluation of the instrument cabinets.

(1) Documentation for inspection of welding on the RCB instrument cabinet supports was not complete.

(2) A review of the available documentation revealed no cases where out-of-position welding occurred. The J. A. Jones weld inspection procedure included instructions for completing WIRs that required a check of the welders certifications, and very few Jones welders were not qualified to all positions. This review has provided reasonable assurance that no J. A. Jones welders performed welding in positions for which they were not qualified.

(3) In any instances where out-of-position welding may have occurred, the complete reinspection and subsequent evaluation of the as-built condition has confirmed its adequacy.

B) Other Welding Performed by J. A. Jones

To ensure that conclusions reached relative to the safety of the instrument cabinet supports could be extended to the rest of J. A. Jones welding, a thorough review was conducted to establish the scope of welding and adequacy of documentation. The additional J. A. Jones welding identified by this review consisted of 22 work packages. They were categorized as 1) temporary work or work done for construction convenience, 2) nonsafety-related welding, 3) safety-related or seismic welding. Work performed under categories 1 and 2 were not considered further due to their non-safety applications. For welding identified as safety-related or seismic, a documentation review was conducted. This review indicated that the available documentation associated with J. A. Jones other welding was as good, and in most cases, better than the documentation associated with the RCB instrument cabinet supports welding. Documentation for three Field Change Requests (FCRs) (1898, 1916 and 1965) has not been located, however, Work Verification sheets indicating completion of this work provides a high level of confidence that the work was adequately performed.

Welding identified as safety related or seismic was also determined to be of a low stress. No applications involving high stress were identified.

The welding performed on the RCB instrument cabinet supports represented a large percentage of the J. A. Jones welding. This welding was completely reinspected and analyzed without identification of any required rework. The acceptable condition of this work, combined with the favorable documentation on additional J. A. Jones welding, substantiates the conclusion that the additional J. A. Jones welding is adequate.

To provide additional confirmation of this conclusion, six of the twenty-two packages determined to be the most important of J. A. Jones additional welding, were selected for inspection. Included in one of these work packages are the three FCRs for which full documentation has yet to be located. This inspection is documented by L-CIWA-18908, and identified no condition requiring corrective action.

CAUSE:

The cause of this situation concerning documentation and quality of work on the RCB instrument cabinet supports is believed to have been a combination of several factors that by themselves had no adverse effects, but as uniquely combined in the instrument cabinet work, resulted in the deficiencies noted by the NRC. These factors were:

(1) Limited welding performed by J. A. Jones provided limited opportunity for detecting any adverse condition in the welding program.

(2) A "Welding Inspection Report" format that did not ensure documentation of inspection on an individual weld basis.

(3) Numerous revisions to the FCRs installing the instrument cabinet support steel. In some cases as many as three separate FCRs were required to complete the installation of steel for a single cabinet.

(4) Frequent modification/removal/reinstallation of support steel as a result of (3) above.

(5) Due to (3) and (4) above, the installation required an inordinate length of time, with different welders involved in small portions of the overall job for each cabinet support.

The WIR used by Jones was, in retrospect, inadequate to deal with this combination of problems confined to these supports. As a result, it has been concluded that a portion of the welding associated with the instrument cabinets may not have been inspected, and deficiencies were not documented and corrected.

GENERIC IMPLICATIONS:

This concern has been addressed generically. A review of all welding performed by J.A. Jones was completed. Elements of the Jones program that resulted in problems on the cabinet supports were common to all welding performed by Jones. However, the unique combination of problems observed on the cabinets was not observed elsewhere.

SAFETY SIGNIFICANCE:

Complete reinspection and engineering evaluation of the welding associated with 17 of the 18 RCB cabinets confirmed its capability to adequately perform its safety function under design conditions. Review of documentation, determination of the low stresses involved and the selected inspection confirmed the adequacy of the remaining J. A. Jones welding. On this basis, there is no recognized reason that this issue should constrain fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

Review and evaluation of the RCB instrument cabinet supports is complete. No further corrective action is required.

Identification and documentation review of J. A. Jones additional welding is complete. Six work packages were selected for inspection. No further corrective action resulted from this inspection.

LP&L considers all corrective action associated with this concern to be completed.

ATTACHMENTS:

None

REFERENCES:

(1) J. A. Jones QA Manual
(2) NCR-W3-7549
(3) J.A. Jones Welding Inspection Procedure, W-SITP-14
(4) E. Stanley memo to file dated August 23, 1984, No. ES-84-08-7
(5) B. Grant/I. Bari memo to J. Houghtaling dated 10/10/84, No.ES-10145-84

RESPONSE

ITEM NO.: 10 (Final)

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:

- 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

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.

The Verification Program determined that non-inspector J. A. Jones QA/QC personnel were qualified.

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.

The Verification Program determined that non-inspector Fegles QA/QC personnel were qualified.

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, statistical 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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector J. A. Jones QA/QC personnel were qualified.

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 OAP-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.

6. Non-Inspector QA/QC Personnel

The Verification Program determined that non-inspector Fegles QA/QC personnel were qualified.

RESPONSE

ITEM NO. 11 (Final)

TITLE: CADWELDING

NRC DESCRIPTION OF CONCERN:

The staff reviewed the cadweld activities related to the deficiencies identified in NCR-W3-6234. The staff is concerned that the applicant has provided only limited data (in other than the raw form) to the NRC on the statistics of the cadweld testing program conducted during construction. The data provided stated that for the base mat 3,673 splices were made with 81 tests run, showing an average strength of 95,397 psi with a range of 60,750 - 107,051 psi. For the entire project the applicant has stated that 14,293 splices were made of which 591 were tested with 6 of those failing to meet tensile requirements. It is noted that the above NCR has been reopened as a result of the CAT inspection and all issues have not been resolved.

LP&L shall provide the cadweld data for the project in such a form that it can be readily compared to the testing criteria used for the Waterford 3 project. This will require breaking down the cadweld data by building or structural element such as the base mat, NPIS walls that are not part of RAB or FHB, containment interior structures etc. Additionally, the data should be broken down by test program type (production or sister), bar size, bar position and cadwelder. Data should be provided in each category on total splices made, visual rejects, production tests and failures, and sister tests and failures. Data shall also be provided on welder qualification and requalification including dates.

Based on discussions with LP&L representatives the NRC staff has been informed that efforts in this area are underway, but this information is needed for staff review.

DISCUSSION:

LP&L has transcribed all the cadweld data onto computer data storage (Reference 1). As described below, the data has been broken down by building, in such a way that it can be readily compared to the testing and other specification requirements.

The compiled data indicates that 3,925 splices were made in the basemat with 81 tensile tests having an average strength of 95,504 psi with a range of 80,750 - 107,051 psi. The reason for the disparity between this range and that quoted in the NRC DESCRIPTION OF CONCERN is that the latter figures were based on incomplete data and includes a typographical error (60,750 should be 80,750). For the entire Nuclear Plant Island Structure (NPIS), 14,583 splices were made by J.A. Jones of which 586 were tested with 6 failures. The total of 591 tests stated in NRC description of Concern includes 5 outside the NPIS. The average strength of the tested splices is 98,215 psi with a range of 64,102 - 113,974 psi. The 6 test failures had an average strength of 69,957 psi with a range of 64,102 - 74,487 psi. The acceptable limit of tensile test is 75,000 psi.

The cadweld records are presently filed on a production sequence basis in accordance with the specification requirements for counting test cycles on a production basis. To facilitate the verification of specification requirements, the following files have now been extracted from the computerized data (Reference 1):

- Cadwelds in Common Foundation Mat

- Cadwelds in Common Foundation Structure (NPIS walls which are not part of the RAB or FHB)

- Cadwelds in Fuel Handling Building

- Cadwelds in Reactor Auxiliary Building

- Cadwelds in Reactor Containment Building

- Cadwelds in all Areas Combined.

The data provides the following information for each area:

- Date cadweld is made

- ID number of welder

- Cadweld number

- Bar size

- Bar position (horizontal or vertical)

- Replacement splice for visual reject

- Replacement splice for production test

- Tension test result

- Building where cadweld is located

- Concrete placement number where cadweld is located

- Cadwelder qualification and requalification dates

- Visual rejects

- Production & sister tests

The computerized cadweld data can be sorted in various formats to expedite reviews. Attachment 4 consists of the cover pages of one sort of the cadweld data printout with the printout keys and four sample pages. The entire document is available for NRC review.

The compiled cadweld data has been reviewed against Ebasco specification LOU-1564.479 (Reference 3) requirements for inspection and testing. These inspection and testing requirements meet those of Regulatory Guide 1.10.

The Nuclear Plant Island Structure (NPIS) is divided into five structures (Attachment 1). A statistical breakdown, by structure, of the testing and inspection conducted is shown on Attachments 2 and 3. The review identified the following 2 minor discrepancies that had not already been identified in NCR-W3-6234:

- Replacement splices for 3 production tests and 5 visual rejects are not shown on the Daily Cadweld Inspection Report.

- At four locations, welder re-qualification cannot be located.

These discrepancies have undergone engineering evaluation and have been determined to be not significant. Further, the frequency of rejects and tensile test failures summarized in Attachment 2 and 3 are well within the allowable limits of the specification. Thus, based on the findings of the review of the cadweld data, it is concluded that the test program was conducted satisfactorily, and the overall requirements of the specification have been met.

CAUSE

With the exception of the minor deficiencies noted and dispositioned in the review, LP&L was in compliance with the specification requirements. However, the lack of a computerized database made after-the-fact confirmation of compliance to the specification difficult. The transcription of the cadweld data onto computer data storage, and the overall review it facilitated, have confirmed the adequacy of the cadwelds.

GENERIC IMPLICATIONS

The NRC concern has been addressed generically. After developing the computerized database for the cadweld data, the data was reviewed for the entire NPIS for compliance to the requirements of the specification for inspection and testing.

SAFETY SIGNIFICANCE

Based on the complete evaluation of computerized cadweld data, LP&L confirms that the cadweld splices are structurally sound; that the installation, inspection and testing met specification requirements; and that the cadwelds are capable of sustaining the design loads including the design basis event. This concern therefore poses no constraint to fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE

The review of all cadweld data for the NPIS is complete. The minor discrepancies noted have been documented and dispositioned on NCR-W3-6234.

ATTACHMENTS

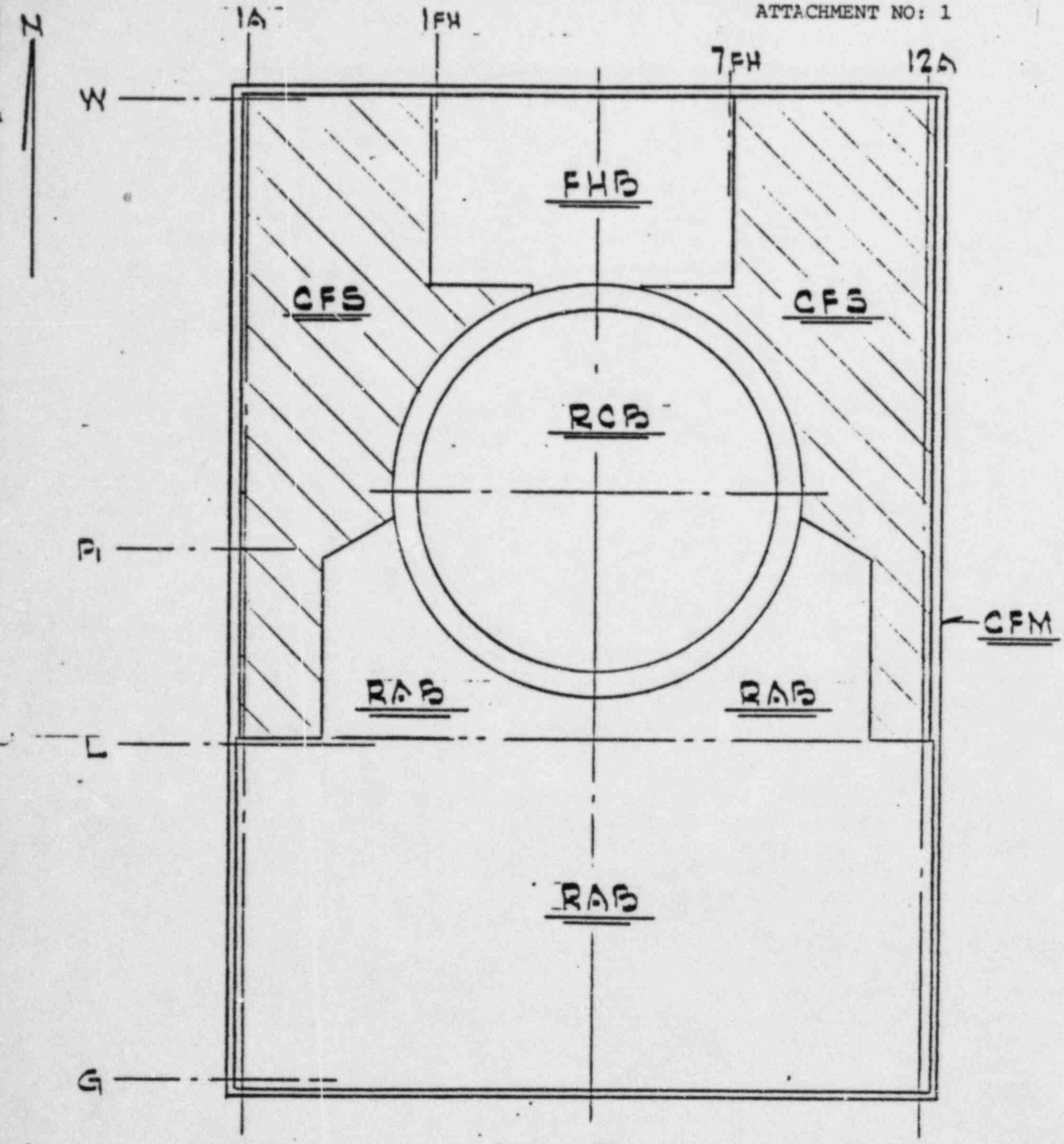
1. Key Plan - Nuclear Plant Island Structure
2. Summary of Cadweld Testing
3. Summary of Cadweld Inspection
4. Sample of Compiled Cadweld Data

REFERENCES

1. Report of Cadwelds
2. NCR-W3-6234
3. Ebasco Specification LOU-1564.479 (Rev. 3)

AF 282878

ATTACHMENT NO: 1



KEY PLAN

LEGEND
CFM· COMMON FOUNDATION MAT
CFS· COMMON FOUNDATION STRUCTURE
~~FHB-FUEL HANDLING BLDG~~
AB· REACTOR AUXILIARY BLDG
RCB· REACTOR CONTAINMENT BLDG

LOUISIANA POWER & LIGHT COMPANY
WATERFORD S.E.S UNIT NO. 3
1983-1165 MW INSTALLATION

NUCLEAR PLANT ISLAND STRUCTURE

EBASCO SERVICES INC.-FIELD

SCALE	RELEASED	DATE
DIV. CIVIL DR. MG CH. DP		FIELD SKETCH SK. 1564

NO.	DATE	REVISION	BY	CH.	RELEASED

ATTACHMENT NO: 2

SUMMARY OF CADWELD TESTING

WATERFORD UNIT #3

LOUISIANA POWER & LIGHT CO.

STRUCTURE	TOTAL NUMBER OF CADWELD	PRODUCTION TEST				SISTER TEST				TEST AVERAGE STRENGTH (PSI)	COMMENTS
		MINIMUM REQ'D	PERFORMED	PASSED	FAILED	MINIMUM REQ'D	PERFORMED	PASSED	FAILED		
COMMON FOUNDATION MAT (CFM)	3925	78	80	80	-	none	1	1	-	95504	
COMMON FOUNDATION STRUCTURE (CFS) (see note 2)	2112	36	31	31	-	37	64	64	-	98267	See note 1 (24)
REACTOR CONTAINMENT BUILDING (RCB)	6100	54	34	33	1	139	253	250	3	98400	See note 1 (129)
REACTOR AUXILIARY BUILDING (RAB)	1820	26	-	-	-	47	94	94	-	101020	See note 1 (46)
FUEL HANDLING BUILDING (FHB)	626	11	-	-	-	12	29	27	2	97886	See note 1 (20)
ALL STRUCTURES	14583	205	145	144	1	235	441	436	5	98215	See note 1 (219)
PERCENTAGE				99.3	0.7			98.9	1.1		

NOTE : 1. SOME OR ALL OF THE REQUIRED PRODUCTION TESTS WERE REPLACED BY SISTER TESTS DUE TO THE FACT THAT, THESE CADWELDS WERE IN BLOCKOUTS, COLUMNS, COREHOLES, CURVE BARS AND NEAR CONSTRUCTION JOINTS, WHERE PRODUCTION TESTING WAS NOT POSSIBLE. THIS WAS DONE IN ACCORDANCE WITH THE SPECIFICATION. DETAILS ARE SHOWN IN REFERENCE 1.
( ) FIGURES IN PARENTHESIS INDICATES THE NUMBER OF SISTER TESTS CONDUCTED IN THE ABOVE MENTIONED AREA'S.

2. CFS IS THE REMAINDER OF NPIS AREA , WHICH IS NOT A PART OF RAB & FHB.

SUMMARY OF CADWELD INSPECTIONS

ATTACHMENT NO: 3

WATERFORD SES UNIT #3

LOUISIANA POWER & LIGHT CO.

STRUCTURE	TOTAL NUMBER OF CADWELD	VISUAL INSPECTION		COMMENTS
		NO. OF CADWELD PASSED	NO. OF CADWELD REJECTED	
COMMON FOUNDATION MAT (CFM)	3925	3887	38	
COMMON FOUNDATION STRUCTURE (CFS)	2112	2061	51	see note 1
REACTOR CONTAINMENT BUILDING (RCB)	6100	5977	123	
REACTOR AUXILIARY BUILDING (RAB)	1820	1769	51	
FUEL HANDLING BUILDING (FHB)	626	621	5	
ALL STRUCTURES	14583	14315	268	
PERCENTAGE		98.16	1.84	

NOTES: 1. CFS IS THE REMAINDER OF NPIS AREA, WHICH IS NOT A PART OF RAB & FHB.

ATTACHMENT 4

Attachment 4.1

WATERFORD SES UNIT #3

LOUISIANA POWER & LIGHT CO.

CADWELD INSTALLATION AND INSPECTION DATA

ALL AREAS

(SORTED BY WELDER, AND WELD #)

Prepared By: D. Pershad
Principal Engineer
Ebasco Services Inc.
New York

CADWELD PRINTOUT COLUMN H[illegible]NGS

COLUMN	DESCRIPTION
1.	See Printout key
2.	Date: (Cadweld made)
3A.	Welder I.D.
3B.	Cadweld unique number
3.	P = Production test, S = Sister test
4.	Rebar size used
5.	Position of cadweld (H) Horizontal (V) Vertical
6.	Inspector
7.	Total (sister) tests made per welder, bar size and position
8.	Total (production) tests made per welder, bar size and position
9.	Replacement splice (1) for visual reject (or) production splice
10.	Replacement splice (2) for production splice
11.	Total welds made per welder, bar size and position
12.	Tensile Test Results (PSI)
13.	Building cadweld is located
14.	Elevation of cadweld
15.	Pour cadweld is in (Pour listed at test splices are for reference only.)
16.	Comments

NOTE: Following information is printed at the beginning of this data.

a) Inspector Qualification Information

b) Welder Qualification & Requalification Information

ATTACHMENT 4.2

CADWELD PRINTOUT KEY

CODE A - Cadwelds shot by welder, bar size and position where no tensile tests were taken.

CODE B - Cadwelds shot by welder, bar size and position that were visually rejected.

CODE D - Cadwelds shot by welder, bar size and position that had production test only.

CODE E - Cadwelds shot by welder, bar size and position that were combinations of sister and production tests.

CODE F - Cadwelds shot by welder, bar size and position that had sister tests only.

ATTACHMENT 4.3

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
D	121775	7W	-0196	-P	18	H	SH			197	198		97.750	CFM		499-S01-11A	
	121775	7W	-0197		18	H	JF							CFM		499-S01-11A	REPLACES 7W196
	121775	7W	-0198		18	H	JF							CFM		499-S01-11A	REPLACES 7W196
	121775	7W	-0199		18	H	SH							CFM		499-S02-5A	
	121775	7W	-0200		18	H	SH							CFM		499-S02-5A	
B	121775	7W	-0201		18	H	SH			203	204			CFM		499-S02-5A	
	121775	7W	-0202		18	H	SH							CFM		499-S02-5A	
	121775	7W	-0203		18	H	SH							CFM		499-S02-5A	REPLACES 7W201
	121775	7W	-0204		18	H	SH							CFM		499-S02-5A	REPLACES 7W201
	122375	7W	-0205		18	H	RWL							CFM		499-S02-8A	
	122375	7W	-0206		18	H	RWL							CFM		499-S02-8A	
D	122375	7W	-0207	-P	18	H	RL			208	209		94.500	CFM		499-S02-8A	
	122375	7W	-0208		18	H	RL							CFM		499-S02-8A	REPLACES 7W207
	122375	7W	-0209		18	H	RL							CFM		499-S02-8A	REPLACES 7W207
	122375	7W	-0210		18	H	RL							CFM		499-S02-8A	
	122375	7W	-0211		18	H	RL							CFM		499-S02-8A	
	122375	7W	-0212		18	H	RL							CFM		499-S02-8A	
	122375	7W	-0213		18	H	RL							CFM		499-S02-8A	
	122375	7W	-0214		18	H	RL							CFM		499-S02-8A	
	010276	7W	-0215		18	H	JF							CFM		499-S02-7B	
	010276	7W	-0216		18	H	JF							CFM		499-S02-7B	
	010276	7W	-0217		18	H	JF							CFM		499-S02-7B	
	010276	7W	-0218		18	H	JF							CFM		499-S02-7B	
	010276	7W	-0219		18	H	JF							CFM		499-S02-7B	
	010276	7W	-0220		18	H	JF							CFM		499-S02-7B	
	010576	7W	-0221		18	H	SH							CFM		499-S02-5B	
	010576	7W	-0222		18	H	SH							CFM		499-S02-5B	
	010576	7W	-0223		18	H	SH							CFM		499-S02-5B	
	010576	7W	-0224		18	H	SH							CFM		499-S02-5B	
	010676	7W	-0225		18	H	SH							CFM		499-S02-8B	
	010676	7W	-0226		18	H	SH							CFM		499-S02-8B	

ATTACHMENT NO: 4.1

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	030976	3W	-0453		18	H	DE							CFM		499-S01-12A	
D	031076	3W	-0454	-P	18	H	SH			455	456		98500	CFM		499-S01-12A	
	031076	3W	-0455		18	H	SH							CFM		499-S01-12A	REPLACES 3-W-454
	031076	3W	-0456		18	H	SH							CFM		499-S01-12A	REPLACES 3-W-454
	031076	3W	-0457		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0458		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0459		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0460		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0461		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0462		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0463		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0464		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0465		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0466		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0467		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0468		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0469		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0470		18	H	SH							CFM		499-S01-12A	
	031076	3W	-0471		18	H	SH							CFM		499-S01-12A	
	102775	4W	-0001		18	H	DE							CFM		499-S02-6	
B	102375	4W	-0001-P1		18	H	DE			2W-22	2W-23			CFM		499-S02-1	
	102275	4W	-0001-P2		18	H	DE							CFM		499-S02-2	
	102775	4W	-0002		18	H	DE							CFM		499-S02-6	
D	102375	4W	-0002-P1	-P	18	H	DE		3	2W-24	2W-25	96	96.250	CFM		499-S02-1	
	102275	4W	-0002-P2		18	H	DE							CFM		499-S02-2	
	102775	4W	-0003		18	H	DE							CFM		499-S02-6	
	102375	4W	-0003-P1		18	H	DE							CFM		499-S02-1	
	102275	4W	-0003-P2		18	H	DE							CFM		499-S02-2	
	102775	4W	-0004		18	H	DE							CFM		499-S02-6	
	102375	4W	-0004-P1		18	H	DE							CFM		499-S02-1	
D	102275	4W	-0004-P2	-P	18	H	DE			5W-13A	5W-13B		94.250	CFM		499-S02-2	NCR-6234

ATTACHMENT NO: 4.2

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	071376	7W	-0716		09	V	SV							CFS		499-S04-8A1	
	071476	7W	-0717		09	V	SV							CFS		499-S04-8A1	
	071476	7W	-0718		09	V	SV							CFS		499-S04-8A1	
	071476	7W	-0719		09	V	SV							CFS		499-S04-8A1	
	071476	7W	-0720		09	V	SV							CFS		499-S04-8A1	
	071476	7W	-0721		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0722		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0723		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0724		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0725		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0726		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0727		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0728		08	V	SV							CFS		499-S04-8A1	
	071476	7W	-0729		08	V	SV							CFS		499-S04-8A1	
F	071476	7W	-0730	-S	08	V	SV	3				54	99.494	CFS		499-S04-8A1	BLOCKOUT
	071576	7W	-0731		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0732		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0733		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0734		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0735		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0736		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0737		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0738		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0739		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0740		08	V	SH							CFS		499-S04-8A1	
E	071576	7W	-0741	-S	08	V	SH						96.750	CFS		499-S04-8A1	NO PRODUCTION SHOT THIS DATE
	071576	7W	-0742		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0743		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0744		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0745		08	V	SH							CFS		499-S04-8A1	
	071576	7W	-0746		08	V	MJ							CFS		499-S04-8A1	

ATTACHMENT NO: 4.3

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	100777	1W	-1606		11	V	DS							FHB		593-S04-2A	
	100777	1W	-1607		11	V	DS							FHB		593-S04-2A	
	100777	1W	-1608		11	V	DS							FHB		593-S04-2A	
	100777	1W	-1609		11	V	DS							FHB		593-S04-2A	
	100777	1W	-1610		11	V	DS							FHB		593-S04-2A	
	100777	1W	-1611		11	V	DS							FHB		593-S04-2A	
	100777	1W	-1612		11	V	DS							FHB		593-S04-2A	
	101077	1W	-1613		11	V	DS							FHB		593-S04-5A	
	101077	1W	-1614		11	V	DS							FHB		593-S04-5A	
	101077	1W	-1615		11	V	DS							FHB		593-S04-5A	
	101077	1W	-1616		11	V	DS							FHB		593-S04-5A	
	101077	1W	-1617		11	V	DS							FHB		593-S04-5A	
F	101277	1W	-1618	-S	11	V	JA						93.590	FHB		593-S04-5A	COL. T-3FH
	101277	1W	-1619		11	V	JA							FHB		593-S04-5A	
	101377	1W	-1620		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1621		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1622		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1623		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1624		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1625		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1626		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1627		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1628		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1629		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1630		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1631		11	V	DN							FHB		593-S04-5A	
	101377	1W	-1632		11	V	DN							FHB		593-S04-5A	
	101777	1W	-1633		11	V	DN							FHB		593-S04-1A	
	101777	1W	-1634		11	V	DN							FHB		593-S04-1A	
	101777	1W	-1635		11	V	DN							FHB		593-S04-1A	
	101777	1W	-1636		11	V	DN							FHB		593-S04-1A	

ATTACHMENT NO: 4.4

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	072478	J059	-0325		06	V	NMD							RAB		765-1-[illegible]	
	072478	J059	-0326		06	V	NMD							RAB		765-1-64	
	072478	J059	-0327		06	V	NMD							RAB		765-1-64	
	072478	J059	-0328		06	V	NMD							RAB		765-1-38	
	072478	J059	-0329		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0330		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0331		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0332		06	V	NMD							RAB	-4	765-1-38	
F	072478	J059	-0333A	-S	06	V	ND						104.545	RAB	-4	765-1-38	B-SERIES SPLICE
F	072478	J059	-0333B	-S	06	V	ND						104.545	RAB	-4	765-1-38	
	072478	J059	-0334		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0335		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0336		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0337		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0338		06	V	NMD							RAB	-4	765-1-38	
B	072478	J059	-0339		06	V	NMD			393				RAB	-4	765-1-38	ELEVATOR SHAFT
	072478	J059	-0340		06	V	NMD							RAB	-4	765-1-38	
	072478	J059	-0341		06	V	ND							RAB	-4	765-1-38	
	072478	J059	-0342		06	V	ND							RAB	-4	765-1-38	
	072478	J059	-0343		06	V	ND							RAB		765-1-38	
	072578	J059	-0344		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0345		06	V	ND							RAB	-4	765-1-38	
F	072578	J059	-0346A	-S	06	V	ND						104.318	RAB	-4	765-1-38	B-SERIES SPLICE
F	072578	J059	-0346B	-S	06	V	ND						104.318	RAB	-4	765-1-38	
	072578	J059	-0347		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0348		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0349		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0350		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0351		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0352		06	V	ND							RAB	-4	765-1-38	
	072578	J059	-0353		06	V	ND							RAB	-4	765-1-38	

ATTACHMENT NO: 4.5

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	032180	J096	-0153		08	V	PJ							RCB	+182	521-2A-1	
	032180	J096	-0154		11	V	PJ							RCB	+182	521-2A-1	
	032180	J096	-0155		11	V	PJ							RCB	+179	521-2A-1	
F	032480	J096	-0156	-S	08	V	MJ	1				24	110.632	RCB	+182-6	521-2A1	CURVED BAR
	032480	J096	-0157		08	V	MJJ							RCB	+182	521-2A-1	
	032480	J096	-0158		08	V	MJJ							RCB	+182	521-2A-1	
	032480	J096	-0159		08	V	MJJ							RCB	+182	521-2A-1	
	032480	J096	-0160		08	V	MJJ							RCB	+182	521-2A-1	
	032580	J096	-0161		08	V	MJJ							RCB	+182	521-2A-1	
	032580	J096	-0162		08	V	MJJ							RCB	+182	521-2A-1	
	032580	J096	-0163		08	V	MJJ							RCB	+182	521-2A-1	
	032580	J096	-0164		08	V	MJJ							RCB	+182	521-2A-1	
	032580	J096	-0165		11	V	MJJ							RCB	+182	521-2A-1	
	032580	J096	-0166		11	V	MJJ							RCB	+182	521-2A-1	
	032680	J096	-0167		11	V	MJJ							RCB	+183	521-2A-1	
	032680	J096	-0168		11	V	MJJ							RCB	+183	521-2A-1	
	032680	J096	-0169		11	V	MJJ							RCB	+183	521-2A-1	
	032680	J096	-0170		11	V	MJJ							RCB	+180	521-2A-1	
	032680	J096	-0171		11	V	MJJ							RCB	+183	521-2A-1	
E	032780	J096	-0172	-S	11	V	JO	6				133	104.482	RCB		521-2A-1	CURVED BAR
	032780	J096	-0173		11	V	JO							RCB	+179	521-2A-1	
	033180	J096	-0174		11	V	JO							RCB	+182	521-2A-1	
	033180	J096	-0175		11	V	JO							RCB	+179	521-2A-1	
	033180	J096	-0176		11	V	JO							RCB	+182	521-2A-1	
	033180	J096	-0177		11	V	JO							RCB	+182	521-2A-1	
	040180	J096	-0178		11	H	JO							RCB	+181	521-2A-1	
	040180	J096	-0179		11	H	JO							RCB	+181	521-2A-1	
	040180	J096	-0180		11	H	JO							RCB	+181	521-2A-1	
	040180	J096	-0181		11	H	JO							RCB	+182	521-2A-1	
	040180	J096	-0182		11	H	JO							RCB	+182	521-2A-1	
	040180	J096	-0183		11	H	JO							RCB	+180	521-2A-1	

ATTACHMENT NO: 4.6

(1)	(2)	(3A)	(3B)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	040180	J096	-0184		11	H	JO							RCB	+180	521-2A-1	
	040180	J096	-0185		11	H	JO							RCB	+179	521-2A-1	
	040180	J096	-0186		11	H	JRP							RCB	+179	521-2A-1	
	040380	J096	-0187		11	V	CG							RCB	+30	512-25B	
	040380	J096	-0188		11	V	CG							RCB	+30	512-25B	
	040380	J096	-0189		11	V	CG							RCB	+30	512-25B	
	040380	J096	-0190		11	V	CG							RCB	+30	512-25B	
	040780	J096	-0191		11	V	CG							RCB	+30	512-25B	
	040780	J096	-0192		11	V	CG							RCB	+30	512-25B	
B	040780	J096	-0193		11	V	JS			195				RCB	+30	512-25B	
E	040780	J096	-0194	-S	11	V	CG						98717	RCB		512-25B	BLOCKOUT
	040880	J096	-0195		11	V	CG							RCB		512-25B	REPLACES J96-193
	040880	J096	-0196		11	V	CG							RCB	+30	512-25B	
	040880	J096	-0197		11	V	CG							RCB	+28	512-25B	
	040980	J096	-0198		11	V	CG							RCB	+30	512-25B	
	040980	J096	-0199		11	V	CG							RCB	+28	512-25B	
	041180	J096	-0200		11	V	CG							RCB	+22	512-25B	
F	041180	J096	-0201	-S	11	H	CG						95.385	RCB		512-25B	BLOCKOUT
	041180	J096	-0202		11	H	CG							RCB	+27	512-25B	
	041180	J096	-0203		11	H	CG							RCB	+26	512-25B	
	041180	J096	-0204		11	H	CG							RCB	+29	512-25B	
	041480	J096	-0205		11	H	CG							RCB	+28	512-25B	
	041880	J096	-0206		11	H	CG							RCB	+28	512-25B	
	041880	J096	-0207		11	H	CG							RCB	+29	512-25B	
	041880	J096	-0208		11	H	CG							RCB	+28	512-25B	
	042280	J096	-0209		11	H	CG							RCB	+57	530-15D	
	042280	J096	-0210		11	H	CG							RCB	+58	530-15D	
	042280	J096	-0211		11	H	CG							RCB	+58	530-15D	
	042280	J096	-0212		11	H	CG							RCB	+58	530-15D	
	042280	J096	-0213		11	H	CG							RCB	+58	530-15D	
	042280	J096	-0214		11	H	CG							RCB	+58	530-15D	

ATTACHMENT NO: 4.7

RESPONSE

ITEM NO.: 12 (Final)

TITLE: Main Steamline Framing Restraints

NRC DESCRIPTION OF CONCERN:

As part of the NRC staff's review, the installation and inspection of the main steamline framing restraints above the steam generators was examined to determine if the as-built drawings reflect the actual installation. The NRC staff found no problems with as-built conditions, but found that several bolted connections had not been inspected (or documented) for the framing. The failure to perform (or document) the inspections render the quality of these framing restraints as indeterminant.

Based on discussions with LP&L representatives the staff was informed that the subject inspections are in progress. LP&L shall complete the inspections of the restraints and make the documentation of such inspections available to the staff.

DISCUSSION:

LP&L has completed the reinspections of the bolted connections. Related documentation is available for NRC review.

Deficiencies in American Bridge Structural Steel installations and documentation were reported to the NRC pursuant to 10CFR50.55(e) on March 29, 1983. The deficiencies were classified as Significant Construction Deficiency (SCD) No. 78 per site procedures for evaluation and control of deficiencies reportable under 10CFR50.55(e). It was discovered that complete documentation did not exist for bolted structural steel connections in the Steam Generator Framing. A review found that the Steam Generator Framing was inadvertently omitted from the scope of SCD No. 78. Nonconformance Report No. 7736 was issued to resolve this deficiency. The plan of corrective action required action in three areas.

First, Quality Control performed a reinspection of connections in the Steam Generator Framing. The inspections were performed and documented in accordance with ASP-IV-129. This procedure was developed under the corrective action stated in the SCD No. 78 report. Deficiency Reports (DR) were generated to document deficiencies or concerns noted in the reinspection. The procedure specifically required documentation and engineering evaluation of inaccessible or partially inaccessible bolted connections. Approximately 850 bolts out of approximately 12000 installed were replaced. Approximately sixty percent of these deficiencies consisted of an inability to readily confirm the required bolting material.

Second, Construction Engineering reviewed the scope of the American Bridge work. This scoping was compared to the reinspections originally performed under SCD No. 78 to assure no other American Bridge work had been omitted from the scope of SCD No. 78. The rescoping of American Bridge work is complete. It concluded that the Steam Generator Framing (G-838A and G-839A) was the only structural steel omitted from the original review scope. However, the review of Information Requests conducted in response to NRC Concern No. 14 indicated that American Bridge had performed rework to shop fabricated structural components to facilitate erection and fit-up, and had installed anchor plates. Reinspection of these and other American Bridge components are documented via the Final Report on SCD-78.

Third, since Ebasco and Tompkins-Beckwith had previously reworked many of the steam generator framing connections, Ebasco Quality Assurance assembled and reviewed the existing installation documentation. This action was concurrent with the reinspection effort. As deficiencies were noted during reinspection, Ebasco Engineering researched the existing documentation to determine if Ebasco or Tompkins-Beckwith had reworked the connection. If rework was performed by Ebasco or Tompkins-Beckwith, their respective installation records were used in the evaluation and disposition of the deficiency.

CAUSE:

A review was conducted to determine the cause of the omission of the Steam Generator Framing from the reinspections under SCD No. 78. It was found that the Quality Assurance Installation Review Group (QAIRG) had noted the need to review the installation documentation for the Steam Generator Framing. At the time of initiation of SCD No. 78, Ebasco and Tompkins-Beckwith were working on this steel in the course of normal construction activities. It was decided to delay review of the documentation for the framing until after these contractors had completed their work. Reinspection under SCD No. 78 was not practical at that time due to the large amount of work then in progress in this area. This item was not entered in the appropriate tracking system to ensure a follow-up review of those American Bridge connections not reworked by Ebasco and Tompkins-Beckwith.

GENERIC IMPLICATIONS:

A review was made of the process of the scoping and closeout of SCD's. Existing procedures require the scope of SCD's to be defined in reports submitted pursuant to 10CFR50.55(e). To assure the accuracy of the scope and completion of corrective actions for SCD's, corrective actions are addressed below.

SAFETY SIGNIFICANCE:

Corrective action for the Steam Generator Framing has been completed, including the coatings on the newly installed bolts. On that basis, the Steam Generator Framing is not a constraint to fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

Reinspection and corrective action for the Steam Generator Framing has been completed including the coatings on the newly installed bolts. All connections have been accepted and the supporting documentation has been reviewed and accepted.

To preclude recurrence of similar problems on open SCD's, a review has been performed by Ebasco Quality Assurance to assure the scopes of the SCD's are accurate. The results of this review will be provided to Engineering for review and comment. This scoping will be included in the SCD package.

Prior to closure of the SCDs, corrective actions will be reviewed to assure all items within the scope of the SCDs have been addressed. Deficiencies noted will be documented and resolved prior to closure of the SCDs.

A review by Quality Assurance, Engineering, and Construction will be performed for future SCDs to identify and assure the completeness of their scope when the deficiencies are determined to be significant. This scope will form the basis of review at closure to assure requisite corrective actions have been completed.

REFERENCES:

a) SCD-78 Documentation Package.
b) American Bridge Contract.
c) Procedure ASP-IV-129

RESPONSE

ITEM NO.: 13 (Final)

TITLE: Missing NCRs

NRC DESCRIPTION OF CONCERN:

During the NRC's review of Ebasco's NCR Processing System the card index file of NCRs was examined and the staff noted that there are missing reports in the consecutively numbered NCRs. Specifically W3-27, 814, 859, 981, 1053, 1102, 1109, 1228, 1349, and 1438 are missing from your card index file. Others were also noted to be missing from the Ebasco QA vault.

LP&L shall (1) obtain the missing NCRs, explain why these NCRs were not maintained in the filing system, review them for proper voiding, and (2) assure that when an issue is raised to an NCR, it is then properly filed for tracking and closure.

DISCUSSION:

An overall accountability review was conducted of closed or voided NCRs (both site and Ebasco New York Office (NYO) issued). In certain cases NCR numbers were assigned and the associated NCRs were cancelled or voided; in other cases the investigation has concluded that NCR numbers within the sequential numbering of Ebasco site issued NCRs were not assigned to an NCR. The review described below substantiates that Ebasco NCRs have been properly accounted for.

The review compared information from the NCR tracking mechanisms described below with the NCR card index files located in the Site QA Records Vault in order to identify additional closed or voided NCRs that were not on file in the vault. Emphasis was placed on NCRs which were indicated by the tracking mechanisms as being void. For each case in which it was determined that an index card was not on file, but for which the corresponding NCR record (original or copy) was actually located on file in the vault, an appropriate index card was prepared and filed. For each case in which neither index card nor a corresponding NCR record (original or copy) was located on file in the vault, a review was performed to either obtain the missing NCR or determine if it was ever issued.

Based on advice by the NRC given to LP&L at a public meeting held in Bethesda, Maryland on August 17, 1984, an additional review for accountability of all Mercury NCRs was conducted and is described.

Background

Until June, 1979, Ebasco Site QA utilized a manual tracking log for NCR number assignment and tracking purposes. A sample of this log is included as Attachment 1. At that time, Ebasco QA commenced using a tracking card system for number assignment and tracking. A sample of a tracking card is included as Attachment 2. NCRs which were issued thereafter were monitored via the tracking card system. Each such card tracks the location of the NCR original at any time during the processing cycle by identifying the specific individual to whom it is assigned as well as the specific NCR transmittal memorandum which routed the NCR to the individual. In addition to this system, Ebasco Site QA began utilizing a computerized Master Tracking System (MTS) as a secondary tool for tracking NCRs in the 1980 timeframe. The card index file, referred to in the concern, is an index card system which is located in the QA records vault and is used to locate documents contained in the vault.

NCRs Issued By Ebasco Site QA

The following is a summary of the review conducted for accountability of Ebasco site-issued NCRs.

The review encompassed over 7600 NCR numbers. The following is a summary of the review results which specifically address those NCRs cited by the NRC as well as those identified by the review as being voided, and those NCR numbers which were unassigned.

1. Four NCR numbers cited by the NRC and one additional NCR number (W3-963) were not entered in the card index file but were entered in the manual log with a general subject and with a void and/or void date notation. Copies of NCRs with these numbers have not been found. Our investigation (see Attachment 3) provides us with high confidence that these five NCRs were not issued.

   NCR Nos: W3-859
   W3-963
   W3-981
   W3-1053
   W3-1109

2. Four NCR numbers cited by the NRC were not entered in the card index file but were entered in the manual log with a general subject and with a void and/or void date notation. Original copies of the associated NCRs were not found; duplicate copies have, however, been found and designated as duplicate originals. Our investigations (See Attachment 3) conclude that these NCRs were properly voided. A card index corresponding to each of these NCRs is now on file in the QA records vault.

   NCR Nos: W3-814
   W3-1102
   W3-1228
   W3-1349

3. The original copy of NCR W3-27 was and is located in the appropriate file in the QA records vault. The manual tracking log properly indicates it as voided (See Attachment 3).

4. The NCR W3-1438 record, which pertains only to non-safety related items, had been properly renumbered to indicate a non-safety related designation and was and is located in the appropriate file.

5. The investigation provides us with high confidence that the below listed fifteen NCR numbers within the sequential numbering of Ebasco site-issued NCRs have not been assigned to an NCR.

   NCR Nos: W3-228
   W3-2016
   W3-5026
   W3-5080
   W3-5287
   W3-5361

W3-5570
W3-5793
W3-6068
W3-6098
W3-6542
W3-6646
W3-6724
W3-6749
W3-6900

In the case of NCR W3-228, the manual tracking log shows the NCR number lined out and NCR number W3-211A inserted. The review has determined that the nonconforming condition described on the W3-228 entry had actually been previously documented by NCR W3-211. The review also shows that W3-211 was superceded and closed by issuance of W3-211A, which corresponds to J. A. Jones NCR W3-131A. This was substantiated by a review of W3-211A. The sketch attached to W3-211A indicates it to be W3-228. Further, the sketch and engineering evaluation provides the exact description noted on W3-211A. In summary, the review concludes W3-228 was issued under the same nonconforming description as NCR-W3-211. When this was discovered, NCR-W3-211 was superceded by W3-211A which is the same NCR as W3-228.

In one instance (W3-2016), the Ebasco Site QA NCR file card indicates that the NCR was voided and refers to another NCR (W3-2026) which the investigation verified actually tracked the non-conforming condition.

For the remaining thirteen numbers listed above, it was ascertained that no cards for these numbers were in the Ebasco Site QA NCR tracking card files. In addition, there were no NCR card index files for any of these numbers on file in the Site QA records vault. A check of both the open and closed NCR files of the computerized Master Tracking System (MTS) revealed that none of these numbers had ever been entered into MTS. These particular numbers would have been assigned in 1982 or 1983. A review of the Ebasco Site QA transmittal logs revealed that no entries were made relative to any of these numbers. Ebasco Site QA has utilized uniquely numbered transmittal memoranda to forward NCRs for dispositioning and filing purposes. Based upon the results of this review, it has been concluded that NCRs with any of these numbers have probably not been issued. In order to provide additional clarification with regard to unassigned numbers, an entry has been placed into the Ebasco Site QA NCR tracking card file for each of these numbers which indicates that the number has not been assigned an NCR.

NCRS Issued By Ebasco New York Office QA

In addition to the review of site generated NCRs and NCR numbers, a review of the 659 NYO issued NCRs was undertaken to determine if numbers were missing from the sequence in the QA Records Vault Index File for closed or voided NYO NCRs. The following missing numbers were identified in the QA Records Vault Index File of NYO generated NCRs: NCR 199, 204, 483, 489, 543, 579, 642.

A review of the NYO NCR Log and other QA Records indicates that the missing numbers in the QA Records Vault Index File were appropriate as no NCR was issued for the involved items. All the above items were voided or cancelled prior to issuance of a Nonconformance Report and had been so noted in the NYO Log. The specific NYO NCRs listed above are discussed individually in Attachment 4.

Mercury NCRs

A review of Mercury NCRs has been performed by LP&L QA in accordance with procedure QASP 19.17 to determine whether any were improperly voided or administratively closed. An accountability review of Mercury NCRs was also performed to reconcile whether a Mercury NCR document was issued/processed for each given number issued by Mercury Company. This was accomplished by both a review of the Mercury NCR log and a review of the Mercury NCR documents to assure that the specific categories of NCRs questioned by the NRC within SSER 7 were obtained.

The results of the review performed on the voided and "administratively closed" NCRs has determined that, except as noted below, they were appropriately processed and closed. Cases were found where the documentation to support closure was referenced, but not in the Mercury NCR file. This documentation was retrieved from the appropriate files reviewed by LP&L QA and placed into the Mercury NCR files. The review has also shown that all but two of the Mercury NCRs can be accounted for, that two NCRs were incorrectly administratively closed, and that one was not processed. Attachment 5 details the processing/resolution of these five NCRs.

CAUSE:

The cause for the situation described in items 1 and 2 for site-issued NCRs was the manner in which NCRs were logged and tracked prior to June 1979. The situations described in items 1,2,3 and 4 are not indicative of any loss of accountability. The NCRs that were voided or cancelled had been so noted in the site manual log. It is recognized that the manual log used until June 1979 provided less information with regard to the location of an NCR at any point in time than the current system. The nine NCR numbers mentioned in items 1 and 2 were issued before instituting the tracking card system and MTS.

The probable cause for the situation described in Item 5 is that, from late 1982 to September 1983, Ebasco QA Engineers were co-located with Mercury Company on-site in a "satellite" office in the Mercury complex. In this time frame, when a Mercury NCR was generated and assigned a unique Mercury NCR number, the "satellite" office Ebasco QA engineer would request an Ebasco NCR number by telephone to assign to the Mercury NCR. This was in contrast to normal practice of assigning a number when the Ebasco NCR was written. It is likely that in some instances this request would be duplicated by another Ebasco QA Engineer, perhaps on second shift. The net result would be that two Ebasco NCRs would be issued to address the same Mercury NCR. One Ebasco NCR thus would be used; one would not. This situation was later corrected by assigning a block of Ebasco NCR numbers for use by the "satellite" office.

This hypothesis is supported by the fact that in the cases of three of the NCR numbers mentioned, it has been determined that these numbers were used to address specific Mercury NCRs. The nonconforming conditions described by these Mercury NCRs, however, were addressed by other Ebasco NCRs.

In the case of the Mercury NCR reviews, two NCRs were found to be missing and three not processed properly. An investigation revealed, however, that these were isolated instances and there was no lack of resolution of the underlying problems.

GENERIC IMPLICATIONS:

The review and investigation of the more than 8200 closed or voided Ebasco NCRs has concluded that all are accounted for. In addition, the fact that all of the NCRs described in Items 1, 2 and 3 for site-issued NCRs were issued prior to the establishment of the improved tracking system indicates that the current system has provided improved control.

This issue has also been approached generically in regard to Mercury NCRs. The review has encompassed Mercury voided and administratively closed NCRs and all identifiable missing and unprocessed Mercury NCRs.

SAFETY SIGNIFICANCE:

The review and investigation has concluded that all closed or voided Ebasco and Mercury NCRs are accounted for. On this basis, there is no recognized reason that this issue should constrain fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

The reviews described above have been completed. Documentation is available for NRC review at the Waterford-3 site.

In addition to the measures already established (tracking card system and MTS), additional instructions and measures provide added assurance that NCRs are properly filed for tracking and closure. QAI-031 Revision 0 was issued by Ebasco Site QA on February 20, 1984. It contains detailed requirements for the proper closure (including closure by voiding) of NCRs and their subsequent transmittal to the Site QA records vault. NYO Procedure QAP-3 (Review of nonconformances) was revised to address voiding of NCRs. The procedure revision was completed on 07/20/84. Implementation of these requirements will provide better assurance that the remaining and future Ebasco NCRs are properly processed, closed, and filed. Reviews are being performed periodically by LP&L QA to verify the proper implementation of requirements.

It should be noted that LP&L has converted to operating procedures under which non-conforming conditions are identified as a Condition Identification Work Authorization (CIWA). This is developed in the submittal on LP&L's Assessment of the Collective Significance of the 23 issues.

ATTACHMENTS:

1. Sample Manual Log Sheet
2. Sample Tracking Card
3. Site NCRs
4. NYO NCRs
5. Mercury NCRs That Are Missing or Were Never Processed

REFERENCES:

None

ATTACHMENT 1

NONCONFORMANCE REPORT NO.	GENERAL SUBJECT	DESCRIPTION BY NAME	DESCRIPTION BY DATE	RECOMMENDED DISPOSITION BY NAME OR ORGANIZATION	RECOMMENDED DISPOSITION BY DATE	EVALUATED DISPOSITION BY NAME	EVALUATED DISPOSITION BY DATE	Q [illegible] DATE	14
W3-1453 6/18	1 ea. Mesh 304 Fiber w/ Grifo T 304155	Rah	~~6/18~~ 6/27	M McGrath	10/30/79 11/14/79	A. Sengupta	12/7/79	2/8/80	K. Wolver 530
W3-1454 NISCO-035	Stop A for pump 1A	Dan Neil	6-7-79	J. Sturgis	6-7-79	superceded J. Freshour	by 1438 6/28/79	4 R/1 7/31/79	C.B. 3/1
W3-1455 NC-176	Fuel Pool Heat Exchanger.	D. Lashley	6-14-79	C. Saucier	6-14-79	S. Venkataraman	7/12/79	CA 7/1 8	
W3-1456 NISCO-037	Spool 1404-3	Dash SHAH	6-18-79	J. S. Sturgis	6-19-79	J. Freshour	7/12/79 Superceded Rev. 1	See [illegible]	C. Bstr 3/13/82
W3-1457 F/M W3-	Box BB145-PA, XFMR MOD 52 36B, Conduits 33142-SA, 34408-SA, 33143-PA	C. E. Ferguson	6-19-79	R. L. Hefley ~~W. Szablewski~~ ~~D. Woo~~	6-19-79 ~~9-11-79~~	W. Szablewski D Woolard K ~~D. Renee~~ J. McDonald	9-11-79 9-25-79 12-11-79 2-13-80	3/14/80	L. Kostb 3-1
W3-1458 NISCO 0	REACTOR COOLANT SYSTEM STOP A	C. Van Dyke Reed	6/20/79	C. Van Dyke Reed	6/20/79	Y. Meng	6/26/79	9-18-79	C. Bstr 3/13
W3-1459 JAJ-W3-550	Misplaced and Omitted Rebar	C. Goldman	6-15-79	E.M. Woolery	6-15-79	sent to Hubner for ET			S Hor 4-3
W3-1460 JAJ-W3-551	Bulges in Concrete Walls	C. Goldman	6-21-79	E.M. Woolery	6-21-79	"			S Hor 4-3
W3-1461 NISCO-036	Pump 1B internal	Dash Shah	6-15-79	J. Sturgis	6-18-79	S. Harrington	7/20	Pete rev.	C. Bstr 3/13
W3-1462 F/M W3-151	Cable Entrance into top of [illegible]	C. Ferguson	6-19-79	R. Hanley	6-19-79	[illegible]		6/11/80	L. Kostb 3-13

ATTACHMENT 2

NCR#	SUS#	SUBJECT	DESC BY	INPUT DATE	PO	IT
W3-7768	56A		F. Clawson	6/14/84	N/A	00C
Ebasco		Support BMRR-3138 REF: DN SQ-3087				

TREND CODE 4200.00.62

LETTER#	DATE	RESPONSIBILITY	DUE DATE	STATUS
	6/15/84	F. Clawson	none	in process
W3NCR-21255	6/18/84	U. Quinby/M. McGrath	N/A	RD
W3NCR-21303	7/3/84	U. Quinby/M. McGrath	N/A	CA
W3NCR-21393	8/15/84	CLOSED on 8/15/84		

ATTACHMENT 3

SITE NCRS

NCR-W3-27

The original NCR-W3-27 record was already in the appropriate file in the W3 Site QA records vault even though a corresponding index card was not on file. An index card for this NCR has been prepared and is now on file in the W3 Site QA records vault. NCR-W3-27 was voided by the Ebasco QA Site Supervisor on February 17, 1976. It has been determined from the review of NCR-W3-27 and supporting documentation that the voiding of this NCR is both justified and properly documented.

NCR-W3-814

The original NCR-W3-814 record could not be located in the W3 Site QA records vault. However, a copy of this NCR was located and has been designated as the duplicate original. An index card for this NCR has been prepared and is now on file in the W3 Site QA records vault. The disposition to void NCR-W3-814 was approved by both Ebasco Engineering and the Ebasco QA Site Supervisor, and the NCR was closed accordingly on March 31, 1978. It has been determined from the review of NCR-W3-814 and supporting documentation that the voiding of this NCR is both justified and properly documented.

NCR-W3-859

The NCR log entry for NCR-W3-859 indicates "Erection of Plant Process Piping" under subject and it gives a void date only. The Ebasco Site QA transmittal log has no entry relative to this NCR and a search of files in the Site QA records vault and other locations, did not locate the subject NCR.

A review of documentation pertaining to Ebasco QA audit and surveillance activities relevant to the timeframe and general subject of the entry was performed. It was determined that Ebasco Site QA had performed an audit of the piping contractor's site welding program which identified four findings. There is a possibility that these findings were presented to Ebasco Site QA Management for evaluation and an entry in the log made to obtain an NCR number. Subsequently, it was probably decided that the findings should be identified in the audit report and not the NCR and the entry in the log was voided.

As a result of this investigation, LP&L concludes that NCR-W3-859 was never issued.

NCR-W3-963

The Ebasco Site QA NCR tracking log entry for NCR-W3-963 indicates that the NCR was issued to upgrade Gulf Engineering NCR 086A. The entry indicates that Gulf Engineering had described the nonconforming condition and a recommended disposition on June 22, 1983, but it does not indicate that the Gulf disposition was ever evaluated by Ebasco. In addition, Ebasco QA made an entry on January 25, 1979 to indicate that the NCR had been voided.

Further investigation revealed that Gulf Engineering NCR 086 had been previously upgraded to Ebasco NCR-W3-945 on June 12, 1978. Gulf had provided a recommended disposition for the identified condition and Ebasco had approved the disposition on June 16, 1978. However, on June 22, 1978 Gulf annotated Block IV of their copy of NCR W3-945 with the wording "Refer to NCR 086A for re-evaluation of disposition" and annotated the Gulf NCR log entry corresponding to Gulf NCR 086 with the wording "See NCR 086A dated 6/22/78". Further, on June 23, 1978, Gulf deleted their annotation in Block IV of their copy of NCR W3-945, which had been made on the previous day and added the annotation "Aux. skid aligned with Emerg. Gen. and new holes drilled in accordance with disposition".

It appears that Gulf had been planning to recommend another disposition for NCR W3-945 (Gulf NCR 086) by means of a supplement to Gulf NCR 086 (Gulf NCR 086A) and had notified Ebasco Site QA accordingly in order to obtain a corresponding Ebasco NCR number. Ebasco Site QA had assigned Ebasco NCR number W3-963 to a Gulf NCR 086A and made a corresponding entry in the Ebasco Site QA NCR log, with the understanding that Gulf would be providing the NCR description and recommended disposition. However, Gulf apparently had decided to implement the approved disposition to NCR W3-945 (Gulf 086) rather than to propose a revised disposition via Gulf NCR 086A, which was never issued.

The former Gulf employee, who made the annotations on the Gulf NCR log and Gulf copy of NCR-W3-945 (Gulf NCR 086), has documented by letter (Gulf Engineering Co. QA-3912, 7/2/84) that a Gulf NCR 086A was not issued. If NCR 086A was not issued, then a corresponding Ebasco NCR-W3-963 would not have been issued. Ebasco Site QA was unaware that Gulf had decided not to issue Gulf NCR 086A and therefore, did not void the NCR-W3-963 entry in the Ebasco Site QA NCR log until several months later.

In addition, a review of the Ebasco Site QA transmittal log revealed that no entries have ever been made relative to this NCR. A search of relevant files in the W3 Site QA records vault and at other W3 Site locations was unable to locate an NCR with number W3-963.

As a result of the evaluation, it has been concluded that an NCR-W3-963 was not issued.

NCR-W3-981

The NCR log entry for NCR-W3-981 shows a July 18, 1978 date of preparation and includes a specific heat number, type and size of welding electrode. The Ebasco Site QA transmittal log has no entry relative to this NCR and a search of files in the Site QA records vault and other locations, did not locate it.

A review of documentation in file, applicable to the subject welding electrodes heat number revealed that the manufacturer of these electrodes had submitted a corrected certified material test report for that heat number.

Apparently, Ebasco Site QA had anticipated that an NCR would be necessary to identify deficiencies in the original certified material test report that was submitted with the welding electrodes and a NCR log entry was made. However, the receipt of the corrected certified material test report resolved the deficiency and the entry was voided.

As a result of this investigation, LP&L concludes that NCR-W3-981 was never issued.

NCR-W3-1053

The NCR log entry for NCR-W3-1053 includes entries only for a general subject, a preparer, and a date prepared. It also indicates that NCR-W3-1053 is "void". A review of the Ebasco Site QA transmittal log revealed that no entries were made relative to this NCR. A search of relevant files in the W3 Site QA records vault and at other W3 Site locations was unable to locate an NCR with number W3-1053.

A review of Ebasco Receiving QC Discrepancy Notices, which were issued around the same timeframe as the NCR log entry date (September 25, 1978), was conducted. This review revealed that Ebasco Receiving QC had issued a DN MC-1681 on September 21, 1978. DN MC-1681 identified deficient tack welds on two pipe supports for the reactor coolant pump (the NCR log entry for general subject indicates "Reactor Coolant Pump"). A review of DN MC-1681 revealed that it had been submitted by Ebasco Receiving QC to Ebasco Site QA for evaluation of the discrepancy for possible upgrading to an NCR. The Ebasco Receiving QC recommended disposition in Block No. 2 of the DN had been initially documented as "Issue NCR". Ebasco Site QA had initially concurred with this recommendation as evidenced by the NCR log entry of September 25, 1978. However, after further evaluation of the discrepancy, Engineering requirements, and AWS Code requirements, Ebasco Site QA determined that the issuance of an NCR was not warranted. On September 25, 1978, the QA Site Supervisor documented this decision accordingly on the DN. The identified discrepancy was properly processed and resolved via DN MC-1681, which was closed on October 3, 1978.

As a result of the evaluation, LP&L has high confidence that NCR-W3-1053 was not issued. The discrepancy which corresponds to the NCR log entry for NCR-W3-1053 was properly processed resolved, and documented by DN MC-1681.

NCR-W3-1102

The original NCR-W3-1102 record could not be located in the W3 Site QA records vault. However, a copy of this NCR was obtained from another file at the W3 Site. The description of the nonconforming condition, which is documented in Block 1 of NCR-W3-1102, is identical to the condition documented by NCR-W3-1099. NCR-W3-1099 documents an acceptable disposition and corrective action for the nonconforming condition. NCR-W3-1099 was properly closed on January 16, 1979. A copy of NCR-W3-1102, which is designated as the duplicate original record, has been annotated to indicate that it has been voided since it describes a condition already documented in NCR-W3-1099. The duplicate original record of NCR-W3-1102 and a corresponding index card are now on file in the W3 Site QA records vault.

ATTACHMENT 3
(continued)

NCR-W3-1109

The NCR log entry for NCR-W3-1109 includes entries only for a general subject, a preparer, and a preparation date. It also indicates that NCR-W3-1109 is "void". A review of the Ebasco Site QA transmittal log revealed that no entries were made relative to this NCR. A search of relevant files in the W3 Site QA records vault and at other W3 Site locations was unable to locate an NCR with number W3-1109.

A review was conducted of Ebasco Receiving QC Discrepancy Notices, which were issued around the same timeframe as the NCR log entry for preparation date (November 2, 1978). This review revealed that Ebasco Receiving QC had issued a DN MC-1738 on October 18, 1978. DN MC-1738 identified damaged E 7018 1/8" covered electrodes which had been received under Purchase Order WP3-1847. This corresponds with the brief description in the log entry for NCR-W3-1109 which states the name of the vendor and the notation: "covered electrodes". It should be noted that Purchase Order WP3-1847 was the only WP3 purchase order issued to that vendor.

An additional concern relative to Purchase Order WP3-1847 was that the vendor did not appear on the Ebasco QA Approved Vendors List, Revision 17, dated June 1, 1978, the applicable AVL revision at the time of the NCR entry. However, it is noted that the actual manufacturer of the subject welding electrodes and the company which certified the material, was included on Revision 17 of the Ebasco QA AVL.

Ebasco Site QA anticipated the need for issuing an NCR to address one or both of the conditions described above and the entry had been made in the NCR log book to obtain an NCR number. However, after further investigation into the matter, Ebasco Site QA determined that the issuance of an NCR was not warranted.

As a result of the evaluation, it has been concluded that NCR-W3-1109 was never issued. The discrepant material which was identified by DN MC-1738 was scrapped and removed from the W3 Site in accordance with the approved disposition of the DN. Additionally, Ebasco Site QA had approved Purchase Order WP3-1847 with the rationale that the vendor would be functioning merely as a distributor by supplying materials and documentation that had been provided by the material manufacturer, a vendor approved by Ebasco QA.

NCR-W3-1228

The original NCR-W3-1228 record could not be located in the W3 Site QA records vault. However, a copy of this NCR was obtained from another file at the W3 Site. A copy of NCR-W3-1228, which is designated as the duplicate original record, is now on file in the W3 Site QA records vault. Also, an index card, corresponding to this NCR, was prepared and is now on file in the W3 Site QA records vault. By direction of the Ebasco QA Site Supervisor, NCR-W3-1228 was voided and the condition was re-identified and processed on a Gulf Engineering Discrepancy Report (DR No. 21). The review indicates that NCR-W3-1228 was voided with proper justification and the reported condition was properly processed, corrected, and documented by Gulf Engineering DR No. 21.

NCR-W3-1349

The original NCR-W3-1349 record could not be located in the W3 Site QA records vault. However, a copy of this NCR was obtained from another file at the W3 Site. A copy of NCR-W3-1349, which is designated as the duplicate original record, is now on file in the W3 Site QA records vault. Also, an index card corresponding to this NCR, was prepared and is now on file in the W3 Site QA records vault. It has been determined that NCR-W3-1349 was properly voided, since the same nonconforming condition was processed, corrected, and documented by NCR-W3-1397.

NCR-W3-1438

The original NCR-W3-1438 document, which pertains only to non-safety-related items, had been appropriately renumbered to a non-safety-related designation and was on file in another location at the W3 Site. An index card has been prepared for NCR-W3-1438 and is on file in the W3 Site QA records vault. The index card indicates that the NCR is non-safety related and it has been renumbered as NCR-W3-001 (NNS).

ATTACHMENT 4
NYO NCRS

NCRS 199 and 204

NCRs 199 and 204 were assigned to purchase order 403502 to cover Qualification Reports that were not reviewed by Ebasco Engineering. Subsequently it came to the attention of the NYO that DEF-78-5-19 identified the same problem as NCRs 199 and 204. Report W3QA-6698 dated 3/22/79 indicates that Rosemount Qualification Report No. 3788 was reviewed without comment and DEF-78-5-19 closed. A formal notice of NCRs 199 and 204 being cancelled was transmitted to the vendor on 4/11/80. Based on the investigation, LP&L has high confidence that NCR 199 and 204 were not issued.

NCR 483

NCR 483 was assigned to purchase order 403501 to cover a hydrostatic test time different from specification requirements. Prior to issuing the NCR, the engineer revised the specification via DCN-ME-109. The NYO Log indicates NCR 483 was not issued and replaced by DCN-ME-109. A formal notice of this fact was transmitted to vendor on 3/6/84.

NCR 489

NCR 489 was assigned to purchase order 403509. The NYO Log indicates a report date of 10/26/79; a description that states "No weld data high probability material is non-critical"; and a notation NCR 489 is Void. A search of relevant documentation in the QA Records Vault, NYO QA Files, NYO Vendor QA Files and order 403509 was conducted. No original or copy of NCR 489 was found. A specific review was made of all VQAR Reports and other relevant correspondence for the 6/79 through 6/80 time frame. The review did not reveal any concern which could be construed as being relevant to the general subject description for log entry NRC 489.

Site QA Records indicate that order 403509 has no outstanding deficiencies. Based on the above, LP&L has high confidence that NCR 489 was not issued and that the void notation in the NYO log is valid.

NCR 543

NCR 543 was assigned to purchase order 403623 to cover short cable lengths. The NYO NCR Log indicates NCR 543 was voided because it was the same as NCR 545. NCR 545 was issued on 10/28/81 and properly dispositioned on 11/9/81. LP&L, therefore, has high confidence that NCR 543 was not issued.

NCR 579

NCR 579 was assigned to purchase order 403640 to cover short cable lengths. NCR 579 was voided and never issued as it duplicated a condition previously described on NCR 573. NCR 573 was issued on 5/10/82 and properly dispositioned on the same day. NCR 579 was not issued and formal notification was made to vendor on 4/22/83.

NCR 642

NCR 642 was assigned to purchase order 403516 to cover a missing shipping/packaging procedure. Prior to initiating the NCR Form, the potential nonconforming condition was resolved by locating the missing document and no NCR was issued.

ATTACHMENT 5

MERCURY NCRs THAT ARE MISSING OR WERE NEVER PROCESSED

Mercury NCR-2685

The description provided in the NCR Log indicates that this NCR was written against OCR 1029, instrument number DPI/DPS-HV 5009A, Drawing No. 853-L-183-A to identify "no-fit up date" as the nonconforming condition.

Since the description noted in the log was not specific as to what item(s) did not have a fit-up date, four areas were considered. These areas are the following:

1) Tubing - The tubing on the noted drawing is ANSI B31.1 and therefore no documented inspection would be required.

2) Instrument Stand - The instrument stand is installed per Instrument Installations Detail B430 - X14 which is a non-seismic stand and therefore no documented inspection would be required.

3) Tube Track - The tube track on the drawing is seismic but no fit-up inspections were required.

4) Seismic Supports - There were 19 seismic supports on the subject drawing. These supports required a documented fit-up inspection. After reviewing the documentation for all 19 supports, it was determined that only one Support Locator (No. 12) was missing a fit-up inspection date on the "Support Inspection Report" form (262-1).

   Further search revealed that the "Support Inspection Report" form shows a late entry of the fit-up inspection date for Support Locator No. 12 made by the same person who initiated the NCR. It is deduced that the same individual identified the nonconforming condition and then corrected it.

As a result of this investigation, LP&L concludes that the condition identified by the missing NCR was corrected and documentation is available to show resolution.

Mercury NCR-2242

The Mercury NCR Log entry for this NCR was crossed out by the log keeper noting that the NCR was written in error and that the number was never used.

It was found that at about the same time two more entries were made against the same OCR number, the same drawing number and the same instrument that were noted against NCR-2242. The new entries were NCR-2264 and NCR-2285. NCR-2285 was closed with the notation that the same problem was tracked via NCR-2264.

Mercury NCR-2242 Cont'd)

From the description provided in the NCR Log, the same instrument was identified on all three NCRs and it was resolved under NCR-2264. Since the NCR Log does not describe the specific nonconforming condition, further research was performed to determine if any situation existed which may have gone unaddressed. A review of Mercury QC inspection reports (Form 211) of the same period revealed that three different QC inspectors noted the same condition during three different walkdowns and recommended that NCRs be issued to correct the discrepancy. Furthermore, a Form 211 was found which records that an inspection was performed that verified the correction of the discrepancy and thus the closure of NCRs 2264, 2285 and 2242.

As a result of this investigation, LP&L concludes that the condition identified by the missing NCR was corrected.

Mercury NCRs that were never Processed

Three nonconformances that were issued but were incorrectly administratively closed or not processed by Mercury Q.A. Department were NCR-888 dated 9-19-82, 889 dated 9-19-82 and 2734 dated 3/10/84. Mercury should have processed these NCRs; subsequent actions have resolved the deficiencies contained therein. The rationale by Mercury for not processing the NCRs and the resolution by Ebasco to the NCR concerns are provided below:

NCR-888

This NCR was generically written stating the several Q.C. personnel have been certified to Level II without documented evidence of qualification requirements. At the time Mercury's management response was that the NCR was not processed based on "1) initiator not a Mercury employee at time of writing 2) QCP-3110 paragraph 1.4 references QCP-3040 which does not apply to W-3 3) ANSI N45.2.6 provisions incorporated by QCP-3050 as approved. All Mercury Company QC techs are trained and tested per QCP-3050 prior to performing inspections or tests."

Ebasco's current review of the above document determined that: a) The initiator was terminated on the same date the NCR was initiated. b) Recently a review of all Mercury's quality assurance/quality inspection personnel has been undertaken for adherence to procedural and ANSI requirements relative to qualification/certification status. The concern as stated in the NCR and reinspection is addressed and resolved by the in-depth qualification/verification review being accomplished under Concern No. 1.

NCR-889

This NCR was generically written noting a change to actual field installation versus Mercury's Q.C. support installation documentation. Mercury's Support Verification Group and Mercury's Documentation Review Group had identified numerous deficiencies relative to hanger installation traceability.

At the time Mercury's management response to this NCR was that the NCR was not processed based on: "1) Initiator not a Mercury Company employee at time of writing. 2) The situation has already been identified by LP&L Audits, Ebasco Audits, Mercury Company Audits and case-by-case NCR's. There is insufficient information to process an NCR of this description. Mercury Company has established a program to investigate, evaluate and report on these conditions with LP&L and Ebasco Q.A. concurrence."

NCR-889 (Cont'd)

Ebasco's current review of the above document determined that: a) The initiator was terminated on the same date the NCR was initiated. b) Since the time this NCR was initiated, numerous efforts have been undertaken to verify that as-built field conditions do in fact reflect the Mercury as-built drawings:

1) Ebasco Q.C. verification of supports per procedure ECRRI-3. A total of 1852 supports were inspected for configuration, dimensions, location, amount of weldment.

2) LP&L Construction Q.A. walkdown during the status review of turnover of systems. This consisted of 114 instrument supports.

3) All N1 (approximately 1600) supports were inspected and documented in accordance with LP&L procedure QASP-19.15.

4) Mercury NCR-3578 was upgraded to Ebasco NCR-W3-6512 which generically addressed traceability of Mercury supports.

Based on the above efforts and the resulting documentation, the concern stated on the NCR is considered to be resolved.

NCR-2734

Maximum lengths 4" x 3" x 1/4" angle were exceeded on supports 8-000-H-013N, 17-000-H-008N, 18-000-H-013N by 1", 2" and 4" respectively. Mercury failed to process this NCR.

Ebasco initiated CIWA 018917 to evaluate the cited problem. Ebasco (ESSE) has evaluated the condition and found it to be acceptable. LP&L has concurred with ESSE evaluation.

RESPONSE

ITEM NO.: 14 (Final)

TITLE: J. A. Jones Speed Letters and EIRs

NRC DESCRIPTION OF CONCERN:

During the Ebasco QA review of J. A. Jones Speed Letters and Engineering Information Requests, several items which could affect plant safety were noted. Based on its sample of these actions, the staff does not expect that any of these items will significantly affect plant safety. Nevertheless, the applicant should complete the actions identified in these reviews and issues raised shall be resolved promptly.

DISCUSSION:

1. J. A. Jones

   During the Ebasco Q.A. review of J. A. Jones installation records, references were made in the installation records to information requests. Subsequent to this review, Ebasco Q.A. performed an informal sampling to ascertain whether or not design information had been conveyed using these information requests. Upon finding a number of such cases, all the known information requests and their predecessors, speed letters, were assembled and transmitted to ESSE - Civil Engineering for a complete review which started in January, 1984. Of the approximately 2100 documents, 271 appeared to convey design changes without proper documentation. These 271 have been evaluated and researched on a case-by-case basis. One hundred and four were found to have proper documentation in the form of a FCR, DCN, NCR or specification governing J. A. Jones installations. The remainder have been determined to be acceptable-as-is by way of engineering analysis. As no rework was initiated as a result of this review, there is no impact on plant safety.

2. Other Safety Related Contractors

   To determine if other contractors performing safety-related work used design changes conveyed through informal documents such as engineering information requests, a sampling program was developed. Attachment 1 provides a list of safety-related contractors, the approximate number of documents associated with each, the sample size, and the number of questionable items identified.

The guidelines for the sampling program were as follows:

A. A minimum 10% review of each safety-related contractor's information requests was made on a random basis. For example, T-B numbered their Information Requests (IR) consecutively from 1000 onward. The selected sample might then consist of every IR whose last digit is equal to one i.e. 1001, 1011, 1021. This eliminated bias from the selection process and assured a meaningful cross-section. The only qualifying rule utilized was a reviewer did not review a document in which he participated earlier. If in following the sampling plan, a reviewer identified an item in which he was involved, he proceeded to the next higher item for which he had no involvement.

   If the total number of documents for a contractor was equal to or less than fifty, a total scope review was performed. If there was a violation of design control, regardless of its safety significance, the contractor's sample expands to, at a minimum, another 10% with further expansion as deemed appropriate. Exceptions to this sampling program are noted below.

B. The sampling program is documented using Attachment 2 in the following fashion:

   Item 1 - Contractor's name on whose information requests the sample is taken.

   Item 2 - The nomenclature used to describe the items being sampled: Information requests - IR; Request For Information - RFI; etc.

   Item 3 - The sample is numbered consecutively, i.e. 1, 2, 3, etc. in this column.

   Item 4 - Record the number of the document reviewed, i.e. IR 01001, etc.

   Item 5 - A brief description of the problem identified or question presented.

   Item 6 - A brief summary of the response given to Item 5.

   Item 7 - Categorization for sample trending (optional)

   Item 8 - Justification for response given i.e., FCR, DCN, NCR, SPEC, or other explanation.

   Item 9 - If the sample reviewer is not certain if the item affected plant safety, ESSE evaluates the specific case to determine whether or not a design change should have been documented.

C. If any contractor items are identified which indicate a violation of the design control program, they are reviewed, resolved, and documented in accordance with approved procedures.

The following is a brief summary of results on the sampling program fc the safety related contractors other than J. A. Jones:

A. Contractor: Tompkins-Beckwith

Total number of Documents: Approximately 6600
Sample Size: 661

RESULTS:

The sampling has been completed. There have been no cases found where design changes were conveyed on the information request without proper documentation.

CONCLUSION:

No further action required

B. Contractor: Fischbach & Moore

Total Number of Documents: Approximately 6400
Sample Size: 1271

RESULTS:

Sampling of the Fischbach & Moore information request program has been completed. A 20% sample was performed as the initial 10% sample indicated ten instances of design changes being improperly conveyed. After final review it has been determined that only three cases of design changes being conveyed actually existed in the initial 10% sample and none in the second 10% sample. The three design changes were evaluated to be acceptable as is, thus there was no safety significance.

CONCLUSION:

No further action is required.

C. Contractor: Mercury

Total Number of Documents: 3052
Sample Size: 3052

RESULTS:

Upon completion of the initial 10% sample, sixteen of the Mercury requests for engineering information were determined to have transmitted design data without documenting the change on a FCR or DCN. Engineering has evaluated these changes to be acceptable as is. Given the number of violations (5.2% of the sample) and the other concerns related to the Mercury Program, a total scope review of the Mercury information requests was performed. This review further identified 233 instances of design changes being improperly conveyed. These design changes were evaluated by design engineering to be acceptable as is, thus, there was no safety significance.

CONCLUSION:

No further action is required.

D. Contractor: NISCO

Total Number of Documents: 559
Sample Size: 56

RESULTS:

The sampling has been completed. No cases have been found where design changes were conveyed on the information request without proper documentation.

CONCLUSION:

No further action required.

E. Contractor: Gulf Engineering

Total Number of Documents: 603
Sample Size: 61

RESULTS:

The sampling has been completed. There have been no cases found where design changes to safety-related equipment were conveyed on the information request without proper documentation. There were three cases where design changes were conveyed on non-safety related equipment. These changes were modifications of material specifications and clarification of grouting details. None of these modified the design.

CONCLUSION:

No further action required.

F. Contractor: American Bridge

Total Number of Documents: 779
Sample Size: 779

RESULTS:

The initial 10% sample identified four cases of design control violations. Engineering evaluation determined that one rework was required. The rework involved was minor and the existing condition, if left uncorrected, would not have adversely affected the safety of the plant. In light of the number of violations (5% of the initial sample), the one rework item identified, and other concerns related to the American Bridge program, LP&L decided to perform a full scope review of American Bridge information requests. This subsequent review identified forty-nine additional design control violations. None were evaluated to have safety significance. The review also identified seventeen (17) design control violations involving non-safety installations. There were some additional concerns, however, identified as a result of this review.

The concerns were that American Bridge had performed work for which there were no records and which had not been inspected as committed in the corrective action plan of Significant Construction Deficiency (SCD) No. 78. These items generally fell into one of three categories:

1) Connections which were modified from members welded to embedded plates to connections welded to surface mounted anchor plates. The expansion anchors used in these connections had not received the SCD 78 inspection.

2) Connections which were originally designated and made as shop welds that were modified or removed and rewelded as field welds.

3) Structural members which due to field conditions had to be shortened and re-coped.

These three categories were initially identified from the undocumented design changes. Further scrutiny of the American Bridge Information Requests identified additional items which were to be inspected under SCD 78. These inspections are now complete.

CONCLUSION:

The results of the American Bridge reinspections, disposition of discrepancies, including rework resulting from undocumented design changes and other rework is reported via the Final Report to SCD 78.

G. Contractor: GEO

Total Number of Documents: 46
Sample Size: 46

RESULTS:

The sampling has been completed. There have been no cases found where design changes were conveyed without proper documentation.

CONCLUSION:

No further action required.

H. Contractor: B&B

Total Number of Documents: 541
Sample Size: See Results Below

RESULTS:

A sample of this contractor's information requests was not performed for the following reasons. The design specification governing B&B work provides several alternatives to accomplishing their work. B&B's information requests pertained to definition of the work scope and the application of these alternatives. No design changes were conveyed.

CONCLUSION:

No further action required.

I. Contractor: Waldinger

Total Number of Documents: 1178
Sample Size: 117

RESULTS:

The sampling has been completed. There have been no cases found where design changes were conveyed without proper documentation.

CONCLUSION:

No further action required.

J. Contractor: Fegles

Total Number of Documents: 42
Sample Size: 42

RESULTS:

A total review of the Fegles information requests was performed. Eight cases were found that conveyed design changes. None had safety significance. Engineering has evaluated all to be acceptable as is without any rework.

CONCLUSION:

No further action required.

K. Contractor: Sline

Total number of documents: 118
Sample Size: 12

RESULTS

The information requests submitted by Sline total 118 as of April 14, 1984. From the review, it has been concluded that no design changes have been conveyed without proper documentation.

CONCLUSION:

No further action required

L. Contractor: Ebasco Construction - Mechanical Equipmenc & Piping

Total number of documents: Approximately 105
Sample Size: 105

RESULTS:

During the initial 10% sampling (10 documents), it was determined that several of these documents were still in process and had not been answered to date. The sample size was then increased to 28. Of the 28, seven (7) were still to be answered, eleven were backed up by appropriate documentation, and seven (7) were deviations reported via discrepancy notices (DN's) which were evaluated via information requests by Engineering to accept as is. The remaining three were deviations from design for which there was no back-up documentation. Engineering has evaluated these three to be acceptable as-is without rework.

CONCLUSION:

Since the number of information requests yet to be answered diminished the sample size and three of the 21 (14 percent) answered information requests contained undocumented dated changes, a complete review of all documents in this category has been made. This review produced the following results: 45 were backed up by appropriate documentation; 23 were voided or unanswered and 37 were deviations from design for which a design change had not been issued. The 37 deviations were responded to by the appropriate organization, i.e., design engineering. Thus there is no safety significance.

M. Contractor: Ebasco Construction - Electrical

Total number of documents: Approximately 1500
Sample Size: 155

RESULTS:

This sampling has been completed. There have been no cases found where design changes were conveyed without proper documentation.

CONCLUSION:

No further action required.

N. Contractor: Ebasco Construction - Instrumentation

Total number of documents: 540
Sample Size: 54

RESULTS:

This sampling has been completed. There have been no cases found where design changes were conveyed without proper documentation.

CONCLUSIONS:

No further action required.

O. Contractor: Ebasco Construction - Pipe Supports

Total number of documents: Approximately 1700
Sample Size: 174

RESULTS:

The sampling has been completed. There were no cases found where design changes were conveyed without proper documentation. There were ten deviations reported via discrepancy notices (DN's) for which information requests were written subsequent to the DN issuance. All were evaluated via information requests by engineering to be acceptable as is. None were of safety significance.

CONCLUSION:

No further sampling was performed as the items identified were all of the same nature and were a subset of information requests pertaining to one nonconformance report. As this was an homogenous set of documents traceable to one source, further sampling was not performed. In addition, the as-building program under which Tompkins-Beckwith performed their work provided appropriate documentation for deviations from design under the design control program. Thus, no further action is required.

P. Contractor: Ebasco Construction - Civil

Total number of documents: Approximately 42
Sample Size: 42

RESULTS:

With the sample completed, two cases of undocumented design changes were found. These changes have been evaluated by Engineering to be acceptable as-is without rework.

CONCLUSION:

None of the design changes conveyed by informal documents have safety significance. No further action required.

CAUSE:

Lack of an appropriate procedure for handling informal information requests prior to March 1979, and inadequate implementation of ASP-IV-56 (Control of Information Requests) after its issuance in March 1979 was the cause of this concern. The procedure specifically limits the use of information requests to a) clarification of construction details, b) directives to clear interferences, or c) directives to install and document in accordance with redline procedures. It requires requests for information which require a design change to be responded to with the number of the appropriate document and the expected date of issue.

GENERIC IMPLICATIONS:

This issue has been treated generically. The review conducted included a minimum 10 percent sample of informal information requests of all contractors who performed safety-related work at Waterford-3. Some minor documentation problems exist and are being tracked. The review and evaluation of the design changes conveyed by the informal information requests, without appropriate documentation, indicates that none adversely affected safety. The review only identified one contractor, American Bridge, where rework was appropriate. This contractor, however, was subject to the full scope review.

SAFETY SIGNIFICANCE:

The content of the J. A. Jones changes consisted typically of relocations of embedded items to clear interferences, and adding rebar splices. The review has not found any changes that affect plant safety.

The findings on the other contractors relate to proper documentation. There are no findings which would affect plant safety.

On this basis, LP&L concludes that this concern should not constrain fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

Nonconformance reports have been written where design control violations were identified to document the conditions found during the sampling of that contractors information requests and track the information and approval of corrective action.

To preclude recurrence of this concern, Ebasco has further instructed those individuals involved in the implementation of ASP-IV-56 (Control of Information Requests Between Ebasco and Site Contractors). Emphasis was given to the appropriate documentation of design changes.

In addition, the Station Modification process, now in affect at Waterford (Plant Operating Manual Procedure PE-2-006), defines the method for accomplishing hardware modifications and the updating of documentation to reflect as-built conditions from initiation through to closure. Use of a Detailed Construction Package Change (DCPC) document is also discussed in the procedure. A DCPC is a formal request for change when work associated with a station modification cannot be accomplished in accordance with the detail construction package instructions which requires the responsible engineer's approval prior to implementation. Subsequent to implementation, the DCPC will be incorporated as a revision to the Station Modification Package.

ATTACHMENTS:

1) Summary of Review of Safety Related Contractors

2) Sample Program Documentation Form

REFERENCES:

(1) Ebasco Procedure ASP-IV-56, Control of Information Requests between Ebasco and Site Contractors.

ATTACHMENT 1

SUMMARY OF REVIEW OF SAFETY RELATED CONTRACTORS

SAFETY RELATED CONTRACTORS	APPROXIMATE TOTAL QUANTITY OF DOCUMENTS	SAMPLE SIZE	ITEMS (1) IDENTIFIED	SAFETY SIGNIFICANCE
Tompkins-Beckwith	6600	661	0	0
Fischbach & Moore	6400	1271	3	0
Mercury	3052	3052	249 (8.2%)[2]	0
Nisco	559	56	0	0
Gulf Engineering	603	61	0	0
American Bridge	779	779	70 (8.9%)	0
Nooter	N/A	N/A	N/A	0
Combustion Engineering	N/A	N/A	N/A	0
GEO	46	46	0	0
[illegible]	541	N/A	N/A	0
Waldinger	1178	117	0	0
Fegles	42	42	8 (19%)	0
CBI	N/A	N/A	N/A	0
Sline	118	12	0	0
Ebasco Construction				
(1) Mechanical	105	105	37 (35%)	0
(2) Electrical	1500	155	0	0
(3) Instrumentation	540	54	0	0
(4) Pipe Supports	1700	174	10 (5.7%)	0
(5) Civil	42	42	20 (47.6%)	0
TOTAL	23,781	6,625	397 (6.0%)	0

"Items Identified" is defined as the number of individual information requests which violated the design control program.

(2) In accordance with Design Installation Details (LOU 1564-B-430) Construction Engineering was authorized to approve minor deviations from the Installation Guidelines and Details.

ATTACHMENT 2

NTRACTOR ______________________

DOCUMENT ______________________

ITEM	DOCUMENT NUMBER	DESCRIPTION	RESPONSE	CATEGORY*	JUSTIFICATION	ESSE ** EVALUATION

RESPONSE

ITEM NO.: 15 (Final)

TITLE: Welding of "D" Level Material Inside Containment

NRC DESCRIPTION OF CONCERN:

The staff reviewed the welding of "D" level material for containment attachments. The containment spray system structural component welds were chosen for specific detailed review. The welds on the containment spray piping supports were checked for weld rod traceability and welder identification and certification. The applicant was unable to produce the documentation sought for the staff review.

The applicant shall (1) locate the documentation and verify the adequacy of the information, or (2) perform a material analysis and NDE work, or (3) rework the welds. The staff shall be promptly informed of the applicant's approach and the documentation shall be made available for staff review.

DISCUSSION:

LP&L has reviewed the welding of "D" level material inside containment with the contractor, has determined that a deficiency exists and has undertaken a corrective action program including a sampling inspection.

The Containment Spray system structural component welding records were not shown to the staff reviewers. These supports were installed by Tompkins-Beckwith and are fully documented. Instead, the staff reviewers were incorrectly shown Chicago Bridge & Iron Company (CB&I) drawings. The specific item reviewed by the staff was later determined to consist of temporary supports which, for the most part, have now been abandoned. There were two cases, however, where Containment Spray piping support struts were attached to a CB&I "D" material item. An analysis was performed (Ref. 9) which demonstrated that the containment spray piping is adequately supported without assuming any contribution by the two struts under the design loads, including seismic loads, as committed to in FSAR Sections 3.7.3.1.1.1 and 3.9.3.1.1.4. Therefore, with respect to spray header piping no action is required. Other "D" material applications, however, were found to be Seismic Category I structures and these have been addressed in the response.

CB&I, the installing contractor, defines Class D material as all that material which falls outside the ASME Boiler & Pressure Vessel Code jurisdictional boundary. The documentation requirements of CB&I's Quality Assurance Program Manual applied to material within ASME Code jurisdiction only, thus the D material was not originally provided with material certifications or documented evidence of inspection.

The findings of the review and descriptions of the program are as follows:

Unique weld rod traceability cannot be obtained for Class D material welding since CB&I's program did not provide process control records for D material to the same level as Class A, B or C material. However, records are available for all welding material used by CB&I, and all such material is certified for safety-related applications.

Welder identification cannot be obtained for individual Class D material welds since CB&I's program did not provide detailed process control records for such welding. However, all CB&I welders on this project were qualified in accordance with ASME Section IX Code.

The CB&I QA Manual required, as a minimum, that the site Welding/QA Supervisor inspect fit-up, welding in progress and finished welds on all classes of work. The CB&I Site Welding/OA Supervisor had the responsibility for the completion of a report (See Attachment 1, CB&I Form WL222) that requires the visual inspection of finished welds and includes the inspection of fit-up and in- process welding. Note that the inspection checklist items on Form WL222 references "all welds". Although the requirements for documentation do not apply to "D" material welding, there is therefore reason to believe that this function was performed on Class "D" material field welds. The work was performed by the same welders and inspected by the same welding supervisors to the same standard as the rest of the CB&I work for which documentation is provided. This provides a high degree of confidence in the quality of the finished work since CB&I welders and inspectors were well qualified and very experienced as reflected in their certifications which indicated an average of 7 years for welders and more than 20 years for inspectors, working to ASME Code requirements for CB&I alone. The quality of CB&I welding on this project is very high as has been repeatedly proven by low NDE rates of rejection and by the results of QA surveillances and audits. Attachment 2 is a letter from CB&I to Ebasco providing additional information on their approach to documentation of "D" material welding.

An Ebasco Engineering review of Chicago Bridge & Iron Company drawings was undertaken to list all shop and field welds identified by CB&I as Class "D" material. Class "D" material is defined as all material and welding located 4 inches or more from the face of the containment vessel. After deletion of obvious non-safety related items such as handrails, there are 2652 shop and 810 field welds so that the total number of welds of Class "D" material is 3462.

A sample of welds was chosen for visual inspection based on review of all the welds. The Containment Spray piping seismic clips were not further considered once it was determined that they either had been abandoned or were determined by analysis not to have been required. The Class "D" items in the Personnel Access Hatch and the Escape Hatch were judged to be minor structures or non-structural applications and were excluded from the sample.

The Polar Crane Girder assembly and the Maintenance Hatch supports were identified as the significant structural applications and from these the entire sample of 405 welds (11.7% of the total 3462) was selected to be inspected, of which 188 were inspected with the paint removed and 217 were inspected with the paint on. The paint was removed to inspect for defects that could not be readily seen through the paint. None were identified which would require enlarging the sample. The 217 painted welds were inspected for major defects and size of weld.

No NDE was involved since none was required by the original criteria for Class "D" welds.

The inspection was performed by two qualified welding inspectors in accordance with LP&L procedure "QA Inspection of Structural Steel Weldments" No. QASP-19.10. The welds that had only acceptable indications and were of required size were approved as is and the reports were retained by LP&L. If there were unacceptable indications in any of them, they were forwarded to Ebasco engineering for evaluation under NCR-W3-7792.

RESPONSE

ITEM NO.: 15 (Final)

TITLE: Welding of "D" Level Material Inside Containment

NRC DESCRIPTION OF CONCERN:

The staff reviewed the welding of "D" level material for containment attachments. The containment spray system structural component welds were chosen for specific detailed review. The welds on the containment spray piping supports were checked for weld rod traceability and welder identification and certification. The applicant was unable to produce the documentation sought for the staff review.

The applicant shall (1) locate the documentation and verify the adequacy of the information, or (2) perform a material analysis and NDE work, or (3) rework the welds. The staff shall be promptly informed of the applicant's approach and the documentation shall be made available for staff review.

DISCUSSION:

LP&L has reviewed the welding of "D" level material inside containment with the contractor, has determined that a deficiency exists and has undertaken a corrective action program including a sampling inspection.

The Containment Spray system structural component welding records were not shown to the staff reviewers. These supports were installed by Tompkins-Beckwith and are fully documented. Instead, the staff reviewers were incorrectly shown Chicago Bridge & Iron Company (CB&I) drawings. The specific item reviewed by the staff was later determined to consist of temporary supports which, for the most part, have now been abandoned. There were two cases, however, where Containment Spray piping support struts were attached to a CB&I "D" material item. An analysis was performed (Ref. 9) which demonstrated that the containment spray piping is adequately supported without assuming any contribution by the two struts under the design loads, including seismic loads, as committed to in FSAR Sections 3.7.3.1.1.1 and 3.9.3.1.1.4. Therefore, with respect to spray header piping no action is required. Other "D" material applications, however, were found to be Seismic Category I structures and these have been addressed in the response.

CB&I, the installing contractor, defines Class D material as all that material which falls outside the ASME Boiler & Pressure Vessel Code jurisdictional boundary. The documentation requirements of CB&I's Quality Assurance Program Manual applied to material within ASME Code jurisdiction only, thus the D material was not originally provided with material certifications or documented evidence of inspection.

The findings of the review and descriptions of the program are as follows:

Unique weld rod traceability cannot be obtained for Class D material welding since CB&I's program did not provide process control records for D material to the same level as Class A, B or C material. However, records are available for all welding material used by CB&I, and all such material is certified for safety-related applications.

Welder identification cannot be obtained for individual Class D material welds since CB&I's program did not provide detailed process control records for such welding. However, all CB&I welders on this project were qualified in accordance with ASME Section IX Code.

The CB&I QA Manual required, as a minimum, that the site Welding/QA Supervisor inspect fit-up, welding in progress and finished welds on all classes of work. The CB&I Site Welding/QA Supervisor had the responsibility for the completion of a report (See Attachment 1, CB&I Form WL222) that requires the visual inspection of finished welds and includes the inspection of fit-up and in- process welding. Note that the inspection checklist items on Form WL222 references "all welds". Although the requirements for documentation do not apply to "D" material welding, there is therefore reason to believe that this function was performed on Class "D" material field welds. The work was performed by the same welders and inspected by the same welding supervisors to the same standard as the rest of the CB&I work for which documentation is provided. This provides a high degree of confidence in the quality of the finished work since CB&I welders and inspectors were well qualified and very experienced as reflected in their certifications which indicated an average of 7 years for welders and more than 20 years for inspectors, working to ASME Code requirements for CB&I alone. The quality of CB&I welding on this project is very high as has been repeatedly proven by low NDE rates of rejection and by the results of QA surveillances and audits. Attachment 2 is a letter from CB&I to Ebasco providing additional information on their approach to documentation of "D" material welding.

An Ebasco Engineering review of Chicago Bridge & Iron Company drawings was undertaken to list all shop and field welds identified by CB&I as Class "D" material. Class "D" material is defined as all material and welding located 4 inches or more from the face of the containment vessel. After deletion of obvious non-safety related items such as handrails, there are 2652 shop and 810 field welds so that the total number of welds of Class "D" material is 3462.

A sample of welds was chosen for visual inspection based on review of all the welds. The Containment Spray piping seismic clips were not further considered once it was determined that they either had been abandoned or were determined by analysis not to have been required. The Class "D" items in the Personnel Access Hatch and the Escape Hatch were judged to be minor structures or non-structural applications and were excluded from the sample.

The Polar Crane Girder assembly and the Maintenance Hatch supports were identified as the significant structural applications and from these the entire sample of 405 welds (11.7% of the total 3462) was selected to be inspected, of which 188 were inspected with the paint removed and 217 were inspected with the paint on. The paint was removed to inspect for defects that could not be readily seen through the paint. None were identified which would require enlarging the sample. The 217 painted welds were inspected for major defects and size of weld.

No NDE was involved since none was required by the original criteria for Class "D" welds.

The inspection was performed by two qualified welding inspectors in accordance with LP&L procedure "QA Inspection of Structural Steel Weldments" No. QASP-19.10. The welds that had only acceptable indications and were of required size were approved as is and the reports were retained by LP&L. If there were unacceptable indications in any of them, they were forwarded to Ebasco engineering for evaluation under NCR-W3-7792.

Ebasco evaluated 32 connections which were not accepted on QC inspection under NCR W3-7792 This evaluation found that although some of welds were slightly undersize or exhibited relatively short regions of surface defects, engineering calculations based on the original design requirements demonstrate that the connections in which they are found are nevertheless not overstressed when subject to the design loads. The welding of these connections is therefore acceptable.

Therefore, it has been concluded that the design requirements are satisfied for the entire sample of 405 welds inspected and that, on the basis of the satisfactory results of the sample inspection all CB&I "D" material welds are considered satisfactory and may be accepted as is.

On the basis that all weld materials used were provided with proper certifications, all welders and inspectors were qualified and performed work to the procedures of the vendor's program and that the sampling inspection of the welds has identified no unacceptable conditions, the quality of the all D material welding is evaluated to be satisfactory and no further action is required.

During the weld inspection, six arc strikes were found on the Polar Crane Girder Stiffeners and one on a crane rail shim plate. Because of the type of steel involved (SA.516 Grade 70), and the position and function of the crane, a reinspection of all crane girder stiffeners for arc strikes was undertaken. All arc strikes found were removed and upon reinspection and evaluation, were found to not be structurally significant.

CAUSE:

The cause of the documentation deficiencies in CB&I Class "D" material welding is that the approved vendor quality program did not require such documentation. CB&I did not adequately interpret the distinction between Seismic Class I designation and ASME code jurisdictional boundaries; and on the part of Ebasco and LP&L, they did not identify the omission in the CB&I QA Manual either during the program review process or in reviews of in-process documentation. Other contractors which performed work in accordance with both the ASME Code and outside the code jurisdictional boundary (Seismic Category I) satisfied the criteria of 10CFR50, Appendix B.

GENERIC IMPLICATIONS:

The generic implications regarding CB&I have been addressed in the program just completed since all Class D material welding was considered. With respect to other contractors, the ASME Code boundary/Seismic Category I boundary issue does not arise.

SAFETY SIGNIFICANCE:

The CB&I's quality program was applied to the Class D material installation as all other classes in every respect except detail documentation. The above evaluation just completed verifies the work is of satisfactory quality. These welds are not considered to pose a constraint to fuel load, power ascension or commercial operation.

CORRECTIVE ACTION:

The review and sampling programs described above are complete. All arc strikes identified during the inspection of the Polar Crane girder were removed by grinding.

ATTACHMENTS:

(1) CB&I Form WL222

(2) CB&I letter to Ebasco Services Inc. dated 6/29/84

REFERENCES:

(1) Ebasco Specification No. LOU-1564.717

(2) Ebasco Drawings Nos. 1564-G-816 through 819

(3) CB&I QA Program Manual

(4) CB&I Dwgs. 71-2426 Series

(5) NCR W3-7792 dated 7/24/84

(6) LP&L Procedure No. QASP-19.10, "QA Inspection of Structural Steel Weldments"

(7) Inspection Reports, Form LPL Q-58 (7-84)

(8) CB&I Letter dated 6/29/84

(9) S/A Calculation No. 1071, Part 1 and No. 1077

ATTACHMENT 1

Attachment 2

CBI FIELD WELDING SUPERVISORS REPORT

Contract No. ______ Construction Office ______ Date ______

Description ______

Material Specifications ______

Customer ______ Location ______

Erection Supt. ______ Weld Foreman ______ Code ______

Weather Conditions and Temperature ______ Hours Spent on Job ______

No.	Yes	No	Fit-Up and Welding	No.	Yes	No	Testing
1			Breakdowns per Manual 13	18			Bottom welds cleaned & pickups made before vacuum test
2			Bottom laid per Manual 13	19			Bottom vacuum tested per Std. 751-5-2
3			Bottom fit per Manual 13	20			Bottom testing up to date
4			Roof fit per Manual 13	21			Magnetic particle testing up to date
5			Verts fit-up & aligned per Manual 13 and/or Code	22			Dye penetrant testing up to date
6			Girths fit-up and aligned per Manual 13 and/or Code	23			X-ray or plugs up to date
7			Tab plates used as required	24			Fittings tested up to date
8			Joints properly cleaned for AGW	25			Customer witness of NDE up to date
9			Fittings properly installed per Manual 13 and/or Code				**Inspection and Cleanup**
10			Joints backgouged properly	26			Slag cleaned from all welds daily
11			Contract welding procedure being used	27			Pickups made properly daily
12			3 – Plate laps per Manual 13	28			Any unacceptable undercut
13			All splices properly welded 100%	29			All fillet and other welds proper size
14			Wide gaps built up before welding	30			Burrs properly removed
15			Construction manuals used as required	31			Columns, stairways, top angle etc. plumb
16			Welding electrodes stored properly	32			Any unacceptable buckles or peaked verts
17			Proper preheat used as required	33			Any fabrication errors—report on backside
				34			Any engineering errors—report in remarks below

Fabrication—CBI Shop Location ______ Or Subcontractor ______

Type and brand of Electrode and Flux ______

Type X-Ray film, screens and penetrameters ______

No. of X-Rays or Plugs taken this week ______ Good ______ Bad ______

Total no. of X-Rays or Plugs to date ______ Good ______ Bad ______

Welding defects found by NDE ______

Steps taken to prevent/correct defects ______

Types of automatic equipment used ______

Form G.E. 155 Level Readings	Tank #		Tank #		Tank #	
Before Laying Bottom	High	Low	High	Low	High	Low
After 1st Ring is Fit	High	Low	High	Low	High	Low
After 2nd Ring is Fit	High	Low	High	Low	High	Low
After 3rd Ring is Fit	High	Low	High	Low	High	Low

REMARKS (State briefly your opinion of job considering workmanship, safety, fabrication, erection and testing)

Original: CONSTRUCTION OFFICE
Copy: ERECTION SUPT.
Copy: HOUSTON WELDING SERVICES
Copy: WELD SUPERVISOR

WELDING SUPERVISOR'S SIGNATURE

Printed in USA

WL 222 (FRONT) APR 76

ATTACHMENT # 2

Attachment 2
NRC Concern 15

cc MKY J. Cockrell
L. Stinson G Bourgeois

CBI Chicago Bridge & Iron Company

8900 Fairbanks North Houston Road
P O Box 40066
Houston, Texas 77040
713 466 7581

June 29, 1984

EBASCO Services Incorporated
P. O. Box 70
Killona, LA. 70060-0070

ATT: Mr. Michael K. Yates
Project Manager

RE: Waterford SES No. 3
TAft, La.
CBI Contract 71-2426

SUBJ: NRC Concern No. 15
EBASCO Letter ES-9423-84 Dated 6/25/84

Dear Mr. Yates:

Attached please find CBI's responses to your letter ES-9423-84 requesting information necessary to answer the NRC's concern No. 15. This concern deals with documentation of class D material welds. The number of each response corresponds to the number of each action request in your letter:

1. No process control records documenting visual inspection of field welds of type D materials exist. Permanent records for these welds were not required by the ASME Code, customer's specifications, or the CBI Quality Assurance Program.

2. Applicable records for materials and welding consumables are on file in the EBASCO/LPL records' vault on site.

3. Shop records on file at the site detail inspections for the crane girder sub-assemblies and some of the spray systems' structural components.

   Although not required by the QA Manual, some D material welds were documented on the shop records as a matter of convenience to shop personnel. No class D material welds were documented in the field.

4. All CBI welders (including tackers) on this project were fully tested and qualified in accordance with ASME Section IX Code.

CBI Welding/QA Supervisors are long-term employees who have risen through the ranks to their position because they are outstanding craftsmen who display an exemplary attitude toward quality and they have the full backing of management to do whatever is required on site to assure that quality is satisfactory. The Welding/QA Supervisor never works for the site foreman, but instead works for the District Welding/QA Manager. Therefore, he has full independence to perform his QA duties. It was this way by choice within the CBI organization long before the nuclear power industry came into existence.

Each week, no matter what class of structure to which he is assigned, the Welding/QA Supervisor is required to complete a report (see attached form WL222) whereby the district office can be kept up-to-date on the job from a QA standpoint. Note that items 26 through 29 deal with the timely visual inspection of welds. Also, attached are CBI forms WL232, WL233 and WL234 which deal with the final inspection of various types of CBI products. Again, note that there are references to inspection of <u>all</u> welds. Two conclusions can be drawn from this discussion:

a. CBI Welding/QA personnel are taught and expected to inspect all welds.

b. Although documented inspections of class D material welds were not required by this contract, inspections were most certainly performed as a matter of routine.

5. A review of CBI's photograph collection for this project did not produce any appropriate photographs showing work in progress on class D materials.

6. Individuals contacted who were on site at Taft during the construction phase of the contract indicate that all of the welds in question received a visual examination both after fit-up and after completion of the welds. However, with the passage of time, none of these individuals felt comfortable with providing any further documentation beyond that which was signed at the time of construction.

Discussions with our site personnel indicated that the EBASCO/LPL inspectors and the Hartford ANI were very diligent in their duties, and it is most unlikely that <u>any</u> welding on this contract - either documented or undocumented - would have escaped their scrutiny.

Attachment 2
NRC Concern 15

Chicago Bridge & Iron Company

7. The list of certified field welders on this job may be found in CBI files numbered 8.10 in the EBASCO/LPL records' vault at the jobsite.

8. It is CBI's interpretation of AISC requirements that all welds governed by this specification be given a visual inspection of the completed weld.

9. It is Chicago Bridge & Iron's corporate policy to depend upon its internally enforced quality assurance programs and to demand that this system work. Doing so yields the following benefits:

   a. Rework with its attendant lost profits is minimized by effectively using site quality assurance personnel. Their presence on the jobsite is considered to be a positive influence as it is QA's job to ensure that quality is built in on an on-going basis - not "inspected in" as an afterthought.

   b. Our image with our customers is enhanced because it is well known within the industry that our QA systems are effective and would be so even without outside inspection. This is reinforced by the fact that Chicago Bridge & Iron has built thousands of trouble-free structures which received no customer or third-party inspections.

The centerpiece of CBI QA programs is the site Welding/QA Supervisor. Whether or not examinations are documented, these individuals are expected at the very least to inspect fit-up, welding-in-progress and finished welds on all classes of work. This is so stated in paragraph 3.4.3.1.C.6, Division 4 of the QA Manual. There is no reason to believe that this function was not performed on the class D material field welds.

Please feel free to contact either Mr. Nixon or me if we can be of further assistance on this matter.

Yours very truly,

Thomas D. Warner

Thomas D. Warner
Welding/QA Manager
Houston Construction District

TDW:mjr

Attachments - WL222
WL232
WL233
WL234

RESPONSE

ITEM NO.: 16 (Final)

TITLE: Surveys and Exit Interviews of QA Personnel

NRC DESCRIPTION OF CONCERN:

In a memorandum dated January 3, 1984, R.S. Leddick, LP&L Vice President for Nuclear Operations, directed that the LP&L Quality Assurance (QA) personnel conduct interviews of the on-site contractor QA personnel to elicit any concerns the contractor staff may have regarding the quality of construction of Waterford Unit 3. That memorandum also indicated that exit interviews would be similarly conducted with the contractor personnel prior to their leaving the Waterford 3 project. A total of 407 such interviews were conducted beginning in January 1984. Individual responses were sent to the specific employee(s) who raised the concern.

Exit interviews with the contractor QA Employees (resigned, transferred, or terminated) began on January 16, 1984. A compilation of the concerns raised during those interviews were forwarded for follow-up on May 22, 1984.

The NRC staff reviewed all of the questionnaire forms and responses to the questions identified by the LP&L QA staff. In some cases, the NRC review identified additional potential issues, beyond those identified by LP&L, and responses that did not address the intent of the concerns. Nevertheless, the staff found that the majority of the concerns raised are being or have been addressed as part of all of the other NRC review efforts associated with Waterford 3.

As a result of the staff review, it is not evident that the survey and exit interviews have been vigorously pursued by LP&L to investigate the issues raised for safety significance, root cause, and generic implications. For example, the exit interviews began in January and are continuing. However, the process of reviewing the content of those interviews did not begin until late May 1984. For some of the interviews, additional information should have been obtained from the person interviewed but the interviewers did not indicate on the form whether or not they sought additional facts. Finally for a number of areas, issues or potential problems were acknowledged but it is not clear that any follow-up action occurred.

The NRC staff is concerned that the LP&L program to investigate issues does not promptly and thoroughly examine the specific areas and the programmatic implications of them. Other successful programs have utilized independently staffed groups to assess each issue raised and formally report to senior utility management on their findings and recommended corrective actions. These elements are not evident in the LP&L process. As a result, LP&L should develop and implement a formal program for handling issues raised by individuals. One of the first tasks to be dealt with by the program should be the review of the responses previously provided to the QA survey and during the exit interviews.

DISCUSSION:

In addressing the NRC staff's concerns, we will discuss first, the LP&L interview program as initially conducted by the company, and second, LP&L's plans for this program in the future. The initial program - a new type effort within LP&L--has been helpful and effective, LP&L believes, in identifying and resolving potential quality issues. At the same time, as reflected in experience to date and in the NRC staff comments, the program can be significantly improved. Program improvements, including those recommended by the NRC, are being implemented.

I. PROGRAM AS INITIALLY CONDUCTED

Discussion of the program is divided into six parts--establishment of the program, implementation of the program in initial QA/QC interviews, implementation of the program in exit interviews, program review, program benefits and program shortcomings.

A. Establishment of the Program

In December 1983, construction work on Waterford 3 was essentially complete and the project was in a construction punch list mode. System testing and system turnover activities were nearing completion, and the work force was in transition from contractor construction personnel to startup personnel and permanent plant staff. During this time frame, LP&L Management became aware, through a variety of sources, that rumors and allegations of construction quality concerns were surfacing. Management recognized that first hand information was very important in addressing such concerns and that the best source of information should be the site QA/QC personnel.

Accordingly, as an effort to identify and resolve such concerns, LP&L Management promptly established in early January 1984, a program to interview all on-site QA/QC personnel and to interview such personnel thereafter when they were leaving the site. The objectives of this program were twofold:

1. Identify and resolve QA/QC concerns, in particular concerns of potential safety problems.

2. Communicate to these personnel, if they desired, the disposition of their concerns.

This program was a new, voluntary effort of a type not previously undertaken by the company; it was not an NRC requirement, nor was it part of a prior commitment.

The decision to establish the QA/QC interview program was made by the Senior Vice President - Nuclear Operations after being proposed by the Corporate Quality Assurance Manager. LP&L QA was assigned the responsibility to conduct such a program. Prime responsibility for program implementation was assigned to a senior member of the Corporate QA Staff with 22 years experience in the utility industry. He was assigned by the LP&L Corporate Quality Assurance Manager as the principal interview team leader and is widely respected for his competence and professionalism. Reflecting his capability, that interview team leader was also designated by LP&L as Construction Appraisal Team coordinator for the company.

B. <u>Implementation of the Program in Initial QA/QC Interviews</u>

The program commenced on January 3, 1984. On that date, the LP&L Senior Vice President - Nuclear Operations issued a memorandum (Attachment 1) to Waterford 3 QA/QC personnel advising them that LP&L QA would, at his direction, be conducting interviews with QA/QC personnel. It was further directed in the letter that the plan was to conduct interviews with QA/QC personnel prior to their leaving the site, and that the objective was to identify quality concerns these individuals might have.

The initial interviews of QA/QC personnel were begun on January 5, 1984. During this initial phase, 407 people involved in Quality Assurance and Quality Control functions were interviewed. Those interviewed are believed to have included all LP&L QA/QC personnel as well as Ebasco and subcontractor QA/QC personnel on site.

Interviews were conducted principally by two-man teams of LP&L QA personnel. The Corporate Quality Assurance Manager briefed the interviewers prior to the interviews and stressed that the objective was to obtain as much information as possible and that they should not intimidate, or appear to intimidate, the interviewees.

Interviews were intended to be conducted in the following general manner:

° Interviewee was shown a copy of the memorandum from the Senior Vice President-Nuclear Operations.

° Interviewee was given the option to remain anonymous.

° Interviewee was asked questions contained in a questionnaire prepared by LP&L QA. The questionnaire included general questions inviting comments on quality concerns the interviewee wished to discuss. Responses were recorded on the questionnaire by one of the interviewing team members. In most cases, the interviewee signed the questionnaire.

° The interviewee was told he would be provided a copy of the response to his concerns if he so desired.

The program, as implemented, was not designed to be and was not auditable in the sense that all related corrective actions were documented and easily traceable. Thus, while concerns were evaluated and action was initiated as deemed appropriate, the questionnaire itself did not include a space for disposition of the concern.

As the initial interviews were proceeding, interview comments were being contemporaneously reviewed by the interview team leader to determine:

1. If a concern expressed by the interviewee required addressing from a safety significance standpoint;

2. If the concern had generic implications; and

3. If the interviewee desired a response to his concerns.

Again, while this review in fact was performed, systematic records were not maintained. However, concerns detected were handled as indicated below.

Of the 407 individuals interviewed, approximately two thirds expressed no concerns. For the remainder, the interview team leader identified 72 potentially safety related concerns (some concerns were referenced by more than one individual).

One of these concerns was answered orally. As for the remaining 71 concerns, the interview team leader presented these to the Corporate Quality Assurance Manager, and LP&L then requested and obtained formal written responses to these concerns from the persons believed to be best able to respond. The concerns were consolidated in five requests for response as follows:

- Letter W3K84-0059 dated 1/11/84, from LP&L Corporate Quality Assurance Manager to Ebasco QA, listing 15 concerns;

- Memorandum W3K84-0069 dated 1/12/84, from LP&L Corporate Quality Assurance Manager to LP&L Plant Manager, listing 13 concerns;

- Memorandum W3K84-0097 dated 1/16/84, from the interview team leader to LP&L Corporate Quality Assurance Manager, listing 4 concerns;

- Letter W3K84-0108 dated 1/17/84, from LP&L Corporate Quality Assurance Manager to Ebasco QA, listing 25 concerns;

- Letter W3K84-0109 dated 1/17/84, from LP&L Corporate Quality Assurance Manager to Ebasco QA, listing 14 concerns.

In the letters and memoranda, LP&L QA set out the concerns essentially as stated by the interviewees, with only minor changes.

As reflected by the dates of these letters and memoranda, they were sent within a week of completion of the interviews. Thus, in January, 1984 LP&L interviewed 407 individuals, evaluated their concerns, and developed and sent written requests for formal responses for 71 concerns determined to require such response.

Responses to the letters and memoranda were coordinated between the individuals preparing a response and LP&L QA. Written responses were provided for all concerns, as follows:

- Letter W3QA-27541 dated 1/17/84 from EBASCO QA to the LP&L Corporate Quality Assurance Manager.

- Memorandum W3Q84-0010 dated 2/11/84 from the LP&L Plant Manager to the LP&L Corporate Quality Assurance Manager.

- Letter W3QA-27570 dated 1/25/84 from EBASCO QA to the LP&L Corporate Quality Assurance Manager.

- Letter W3QA-27567 dated 1/25/84 from EBASCO QA to the LP&L Corporate Quality Assurance Manager.

- Memorandum W3K84-0170 dated 3/2/84 from the LP&L Corporate QA Manager to the LP&L interview team leader.

As the responses were finally developed, 13 concerns were deemed to require corrective action, which was initiated through formal project procedures. The 13 concerns deemed to have required corrective actions can be categorized as:

- Four required procedural revisions or issuance of new procedures.

- Five required individual and/or groups of nonconformance reports to be reviewed.

- Three required some type of records review to be accomplished.

- One required a limited inspection.

Corrective action for these identified concerns was completed prior to fuel load.

Fifty-eight concerns were deemed not to require corrective action by the responding organization. In several instances, additional information was required from the interviewee for a full response. In these cases, the interview team leader sought such information; however, the interviewee generally did not provide it.

During the course of this interview and review process, the Corporate Quality Assurance Manager kept the Senior Vice President-Nuclear Operations generally informed of the program's progress and of the overall results. This was done without detailed written reports.

The process, including identification of generic concerns, can be illustrated by the treatment of the following concern:

> Review of NCRs. Several interviewees questioned whether particular NCRs had been properly dispositioned. LP&L QA considered this to be a generic issue and, indeed, it was one that LP&L previously had independently identified. Based on the independent identification, LP&L was considering conducting an extensive NCR review. The fact that several QA/QC personnel also raised this concern specifically confirmed for LP&L QA that such a review should be undertaken and the review was begun in February, 1984.

C. Implementation of the Program in Exit Interviews

In addition to initial interviews in January 1984 of on-site QA/QC personnel, the LP&L program requires interviews of QA/QC personnel leaving the site. Such interviews were commenced on January 16, 1984, and are continuing. Through July 1, 1984, when the program was substantially modified as discussed below, a total of 174 interviews were conducted. The format and procedure for the exit interviews has been the same as for the initial interviews; however, the response process was longer in duration.

Regarding the response process, the interview team leader reviewed the interview notes promptly after they were recorded to determine whether immediate action was required for the particular concern. On February 10, 1984, the first concern requiring a response was raised in an exit interview. Between then and May 22, 1984, 12 additional such concerns were raised. In each instance, the interview team leader made determinations that a response would be required, but that immediate action was not necessary. On May 22, 1984, these concerns were consolidated and listed in a letter (W3K84-1217) from LP&L to Ebasco QA and a formal response was requested. A response (letter W3QA-28213) was issued by Ebasco QA on June 17, 1984. Of these concerns, one concern was deemed to require corrective action, which has been accomplished. The delay in seeking formal responses in no way shows lack of concern (as has been suggested); rather, it reflects simply a perceived lack of safety need for immediate response and a perception that other matters (CAT, Task Force) required priority attention.

Between May 22, 1984 and the initiation of the enhanced program described below, five concerns requiring responses were identified. Reflecting the NRC staff's expression of concern in the June 13,1984 letter and LP&L's own reanalysis, LP&L compiled a listing of these concerns in memoranda W3K84-1517 dated July 2, 1984 and W3K84-1458 dated July 3, 1984. LP&L requested the Quality Team (see Part II, below) to obtain responses to these concerns.

D. Program Review

Following the NRC letter of June 13, 1984, several relatively quick internal reviews have been made of the interview program. The interview team leader, for instance, reviewed his own determinations. Further, LP&L's Independent Safety Engineering Group conducted a review. As a result of these reviews, one additional concern having potential safety significance was identified which required review and response. That concern related to Hilti bolts and was the subject of response request Letter W3K84-1466 dated June 25, 1984 to Ebasco QA (this letter also sought a formal response to the concern which the interview team leader had answered orally). Ebasco QA responded via Letter W3QA-28220 dated July 6, 1984 to the LP&L Corporate QA Manager. The Hilti Bolt concern was recommended to require no corrective action.

In addition to these internal reviews, and as suggested by the NRC staff, an external organization conducted a thorough review of all interviews conducted under the original program and their disposition to assure that all the concerns are identified, thoroughly developed and resolved. The external review is discussed further in Part II below.

E. Program Benefits

The interview program as conducted by LP&L, clearly has been of benefit to LP&L. The very fact that LP&L instituted a program is helpful in that the effort to date has convinced LP&L that such an interview program can be an effective and valuable tool in identifying and resolving potential safety concerns. Further, QA/QC personnel, in fact, were systematically interviewed for expressions of quality concerns. The vast majority of individuals expressed no concerns. For those who raised concerns, those concerns were addressed, corrective action was taken as deemed necessary, and explanations of disposition were given to individuals desiring this. The program, in short, has established and institutionalized an additional channel for communications within LP&L of potential safety concerns.

F. Program Shortcomings

While the program has been beneficial, it also, as initially conducted, had shortcomings. The most significant of these were the following:

1. The program was not established to be auditable, i.e., all reviews and actions taken were not documented and are not readily traceable.

2. No formal procedure was established for the program (this, for example, allowed for the lack of detailed written reports to upper management).

3. The program was conducted by in-house personnel who were not trained interviewers.

4. A more thorough review of the responses might have uncovered more concerns or modified the concerns which were recognized.

LP&L believes that these program shortcomings are addressed and resolved by the program revisions instituted by LP&L as described in Part II below.

II. CORRECTIVE ACTION PLAN/SCHEDULE

LP&L, in agreement with the NRC staff, believes that the initial program could be significantly enhanced. Reflecting its commitment to the program, LP&L has adopted the following program modifications:

A. An enhanced interview program is being conducted by an independently managed organization. LP&L has selected Quality Technology Company for this effort. Quality Technology was responsible for a similar program at the Wolf Creek Generating Station in Kansas. Quality Technology's personnel include both individuals who have technical expertise regarding nuclear power plants and individuals with substantial experience in interview techniques. The head of the Waterford 3 "Quality Team" (as the program has been designated) for Quality Technology is Mr. Scott Schum. Mr. Schum is a former NRC Senior Resident Inspector, and he has a solid reputation within the industry. The "Quality Team" commenced its operations onsite at Waterford 3 on July 6, 1984. They are responsible for soliciting and receiving quality concerns. Concerns are validated and submitted to appropriate management for corrective action.

B. LP&L is closely monitoring the program. First, the program has been made auditable in form, i.e., all concerns and analyses and dispositions thereof will be documented in a readily traceable manner. LP&L QA will conduct regular program audits. Second, "Quality Team" personnel report on Quality Team activities and concerns received in a weekly status report to the Senior Vice President-Nuclear Operations with copies to the LP&L Corporate Quality Assurance Manager. Monthly Summary reports have been written to encompass the concerns expressed by interviewees and the status of the disposition of those concerns. Analyses of the safety significance, cause and generic implications will be performed for those concerns which are substantiated, and the results of such analyses will be promptly reported to LP&L Management. Concerns deemed to require immediate action will be immediately brought to the attention of LP&L Management.

C. A procedure for the program was formally issued on July 13, 1984. This detailed procedure was prepared by the Quality Technology Company and was reviewed and approved by LP&L Management.

D. The program has been expanded in scope. The exit interview program now applies to all onsite personnel. In addition, access to the Quality Team has been expanded to include a walk-in policy for persons still working at the Waterford 3 project and by telephonic contact.

E. Quality Technology set up the exit interview program and is conducting interviews. In addition, Quality Technology has reviewed all concerns expressed in the original interviews conducted up to July 13, 1984. This review covered both the initial LP&L interviews of January 1984, and the exit interviews subsequently conducted. Quality Technology, analyzed interviews thoroughly for additional potential concerns, the cause and generic implications. Matters deemed to require further information have been followed up. A file for each individual's concern expressed along with documentation specifically addressing the disposition of each has been established. This effort, has been completed for the original interviews. The Quality Technology review determined that no items of safety significance had been overlooked in the initial LP&L interviews.

CAUSE:

See paragraph I.F. above.

SAFETY SIGNIFICANCE:

All recognized items of safety significance found as a result of the original interviews are felt to have been adequately addressed. On this basis, there is no recognized reason that this issue should constrain operation.

GENERIC IMPLICATIONS:

Issue 16 as an issue has no recognized generic implications. Some of the individual concerns raised did fall into generic areas. However, all have been identified and corrective action has been implemented.

The NRC can be assured that the company is vitally interested in having as effective and thorough an interview program as possible. The company believes that the program as initiated has been beneficial. As with any new effort, however, the company has learned from its experience, as well as from the comments of the NRC; and the company has strengthened the program accordingly. The revisions and additions to the initial program are extensive and reflect LP&L's commitment to the program.

ATTACHMENTS:

(1) 1/3/84 memorandum from R.S. Leddick

REFERENCES:

None

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NEW ORLEANS, LOUISIANA 70174-6008 • (504) 366-2345
MIDDLE SOUTH UTILITIES SYSTEM

ROTH S. LEDDICK
Senior Vice President
Nuclear Operations

January 3, 1984

W3K84-0005
Q3-A35.01

TO: QA Personnel

FROM: R. S. Leddick

SUBJECT: Interviews

The purpose of this letter is to advise you that, during the next two weeks, LP&L QA personnel will be conducting interviews with Ebasco and other onsite QA personnel. This is being done at my direction in order to identify any quality concerns that you may have. We also plan to conduct Exit Interviews with you prior to your leaving the Waterford Project. During these interviews, you should feel free to express any quality concerns you may have. No one need fear retribution for anything disclosed during the interview and you can remain anonymous if you wish.

LP&L intends to construct and operate Waterford 3 as safely as possible. Your help in achieving this goal will be greatly appreciated.

R S Leddick

R. S. Leddick

RSL/cb

cc: Interviewees

RESPONSE

ITEM NO.: 17 (Final)

TITLE: QC Verification of Expansion Anchor Characteristics

NRC DESCRIPTION OF CONCERN:

A review of Mercury Construction Procedure SP-666, Revision 8, "Drilled-In Expansion Type Anchors in Concrete for Category I Structures," revealed that it does not require QC verification of many characteristics necessary to ensure proper installation of concrete expansion anchors. These characteristics include:

- Spacing between adjacent anchors
- Spacing between an anchor and the edge of a concrete surface
- Spacing between an anchor and an embedded plate
- Minimum anchor embedment depth
- Grouting of unused/abandoned holes in the concrete
- Mounting plate size
- Size of holes in mounting plates and hole distance from plate edges

Although most of the above characteristics are addressed in Section 6.1 "installation," they are not included within Section 6.2 "Inspection," as items requiring QC verification. In addition, QC Inspection Report Form 277A, Rev. May 1982, "Equipment Installation (Anchors)," does not list these attributes as inspection points.

Therefore, Procedure SP-666 should be revised to include all necessary inspection attributes, and a reinspection program should be initiated. This program should be of sufficient size and scope to indicate whether these concrete anchors, in general, are able to perform their intended function. Detailed results should be made available to the NRC staff for review.

DISCUSSION:

LP&L acknowledges that not all of the expansion anchor characteristics cited by the NRC were specifically included in Mercury QC Inspection Report (Form 277A), although all necessary criteria were included in inspection procedures either by referencing the governing procedure (SP-666) or other inspection checklists. Mercury is no longer on site and it would therefore be of no positive consequence to revise SP-666. The procedures currently used on-site to install expansion anchors, however, will be revised to ensure all necessary inspection attributes are explicitly included on the inspection checklists. The five-part discussion that follows, including a discussion of the LP&L reinspection in-progress, will demonstrate that the overall expansion anchor installation program has led to an end product which will adequately perform its required safety function. The discussion is formatted as follows:

I. Comparison of Characteristics Cited By the NRC versus Mercury Procedures and Inspection Checklists.

II. Training of Mercury Personnel on Expansion Anchor Installations.

III. Corrective Action Programs for Deficiencies Identified While Mercury Was On-site.

IV. Reinspections After Mercury Left the Site.

V. Analyses Demonstrating the Conservatism of the Mercury Expansion Anchor Installations.

I. A Comparison of Characteristics Cited By the NRC versus Mercury Procedures and Inspection Checklists.

Mercury Company Procedure SP-666 establishes the method for the installation and inspection of Seismic Class 1 drilled in expansion type anchors. It references project installation documents such as Ebasco Drawings LOU-1564-B430 (Instrument Installation Details) and also states in Section 5.0 that:

> "Mercury QA is responsible for the completeness of all documents and to ensure that the quality requirements of this procedure are met."

Included in these "quality requirements" are adherence to the project's installation documents, referenced in SP-666, the Mercury QC Inspection Report (Form 277A) (Attachments 1 and 2) and other Mercury procedures. The following is a cross reference of the characteristics cited by the NRC to these other documents. Also included is a reference to other parts for this discussion for pertinent reinspections or analyses:

A. Spacing Between Adjacent Anchors

This criteria is addressed in Ebasco Anchor Installation Specification 1564.468, which is referenced in all revisions to SP-666 and was directly transcribed into revision 7 (9/28/82).

Ebasco and LP&L QC reinspections to this criteria are discussed in Sections III and IV, respectively.

B. Spacing Between an Anchor and the Edge of a Concrete Surface

This criteria is addressed in Ebasco Anchor Installation Specification 1564.468, which was referenced in all revisions to SP-666 and was directly transcribed into revision 7 (9/28/82).

Ebasco and LP&L QC reinspections to this criteria are discussed in Sections III and IV, respectively.

C. Spacing Between an Anchor (Plate) and Embedded Plate

There are essentially two cases found in the field which related to this characteristic. First, anchor plates may be welded to embedded plates. Second, an anchor plate may be immediately adjacent to an embedded plate. These situations are allowable per design drawings and therefore were not included in the inspection requirements. See Section V for a discussion of each case.

D. Minimum Anchor Embedment Depth

This criteria was required to be verified in Section 6.2 (Inspection) in all procedure revisions of SP-666 and was noted in checklist item 3 of Form 277A associated with SP-666.

Ebasco and LP&L QC reinspections to this criteria are discussed in Sections III and IV, respectively.

E. Grouting of Unused/Abandoned Holes in Concrete

This characteristic was addressed in all procedure revisions of SP-666 and was noted as checklist item 13 of 277A form through revision 4 of SP-666 - (5/18/82). In later revisions, SP-666 required that Ebasco be notified to fill unused holes.

Section V presents the results of an analysis demonstrating the conservatism of the design in regard to this criteria.

F. Mounting Plate Size

This item was verified and signed off by the Q.C. inspector as part of the support inspection checklist (Form 262), which is addressed in Mercury procedures SP-654 and SP-655. In addition, revisions 7 and 8 of SP-666 referenced the Ebasco B-430 drawings which detailed the mounting plate sizes. The specific B-430 drawing used for a particular application was indicated on the completed inspection report form 277A.

G. Size of Holes in Mounting Plate and Hole Distances from Plate Edges

Per paragraph 6.1.2 of all SP-666 procedure revisions, a carbide bit of the same nominal diameter as the expansion bolt was to be used to drill the hole, unless otherwise directed by the Engineer.

The hole distance from plate edge was part of the configuration checkpoint verified by Q.C. during support fabrication noted in Mercury procedures SP-654 and SP-655 and documented on form 262-1. This attribute was also detailed on the Ebasco B-430 drawings which is referenced in revisions 7 and 8 of SP-666. The specific B-430 detail drawing used for installation was referenced on the completed inspection checklist form 277A.

II. Training of Mercury Personnel on Expansion Anchors

The following is a discussion of the training program developed and implemented by Mercury. This program provides additional confidence concerning anchor bolt installations.

All revisions of Mercury procedure SP-666 required training on expansion anchor installation techniques. Revisions 2 through 8 required that this training be documented.

Initial training and indoctrination was given by Hilti representatives. Hilti training sessions were conducted on 2/1/79, 6/28/79, 1/29/80 and 8/29/80. Approximately 40 Mercury personnel were trained by Hilti on these dates. Subsequent training was conducted by Mercury.

The Hilti sessions provided the following information:

A. Proper identification of Hilti bolt lengths. Trainees were instructed to ensure the expansion bolt was identified by a letter designator on the bolt end which identified the bolt length and subsequent embedment after installation. It is noted that Hilti's Manual required considerably shorter embedment depth than that required by Mercury.

Because of the seismic considerations, Hilti initiated recommendations exclusive to the site contractors for installing anchors. The Hilti criteria for embedment depths for expansion anchors was incorporated into Mercury's procedure. The embedment depths are as follows:

	MINIMUM EMBEDMENT		
Bolt Size	Hilti Recommends For Commercial Use	Hilti Recommends For Site Contractors	Mercury Procedure Requires
3/8"	1 5/8"	3 1/2"	3 1/2"
1/2"	2 1/4"	5 1/2"	5 1/2"
5/8"	2 3/4"	6 1/2"	6 1/2"
3/4"	3 1/4"	7"	7"

B. A discussion on the drilling of concrete with Hilti equipment stressing the use of Hilti drill motors and drill bits.

C. A demonstration on how to drive the bolt into the drilled out bolt hole.

D. Instructions for the proper number of turns to "set" and torque the bolt.

Mercury's training program on expansion anchor installation was an on going activity. Documented training sessions, which included anchor bolt training, were administered by Mercury on April 5, April 28 and June 25 of 1982. Mercury memos WA-980 (7/1/82), WA-1047 (7/29/82) and WA-1049 (8/3/82) document the extension of their retraining program to individuals not on site at the time of previously held indoctrination sessions.

III. Corrective Action Programs for Deficiencies Identified While Mercury Was On-site

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 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. It should be noted that this spacing criteria was not included in the Hilti training sessions described in Section III.

As a result of this Corrective Action Report:

A. Nonconformance Report (NCR-W3-3316) was initiated to evaluate all identified cases where the spacing criteria was 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.

B. Mercury was required by the C.A.R. to retrain personnel on the installation of expansion anchors relative to the distance between anchors and the distance between anchors and a free edge.

C. Mercury was required by the C.A.R. to revise its procedures as necessary to include the spacing criteria required by Ebasco Specification 1564-468.

IV. Reinspection After Mercury Left the Site

A. Mercury Records Transfer Review and Field Verification (ECRRI-1)

When Mercury Company left the jobsite, Ebasco assumed the responsibility for the review of Mercury QA records prior to transfer of the records to LP&L. During the course of this review, Ebasco's Quality Assurance Installation Review Group (QAIRG) identified expansion anchor concerns due to incomplete installation or incomplete/questionable documentation (note that some of these conditions were in process when Mercury left the site). When any one of these conditions occurred, a field verification was performed by the Ebasco Quality Control Department utilizing Ebasco Procedure ECRRI-1.

The intent of the field verification by Ebasco QC was to confirm the as-built condition of the expansion anchors and supplement the Mercury QC documentation accordingly. The program utilized "inspection requests" which were initiated by the QAIRG and implemented by Quality Control. There were 896 requests made and implemented relative to the expansion anchor program. Each of the following actions was taken and checked off when an inspection request form was initiated: 1) the Ebasco QC inspectors witnessed the torque verifications of the expansion bolts; 2) the Ebasco QC inspectors checked the identification mark on the anchor bolts to ensure adequate embedment depth of the anchor. If no identification mark was visible, a Discrepancy Notice was initiated and the bolts were ultrasonically measured and replaced as necessary; 3) the Ebasco QC inspectors provided a sketch as necessary, of the expansion plate and the location of the bolts on the plate. This information was then transmitted to the reviewers to determine compliance to the B-430 drawing details.

From this field verification, a total of 196 Discrepancy Notices were written by Ebasco Quality Control. Of the 196 DNs written, fifteen required rework. This rework primarily consisted of changing out one bolt per DN due to unachievable torque. The remaining 181 DNs were resolved as appropriate by ultrasonic measurement, initiation of a Design Change, torquing bolts to proper range or attaching additional documentation. Documentation of the field verification program performed in accordance with Ebasco Procedures ECRRI-1 and ECRRI-3 is available.

B. Additional QA Inspection of Instrument Installations

LP&L performed a reinspection of 100% of the Mercury N1 instrument installations. It was implemented under LP&L QA procedure QASP 19.15. The program was initiated primarily in response to NRC Concern No. 1 (Inspection Personnel Issues). It did, however, include requirements for reinspection of the following three attributes:

1. Inspection of expansion anchors on adjacent plates to verify adequate spacing between anchors.

2. Inspection of anchors to a free edge to verify sufficient distance between the anchor and the free edge.

3. Inspection of the bolt marking on top of the anchor bolt to verify the embedment.

Out of the approximately 5500 anchor bolts subject to the above described reinspection, 36 deficiencies were identified. Based on engineering evaluation, none of these deficiencies would have prevented the anchor plates from performing their safety-related functions. The results, therefore, indicate that the Mercury program in conjunction with Ebasco and LP&L corrective actions and prior reinspections were effective.

V. Analysis Demonstrating Conservatism of the Mercury Expansion Anchor Installation

A. Analysis of spacing between Embedded Plates and Anchor Plates

Conditions may exist in which an embedded plate is immediately adjacent to an anchor plate. This apparently raised a concern that the anchor bolts and nelson studs may be so close as to create overlapping shear cones with resulting reduction in the capacities of both plates. There is a detail on Ebasco Drawing 1564-G-896S02, Rev. 11 which allows an anchor plate with the drilled in anchor bolt to be adjacent to the edge of an embedded plate.

To fully address this concern, however, a detailed analysis (reference 1) was conducted which considered four combinations of anchor plates installed by Mercury butting up against embedded plates. The combinations chosen represent the most critical cases. The analysis took into account the concrete cone capacity, the ultimate load capacity of an anchor or stud per original design and the required factor of safety per the original design. The results (Attachment 3) indicated that the concrete pull out shear cone capacity is greater than the design pull-out load by a factor of about two with an additional safety factor of at least four. It should be noted that since the loads on the Mercury anchor plates are actually much less than the ultimate load capacity, this was a very conservative analysis.

B. Evaluation of Plate Spacing Concerns Cited by the NRC

The NRC identified six specific cases of concern involving spacing between anchor and embedded plates. As discussed in section V.A above, such configurations are in accordance with Ebasco design drawings and supporting analyses were conducted on various combinations of Mercury anchor plates butting up against embedded plates. However, a specific evaluation (reference 1) of each of the six identified cases was conducted. The results indicate that the concrete pull-out shear cone capacity is much greater than the design pull-out load.

C. Evaluation of Abandoned Holes Adjacent to Installed Hilti Anchor Bolt

An analysis was conducted that assumed the entire shear cone area of a drilled in expansion anchor was damaged by abandoned holes with a depth extending two inches to the outer edge of the reinforcing bars. The analysis is contained in reference 2 and shows that the shear cone pull-out capacity is greater than four times the allowable.

CAUSE:

The basic cause for this concern was the fact that not all expansion anchor characteristics were specifically delineated on the Mercury inspection checklist.

GENERIC IMPLICATIONS:

This concern has been treated generically. The generic review began with the corrective actions undertaken while Mercury was on-site, and continued through the reinspections that took place after their departure, including the 100% reinspection of N1 installations performed in response to the NRC concerns.

In regard to expansion anchors installed by other contractors, the common interface criteria are the distance between adjacent anchors and the concrete edge distance of anchors. These criteria were site addressed and resolved by the previously mentioned Corrective Action Report and NCR-W3-3316 and were again checked in the LP&L QA reinspection of N1 instrument lines.

SAFETY SIGNIFICANCE:

It is LP&L's position that the Mercury expansion anchor installations are capable of performing their design safety-related function based on:

1) The requirements within SP-666 as well as those requirements provided in the design documents referenced in SP-666.

2) The in-depth review and subsequent field verification and Discrepancy Notice program initiated by Ebasco.

3) The results of the inspection of instrument installations performed per procedure QASP-19.15.

Thus, LP&L believes this issue is not a constraint to fuel load or power ascension.

Attachment 4 provides a matrix overview of the inspections, reinspections and analyses discussed in this response.

CORRECTIVE ACTION PLAN/SCHEDULE:

The Mercury Company is no longer on site and it would be of no positive consequence to revise SP-666 as recommended. However, the installation of expansion anchors for instrumentation continued for any remaining work under the Ebasco Force Account Program utilizing CP-674 (Construction Installation Procedure). This procedures is more in-depth relative to installation techniques and inspection attributes but has been revised to ensure all necessary attributes for expansion anchor installations are explicitly included on the inspection checklists.

The reinspection performed under QASP 19.15 is complete.

ATTACHMENTS:

1) Form 277A to SP-666 Procedure (Blank)
2) Completed form 277A to SP-666 Procedure
3) Results of Analysis of Four Cases of Anchor Plates Adjacent to Embedded Plates
4) Summary of Verifications of Expansion Anchor Characteristics Cited By the NRC

REFERENCES:

1) Report on Attachment 4 to Allegation 4-84-A-06 #110 and #119 (NRC Concern No. 17) 8/20/84.

2) Report on Abandoned Holes Adjacent to the Installed Anchor Bolt 9/11/84.

ATTACHMENT 1

COMPANY OF NORWOOD, INC.

EQUIPMENT INSTALLATION (ANCHORS)

CUST. ORDER NO. W3-NY-15

PROJECT Waterford III

TRIBUTION:

Or.. to: [x] MQC Project Folder

..pleted copies to:

[ ] MQC [x] Customer

[ ] Proj.Mgr. [x] SUS

ITEM INSPECTED: ..R

Location

System Class Seismic Cl. 1

REFERENCES:

Dwg. No.	Rev.	Proc. No. SP-666	Rev.
Dwg. No.	Rev.	Proc. No.	Rev.
Dwg. No.	Rev.	Proc. No.	Rev.
Dwg. No.	Rev.	Proc. No.	Rev.

INSPECTION CHECKLIST	MQC. INIT. ACC	MQC. INIT. REJ	DATE	N/A	REMARKS
1. PROPER INSTALLATION LOCATION					
2. PROPER INSTALLATION EQUIPMENT					S/N:
3. PROPER LENGTH (By ID Mark on Bolt) List leng.					
4.					
5. PROPER THREAD ENGAGEMENT					
8.					
9.					
10. TORQUE TESTING WRENCH NO	X	X	X	X	
VALUE QUANITY					
TENSION TEST TESTER NO	X	X	X	X	
VALUE QUANITY					
11.					
12.					
13. REPAIR OF DAMAGED CONCRETE					
14.					
15.					
16.					
17.					
20.					

FOR INFORMATION ONLY

Installation completed and accepted MQC Date

Form 2771 (12/78)

ATTACHMENT 2

[illegible] OF NORWOOD, INC. [illegible]

EQUIPMENT INSTALLATION (Anchors)

CUST. ORDER NO. [illegible]

PROJECT Waterford III

IBUTION

[illegible]S TO: ☒ MQC Project folder

[illegible]d copies to:

MQC --

Proj. Mgr. ☒ Customer

SUS43H

ITEM INSPECTED: OCR 1678

SUPPORT # 1891-9

ATTACH. NO. NRC CONCERN #17

Location RAB (-4'0)

System

Class Seismic Cl[illegible]

References		Rev.
No.	X23-528 B1A 6-22-83	NA
No.	RC-SK-148	1
No.	NA	NA
No.	NA	NA
No.	NA	NA
No.	4351 034A 6-24-83	

		Rev.
Proc. No.	SP666	8
Proc. No.	NA	NA
Proc. No.	NA	NA
Proc. No.	NA	NA

INSPECTION CHECKLIST	MQC INITIALS ACC.	MQC INITIALS REJ.	DATE	N/a	Remarks
PROPER INSTALLATION LOCATION	RW		6-1-83		
PROPER INSTALLATION EQUIPMENT	RW		6-1-83		
PROPER LENGTH (By ID Mark on Bolt)	RW		6-1-83		
[illegible]st Length.					J - 3/8"
PROPER THREAD ENGAGEMENT	RW		6-1-83		
TORQUE TESTING WRENCH NO TE591	x	x	x	x	
VALUE 35 Lbs QUANTITY 2	RW		6-1-83		
TENSION TEST TESTER NO NA	x	x	x	x	
VALUE NA QUANTITY NA	NA			NA	

[illegible]allation completed and accepted MQC [signature] Date 6-1-83

ATTACHMENT 3

FOR CALCULATIONS AND AMPLIFICATIONS OF RESULTS SEE REFERENCE 16

RESULTS OF ANALYSES OF FOUR CASES OF ANCHOR PLATES ADJACENT TO EMBEDDED PLATES

CASE I: Anchor Plate P-101 Butting Against Embedded Plate P-15.

Pull out capacity of 1/2" Dia.x 5-5/16" Nelson Stud	=	5.3 kips (F.S=2)
Pull out capacity of 1/2" Dia.x 5-1/2" (minimum embedment) expansion anchor	=	3.01 kips (F.S=4)
Total pull out load	=	8.31 kips
Spacing between stud and anchor	=	2-1/4"
Pull out capacity of combined concrete shear cone	=	18.02 kips

18.02 is greater than 8.31 Kips, Hence Case I is acceptable.

CASE II: Anchor Plate P-101 Butting Against Embed Plate P-19

Allowable pull out load on a P-19 plate as per original design.	=	37.3 kips (F.S=2)
Allowable pull out load on two 1/2" Dia.x 5-1/2" (minimum embedment) anchors	=	3.57 kips (F.S=4)
Total pull out load	=	40.87 kips
Spacing between stud and anchor	=	4-1/4"
Pull out capacity of combined concrete shear cone	=	89.01 kips

89.01 is greater than 40.87 Kips, Hence Case II is acceptable

CASE III: P-108 Butting Against Embedded Plate P-37

Pull out capacity of 3/4" Dia.x 8-3/16" Nelson Stud	=	11.94 kips (F.S=2)
Pull out capacity of 1-1/4" Dia.x 9-1/2" (minimum embedment) expansion anchors	=	5.42 kips (F.S=4)
Total pull out load	=	17.36 kips
Spacing between stud and anchor	=	3-1/2"
Pull out capacity of combined concrete shear cone	=	41.34 kips

41.34 is greater than 17.36 Kips, Hence Case III is acceptable

CASE IV: Two Bolt Anchor Plate Butting Against Embedded Plate P-15.

1/2" Dia. Nelson Stud and 1/2" Dia. expansion anchors are used. This Case is similar to Case I. Hence Case IV is acceptable.

ATTACHMENT 4

SUMMARY OF VERIFICATIONS OF EXPANSION ANCHOR CHARACTERISTICS CITED BY NRC

Attribute Cited By NRC	Explicit Checkpoint on Form 277A	Checkpoint via Reference on Form 277A	Allowed by Design (G-896 S02) (See para.V)	Analysis (See para.V)	Reinspected Under CAR 82-3-2 (See para. III).	Reinspection Under ECRRI-1 and 3 (See para. IV).	Sample Reinspection to be Conducted under QASP19.15 (See para. IV).
1. Spacing between adjacent anchors.		X (Checklist Item 1)			X		X
2. Spacing between an anchor and the edge of a concrete surface.		X (Checklist Item 1)			X		X
3. Spacing between an anchor (plate) and an embedded plate.			X (Anchor plate welded to embedded plates)	X (Anchor plate butts up against embeded plate)			
4. Minimum anchor embedment depth		X (Checklist Item 3)				X	X
5. Grouting of unused/abandoned holes in the concrete.	X (Checklist Item 13)			X			
6. Mounting plate size.		X				X	
7. Size of holes in mounting plates.		X				X	
8. Holes distance from plate edges.		X (Checklist Item 1)				X	

RESPONSE

ITEM NO.: 18 (Final)

TITLE: Documentation of Walkdowns of Non-Safety Related Equipment

NRC DESCRIPTION OF CONCERN:

A review of the design and evaluation of the non-safety instrument air piping, tubing, and their supports indicated that the general recommendations of Regulatory Guide 1.29, "Seismic Design Classification" were considered. This non-safety equipment is installed in areas with safety related equipment, such as the containment and auxiliary building areas. From the information provided relative to this system, it is apparent that the potential for system failure was considered in the design.

Also a number of procedures and controls were implemented to further assure that these non-safety related components would not affect safety related equipment. However, the follow-up documentation of the final walkdowns did not list the reviewed equipment in detail and therefore it could not be concluded that the instrument air piping and tubing (and their supports) had been adequately addressed regarding potential physical damage to safety-related equipment.

Therefore, documentation should be provided that clearly shows what equipment was reviewed during the walkdowns and on what bases it was concluded that the installation was acceptable.

DISCUSSION:

A. General

Copies of the documentation generated during each of the initial plant wide walkdowns is provided as Attachments 1 through 5. Attachment 6 has been developed for this response to more readily relate the areas of the plant reviewed during each walkdown.

As indicated in the description of the concern, the potential for failure of non-Seismic Category I equipment was considered in the design of Waterford-3. In Section B of the discussion that follows, a summary description of these design features is presented. The plant walkdowns were then conducted to determine if LP&L's confidence in the adequacy of these features was well-placed. For that reason, the walkdowns were expanded beyond that specifically committed to by LP&L. Because they were confirmatory in nature, the walkdowns were documented on an exception basis, i.e. only interactions of concern or of potential concern were documented. The walkdowns did, in fact, affirm LP&L's confidence in this aspect of the design. The methodology and basis for acceptance is discussed in Section C of this response.

The process of protecting safety-related equipment from the effects of failures of non-Seismic Category I components began by identification of safety-related components on General Arrangement drawings. Decisions were made to seismically support portions of certain non-safety installations, and to route other installations around safety-related components as much as possible. After construction was essentially complete, room by room walkdowns of the safety-related buildings were conducted in which the safety-related equipment in each room was evaluated. The results of these walkdowns affirmed our high level of confidence that the adverse effects of non- Seismic Category I components on safety related equipment was successfully accounted for and precluded in the design.

To provide an additional basis for a judgement of the overall design and the adequacy of these original walkdowns, LP&L has performed additional walkdowns of the instrument air system piping, tubing and supports and of the "A" Shutdown Cooling Heat Exchanger area and the corridor area outside of the Component Cooling Water Pump Rooms. These walkdowns were accomplished using formal LP&L procedures to determine the effects of SSE induced failure on safety-related equipment. A walkdown of the instrument air system was appropriate because it runs through many areas of the plant. The two areas were selected as examples of areas with low and high concentrations of non-seismic components and safety related equipment. No interactions which would adversely affect plant safety were identified during these additional walkdowns. The results are discussed in Section D below.

B. Actions Taken To Minimize the Potential For Non-Seismic Components Becoming Gravity Missiles.

Non-Seismic Category I components (pipe, conduit, duct, instruments and their supports) are designed based on the material allowables. These allowables include substantial margins of load carrying capability before stresses which could cause failure would occur. The following are examples of typical materials used:

MATERIAL	ALLOWABLE STRESS (1)(psi)	MINIMUM TENSILE STRENGTH (psi)
A-36	12600	58000
A-312 Type SA	18700	75000
A-106 Gr. B	15000	60000

(1) These stresses are per ANSI B31.1 at 100°F.

With this conservative base, the following is a general description of the actions taken, by discipline, to prevent SSE induced failures of non-Seismic Category I components from generating missiles that would adversely affect safety-related components.

1. MECHANICAL

The majority of non-Seismic Category I piping is small bore (2" and under). This piping is inherently flexible, of welded construction and typically supported using clamps and U-bolts. These are "positive" type devices which grip pipe and prevent it from falling should it break. In addition seismic analyses have been performed on typical small bore piping runs to ascertain their behavior under SSE conditions. Maximum accelerations were inputted and the magnitude of pipe stresses compared to ASME Section III allowables. The results have shown that the stresses remain well within allowables.

Large bore Non-Seismic Category I lines are of welded construction and generally supported by rod hangers, and rigid restraints (i.e. U-bolts, struts and box type) which will restrain the pipe, limiting the displacement and resulting stresses. As with the small bore piping, a typical large bore line was analyzed to understand what effect the earthquake would have on the pipe stresses. The results showed that the stresses were within the code allowables.

Non-Seismic piping was originally routed to avoid safety-related components as much as possible. For example, the Station Air Piping in the RCB is routed around the perimeter of the building between the columns and the containment pressure vessel to ensure its failure would not affect safety-related components. In some cases where it was not possible to route piping around safety-related components, it was seismically supported. For example, Fuel Pool Cooling Piping in the cooling tower area was seismically supported, as was some Fire Protection piping. During the design phase plumbing and drainage piping was reviewed to determine its potential for effecting safety-related components. Due to its size and presence throughout the plant it was supported in buildings based on seismic spans, utilizing U-bolts and other clamping type devices to hold the pipe.

It should also be noted that on Waterford 3 all non-Seismic Category I piping/support systems, except plumbing and drainage which has received the special consideration described above, are designed and constructed to ANSI B31.1 Power Piping. Data on plants with such systems that have actually experienced earthquakes (ref: Seismic Performance of Piping in Earthquakes, by R. L. Cloud) have shown that B31.1 systems survive maximum ground accelerations as high as 0.6g (six times Waterford 3's SSE) without failure of either the pipe or supporting structure.

Finally, the room by room walkdown discussed in Section C below was conducted to verify the adequacy of the design and installation process in regard to SSE induced gravity missiles.

2. <u>ELECTRICAL</u>

Non-safety related cable trays on the NPIS are seismically supported.

Electrical equipment, including conduit, in the RCB is seismically supported except for some lighting and communications conduit.

Non-safety related conduit in the Reactor Auxiliary Building and Fuel Handling Building in the vicinity of safety-related equipment made maximum feasible use of existing Seismic Category I structures. In cases of non-seismically supported conduit some plastic deformation following a seismic event could occur. However, these would be localized. Gross failure of the conduit is not anticipated, rather the conduit will continue to be supported by the adjoining supports and the cable within.

Finally, the room by room walkdown discussed in Section C below was conducted to verify the adequacy of the design and installation process in regard to SSE induced gravity missiles.

3. HVAC

Based on the general arrangement drawings of safety-related equipment, non-safety related HVAC system ductwork was seismically supported by Seismic Category I supports. This was necessary to prevent its becoming a gravity missile that could impair the function of safety-related equipment. This is indicated by the double cross-hatch on the HVAC Ductwork Support drawings (Ref. HVAC Ductwork Seismic Support Drawings G922S01 thru 28).

HVAC ductwork and equipment in the RCB is seismically supported in the same manner except a portion located in the non-safety containment sump pump area.

Vertical dead weight duct supports on safety-related and non-safety related ducts are designed such that they will not act as gravity missiles.

The original objective of this approach was maintained by an interdiscipline review of design changes using established engineering procedures.

4. CIVIL

Poured walls are Seismic Category 1.

Block walls have been designed and constructed to withstand SSE loads.

Structural steel is Seismic Category I except some miscellaneous items such as handrails, curb plate, grating, ladders, crane rails and hardware. Some miscellaneous platforms (e.g. Reactor Building Platforms at Coolant Pumps) are non-seismic, however, they are designed for SSE to avoid gross failures.

Cranes operated within the NPIS are Seismic Category I.

5. INSTRUMENTATION AND CONTROL

Since the effects of instrument tubing, acting as a gravity missile on safety-related equipment is negligible, the concern is to protect the safety-related tubing from the effects of other potential missiles.

Accordingly, mechanical protection of safety-related tubing is provided by tube tracks. Where tubing comes out of tube tracks at bends and at expansion loops, protection is afforded by channel separation and use of interposing barriers such as walls, columns and structural steel.

Most safety related instruments are protected by placing them in instrument cabinets and maintaining physical separation.

Finally, the room by room walkdown discussed in Section C below was conducted to verify the adequacy of the design and installation process.

C. <u>FIELD VERIFICATION WALKDOWN</u>

The design and installation criteria discussed above provided a high level of confidence that seismically induced failure of a non-seismic components would not impair the functions of safety-related equipment.

In FSAR Question 211.19, the NRC requested that:

> "With regard to gravity missiles, identify all non-seismic equipment located above the reactor vessel, reactor coolant system piping and components, ECCS piping and components, and instrumentation and controls required for ECCS operation or safe shutdown. Provide an evaluation of the consequences of this equipment becoming gravity missiles and any procedures or controls required to prevent adverse consequences from this occurrence."

This request referenced FSAR Section 3.5.1.2 (Internally Generated Missiles Inside Containment) and referred only to the RCB. Accordingly, the response addressed missiles in the RCB. In Section 3.5.1 of the Waterford 3 Safety Evaluation Report, the NRC concluded that the overall program for missile protection of safety-related structures, systems and components was acceptable.

As part of the response to FSAR Question 211.19. LP&L committed to a field verification of the piping in the RCB for exposure to gravity missiles. Although not specifically requested by the NRC, a decision was made to have Ebasco Services, Inc. walkdown the entire Nuclear Plant Island Structure (RCB, RAB, and FHB) and inspect non-seismic installations. This walkdown was coordinated with Construction so that as construction became essentially complete in an area, and complete access provided (i.e., no construction activities, scaffolding, machinery, etc. which might hinder inspection), the walkdown teams performed their inspection.

The walkdowns were conducted on five separate occasions: 9/15/81, 3/16-17/82, 5/26/82, 8/10/82 and 6/6/83. The core inspection team consisted of:

Supervisor, Stress Analysis Group
Lead Piping Engineer

The above individuals are familiar with the seismic design and installation having spent a combined total of 13 years on Waterford 3. They were assisted part-time by the Ebasco Project Licensing Engineer and Assistant Project Engineer. The walkdown was conducted on a room by room basis.

The safety-related equipment in each room was evaluated. The bases for determining that safety-related equipment would not be adversely affected by the failure of non-Seismic Category I equipment included the following:

- Smaller pipes acting as gravity missiles will not damage larger pipes (per the SRP3.6.1 pipe rupture criteria).

- Piping/Conduit up to two inches in diameter, acting as a gravity missile will not damage instrumentation tubing run in tube tracks.

- Piping/Conduit up to two inches in diameter, acting as a gravity missile will not damage instruments in instrument cabinets.

- Swing or whip is not considered when the component falls.

- Intervening barriers such as seismically supported installations and/or structures were considered for their potential to deflect missiles.

- Piping supported by U-bolts and clamps will prevent it from falling.

Since the effects of failure of non-Seismic Category I equipment was factored early into the design, and because of LP&L's confidence in the effectiveness of implementation, it was decided that it would be appropriate to document the walkdown by exception, i.e. by potential adverse interactions.

Each room of the plant containing safety-related equipment was inspected. This included the safety-related portions of instrument air piping and tubing mentioned in the concern. Interactions which could not be evaluated on the spot were photographed and subjected to further evaluations. The areas inspected and the evaluations were documented by Ebasco. (See Attachments 1-5). Although the FHB walkdown is not referred to in the attached memoranda, it was in fact inspected. The FHB has a limited amount of non-safety, non-seismic installations and no adverse interactions were found. The results of the walkdowns confirmed that LP&L's confidence and the nature of the walkdowns was appropriate.

The rooms and safety-related equipment reviewed during the walkdown are shown in the attached general arrangement drawings. The results of the walkdown performed by Ebasco were officially transmitted to LP&L via Attachment 7.

D. ADDITIONAL INSTRUMENT AIR AND AREA WALKDOWNS

As described in Section C above, the plant walkdowns were documented on an exception basis. In order to provide an additional basis for judging the adequacy of these walkdowns, two additional walkdowns were conducted. They were performed in accordance with formal LP&L Project Management procedures (references 1 and 2). In contrast to the original walkdowns, these procedures required documentation of all cases where potential adverse interactions, as defined in the procedures, were identified. These cases were then formally evaluated against the specific acceptance criteria delineated in the procedure. Those cases that did not fit this specific acceptance criteria were subject to further evaluation.

The first additional walkdown conducted was of the Instrument Air (IA) System. It consisted of all IA piping, tubing and supports in the NPIS. It was performed in accordance with procedure PMP-313 Rev. 0 (reference 1). No adverse interactions were identified, and consequently no rework was required.

The second additional walkdown was of the Shutdown Heat Exchanger Area A (SDHX A) and the area outside the CCW Pump rooms. It was performed in accordance with procedure PMP-314 Rev. 0 (reference 2). These areas were selected as examples of areas of low (SDHX A) and high congestion (CCWP Rooms). No adverse interactions were identified and consequently, no rework was required.

It is LP&L's belief that these walkdowns provide further evidence that the potential effects of non-seismic Category I components acting as gravity missiles during an SSE were adequately considered in design. They also support LP&L's high degree of confidence that the original plant wide walkdowns, lthough not documented to the same extent as these, were thorough.

Documentation on the results of these walkdowns is available for NRC review.

CAUSE:

No deficiency exists. Waterford-3 adequately met its commitment in the response to FSAR Q211.19 to conduct a verification walkdown. Consideration of the effects of failure of non-seismic components on safety-related equipment was factored into the original design and installation. In view of this, it was considered appropriate to conduct the walkdown in the manner described.

GENERIC IMPLICATIONS:

As discussed above, non-seismic installations were considered in the original design and installation. In addition, the walkdown considered the vulnerability of safety-related equipment in each area. There are no generic implications.

SAFETY SIGNIFICANCE:

LP&L recognizes that the record keeping requirements implemented for the initial plant wide walkdowns did not allow a demonstration of how issues had been dispositioned unless corrective action had been taken. It is believed however, that the documentation showing multiple walkdowns by experienced personnel, the inherent protection provided by the design criteria, and the results of additional walkdowns recently completed are sufficient to demonstrate with reasonable assurance that the quality of design and construction is sufficient to provide protection to the public health and safety during any mode of plant operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

As a result of the NRC concern, LP&L has performed an additional walkdown of the Instrument Air System, and of two specific areas in the RAB. These are described in Section D of DISCUSSION. The results are available for NRC review.

ATTACHMENTS:

1. Memorandum: D. J. Lott to J. P. Padalino (530/198) dated 11/13/81
2. Memorandum: D. J. Lott to J. P. Padalino dated 4/2/82
3. Memorandum: D. J. Lott to J. P. Padalino (530/508) dated 6/3/82
4. Memorandum: D. J. Lott to J. P. Padalino (530/587) dated 8/12/82
5. Memorandum: D. J. Lott to J. P. Padalino (530/959) dated 7/1/83
6. General Arrangement Drawings showing rooms inspected.
7. Ebasco letter to LP&L, LW3-965-83 dated 7/1/83

REFERENCES:

1. Project Management Procedure: Evaluation of Instrument Air Piping/Tubing/ Supports Potential to Damage Safety-Related Components (PMP-313 Rev. 0, dated 8/23/84).

2. Project Management Procedure: Non-Seismic Over Safety-Related Area Walkdown (PMP-314 Rev. 0, 9/6/84).

EBASCO

Interoffice Correspondence

DATE: November 13, 1981 FILE REF.: 530/198

TO: J P Padalino OFFICE LOCATION

FROM: D J Lott DJ OFFICE LOCATION

SUBJECT: LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES UNIT NO. 3
FSAR QUESTION 211.19
"NON-SEISMIC PIPING OVER SAFETY-RELATED COMPONENTS"

Attachments:
1. Copy of subject FSAR question 211.19 and response.
2. J Damitz to D J Lott, dated September 28, 1981
3. RCB Walkdown Results
4. "Seismic Performance of Piping in Past Earthquakes" by R L Cloud

The subject question (See Attachment No. 1) was received and responded to in the summer of 1980. It is specifically concerned with non-seismic components (pipe, hangers, conduit, lighting, steel, tubing, etc.) falling on safety-related components and the resulting effect. This question was only concerned with the RCB. (SRP section reference, 3.5.1.2, deals only with the RCB).

Since that time, the Question and response have been a source of concern to Construction (CIL I, Item No. 1) and has resulted in several meetings, memoranda and much discussion as to exactly how to proceed with the verification, people required, how the results should be documented and what we need to provide to the NRC.

On September 9, 1981, J Tompeck, J Hart, J Horvath, J Damitz and D J Lott discussed the question and decided on the following course of action:

1. J Damitz was in the process of analyzing a large Heater Drain line with existing supports to determine resulting pipe wall stresses due to an earthquake. (Analysis was requested in D J Lott memo, 530/075, dated 8-19-81 to J Damitz).

2. J Damitz was in the process of analyzing two different cases of 2 inch and under, non-safety, non-seismic piping to determine resulting pipe wall stresses due to an earthquake. These cases involved Extraction Steam and Demineralized Water piping. (Analyses were requested in D J Lott memos 530/083 & 093, dated 8-31-81 & 9-2-81 respectively to J Damitz).

3. It was decided that since the question was only about the RCB, we would only consider the RCB at this time.

4. J Damitz would, if specific cases arose (as a result of the walkdown, See No. 5 below), analyze real cases with actual support configurations to prove that resulting stresses (with earthquakes considered) are within ASME Section III allowables.

5. A walkdown of the RCB would be performed. Results would be documented in the project files as proof of our "verification" committed to in the question response. There are no requirements for an additional response to the NRC.

Attachment No. 2 is a memo from J Damitz to D J Lott (dated 9-28-81) outlining the results of the analyses. (See action items 1 and 2 above). Conclusions are:

- the large-bore Heater Drain line is overstressed (i.e., stresses exceed the yield point of the material)
- the small bore Extraction Steam and Demineralized Water lines are within ASME Section III allowables.

These analyses serve only as a "benchmark", they are not specific cases of problems but rather were performed to better understand expected results should specific cases be identified. In some respects (ex. "g" values chosen) these analyses are conservative.

On September 15, 1981, J Damitz, J Tompeck, J Hart and D J Lott walked throughout the RCB looking for cases where nonseismic piping ran over safety-related components. Attachment 3 contains the four data sheets we put together covering all the cases found. Later review by appropriate personnel (see each data sheet) verified that the safety of the plant will not be impaired should this piping fall. However, there were one or two areas in the RCB which were very crowded with scaffolding and were difficult to review. In addition, Construction has pointed out that 2-½-inch and under, nonsafety, nonseismic piping inside the RCB is currently only 60 percent complete. For these reasons, plus the fact that more safety-related tubing and conduits will be installed, an additional walkdown will be required at some later date. We anticipate this would be some time in early 1982.

In addition to reviewing the pipe, we also addressed the lighting and communications conduits which are not seismically supported (see response to question, Attachment No. 1). We saw no cases where these components could fall and damage a safety-related component.

The walkdown described provided positive verification that the design of piping in relation to other safety-related components, in the RCB, satisfactorily precludes concerns about non-safety, non-seismic piping falling and damaging safety-related components. In addition, there are other practical considerations which should be emphasized with the NRC should further questions be raised. These include:

1. "Seismic Performance of Piping in Past Earthquakes" by R. L. Cloud (Attachment No. 4). This report summarizes the effect of earthquakes on B31.1 designed, supported piping in both fossil plants and a nuclear generating station. This report supports the contention that B31.1 designed, supported piping and components will not fail, fall or disintegrate.

2. Per 10 CFR 100 Appendix A (V.(2).(1)(v)), the lowest permissible seismic acceleration used for design shall be 0.10g. This value, 0.10g, is approximately twice the maximum earthquake which has occurred in the site's tectonic province during the past 250 years. (See FSAR section 2.5.2.6).

3. Small bore piping, routed and supported by Tompkins-Beckwith has utilized designs such as U-bolts and clamps which grab the pipe and will not allow it to slide through. This "positive" type device precludes the possibility of the pipe falling even if it should crack or fracture.

4. Stress Analysis results for 2 inch and under piping show (prove ?) that small bore piping is inherently capable of withstanding other loads even though not specifically designed for those loads.

5. Most non-safety, non-seismic piping inside containment is routed between columns and the containment pressure vessel. This limits (restrains) the piping from falling on safety-related components since most are located between the columns and the secondary shield wall.

On September 16, J Hart, J Damitz and D J Lott met with W Yaeger to discuss the walkdown results. Construction is essentially satisfied that the RCB does not represent a significant exposure to rework as a result of the question and that another walkdown of the RCB is necessary sometime in early 1982.

Of more concern is the RAB. We pointed out that the question posed by the NRC is not concerned with the RAB and that review of the RAB is not mandatory. However, we all agreed that reviewing the RAB would be prudent. Our approach will be as follows:

- Construction is to identify area by area those parts of the RAB which are essentially complete and develop a schedule for the balance.

- Walkdown RAB, room by room using Fire Protection SSD (Safe Shutdown) listing as an aid for identifying essential equipment.

- New York office personnel (i.e., J Damitz and D J Lott plus others) to perform and document walkdown. Input from ESSE as required.

- Documentation to be similar to that contained in Attachment No. 3 to this memo.

- Walkdowns to be completed by end of first quarter of 1982. (Based on current schedule).

Copies of this memo and attachments plus updates to the RCB walkdown and RAB walkdown results will be maintained in the following files: Mechanical, III-P-1, Licensing, C211.19 and Project 14Q-C-5A.

Please advise of any questions or comments on the above.

DJL:dad
Attachment

cc: J Tompeck
J Hart (w/a)
J Damitz (w/a)
J Horvath
M Horrell
W Yaeger
J DeBruin
R Milhiser
R Rein
C F M Trapp
D J Lott (w/a)

ATTACHMENT 1

Question No.

211.19 (3.5.1.2) Provide a discussion of credible missiles generated as a result of direct or ricochet impact with primary missiles and potential gravity missiles as per the requirement of SRP Section 3.5.1.2 (Rev 1). With regard to gravity missiles, identify all non-seismic equipment located above the reactor vessel, reactor coolant system piping and components, ECCS piping and components, and instrumentation and controls required for ECCS operation or safe shutdown. Provide an evaluation of the consequences of this equipment becoming gravity missiles and any procedures or controls required to prevent adverse consequences from this occurrence.

Response

In accordance with the requirements of SRP Section 3.5.1.2, "Internally Generated Missiles (Inside Containment)," credible primary missiles are identified in Table 3.5-4. This table also identifies the structure, or the shield wall, which contains the potential missiles within the confined area to prevent damage to the safety related equipment. Any secondary missiles generated by impact with the primary missiles are also contained within the identified shield walls and structures.

The following design criteria, procedures and controls have been implemented to avoid damage to safety related equipment from potential gravity missiles inside the containment.

1) Structural steel inside the containment is designed for the SSE.

2) Electrical equipment including cable trays and conduit inside the containment is seismically supported except for lighting and communications conduit. A verification will be performed in the field to ensure that it does not endanger safe shutdown equipment.

3) The only H&V duct inside the containment not seismically supported is located in the containment sump pump compartment (not the SIS Sump), in which there is no safety related equipment. All other H&V ducts and equipment are seismically supported to prevent gravity missiles.

4) Non-seismically supported piping has been routed away from safety related equipment. A verification will be performed in the field after installation of equipment and piping.

Reference

No FSAR change was made.

ATTACHMENT 2

September 28, 1981
FILE: 13-S-E

TO: D Lott

FROM: J M Damitz J M Damitz

SUBJECT: LOUISIANA POWER AND LIGHT COMPANY
WATERFORD SES UNIT NO. 3
NON-SEISMIC LINES OVER SAFETY RELATED COMPONENTS
NRC QUESTION 211.19

REF: (1) D J Lott memo 530/075 dated August 19, 1981 to J Damitz
(2) D J Lott memo 530/083 dated August 31, 1981 to J Damitz/O Puri
(3) D J Lott memo 530/093 dated September 2, 1981 to J Damitz/O Puri

In response to the above referenced memos, the attached analyses are the results of your requests and are for your information and files.

The following is a summary of the analyses:

The first analysis was performed on a 12 inch Heater Drain line which was picked randomly. On this particular calculation there were two rigid rod hangers and four variable springs. The "g" values for the RAB elevation 69 feet were used to perform a static analysis on this piping. The results indicated that the stresses developed in the piping went beyond the yield point of the material.

The second analysis, Calculation 2875 was performed on B31.1 Extraction Steam 2 inch and under piping which was transmitted in Reference 2. The "g" values from the RAB at elevation 100 feet were used in the static analysis. The results indicate that the stresses under Equation 9 remain within 33% of the allowable.

The third analysis, Calcualtion 2874 was performed on B31.1 Demineralized Water 2 inch and under piping which was transmitted in Reference 3. The "g" values from the RAB elevation 100 feet were used in the static analysis. This results in stresses which are within 24% of the allowable for Equation 9.

I believe this indicates that for 2 inch and under piping we would be able to seismically qualify it if it was necessary with minor modifications. If you have any questions or require any additional information please contact me.

JMD/jt
Attach

cc: J Padalino
J Tompeck
J Z Horvath
M Horrell
J Hart
O Puri
File

ATTACHMENT 3

EBASCO SERVICES INCORPORATED

NEW YORK

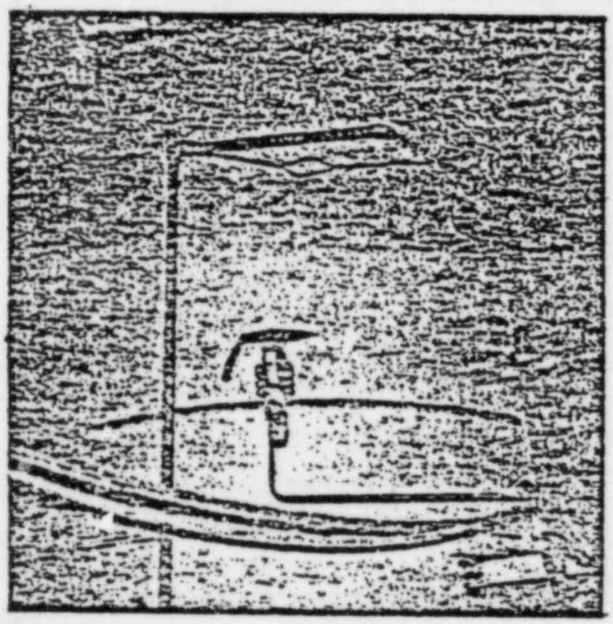
BY DJLott DATE 9-16-81 SHEET ___ OF ___

CHKD. BY ________ DATE ________ OFS NO. ________ DEPT. NO. ________

CLIENT LP & L

PROJECT Waterford SES Unit No. 3

SUBJECT RCB Walkdown - Problem I.D. #1



F1

Problem Identification: 1" ϕ line from top of [illegible] fitting to [illegible] tubing. Supports still need to be installed on line ZSI-Y609-4 (valve shown)

Location: SE [illegible] 2A, +46.0'

Line is CN21-50 see [illegible] 30071 (drain and valve bypass [illegible] by [illegible] dry pot)

Resolution / Change Req'd:

Valve shown as [illegible] supplied [illegible] valve for PE 322 & 332

Need to verify supports in later walk down, probably [illegible]

EBASCO SERVICES INCORPORATED

NEW YORK

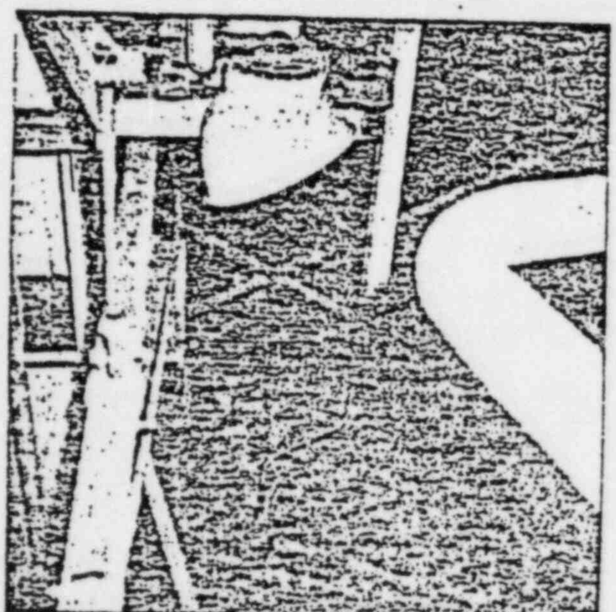
BY DJL DATE 9-16-84 SHEET ___ OF ___

CHKD. BY ___ DATE ___ OFS NO. ___ DEPT. NO. ___

CLIENT LP&L

PROJECT Waterford SES Unit No. 3

SUBJECT RCB Walkdown - Problem I.D. #2



Problem Identification: 2"Ø FP line over Instr. cabinet. [illegible] line supported by Rods only. Box under line labeled "Small Box"

Location:

@ Col. 5 El. +21.0

Resolution / Change Read:

Cabinet is safety-related. Contains 1 of 4 S.G. Pres. & Level inst. channels. (PT-MS-1022D and LT-FW-1123D). Pipe probably would not hit tubing should it fail. In any event, cabinet is one of 4 completely redundant channels, other channels would not be affected, therefore loss of cabinet would not affect shutdown capability.

EBASCO SERVICES INCORPORATED

NEW YORK

BY D.J.Lott DATE 9-16-91

CHKD. BY ______ DATE ______

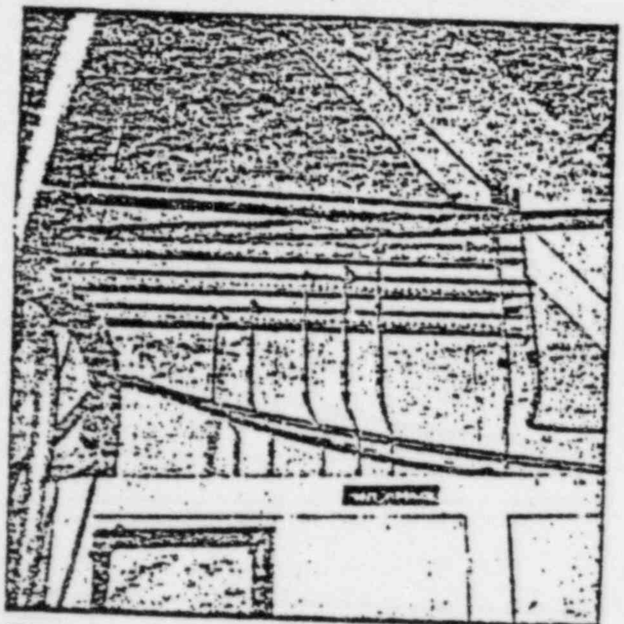
SHEET ____ OF ____

OFS NO. ______ DEPT. NO. ______

CLIENT LP & L

PROJECT Waterford SES Unit No. 3

SUBJECT RCB Walkdown - Problem I.D #3



#3

Problem Identification: 2"Ø FP line on R.L. running down & over fire lines & Cabinet "C-9". Same line as problem #2

Location: Between Col 6 & 7 @ +21.0'

Resolution / Change Reqd.: Per QA eng. [illegible] Instr. Cabinet is non-safety-related, therefore no problem. — This was verified by I&C.

EBASCO SERVICES INCORPORATED

NEW YORK

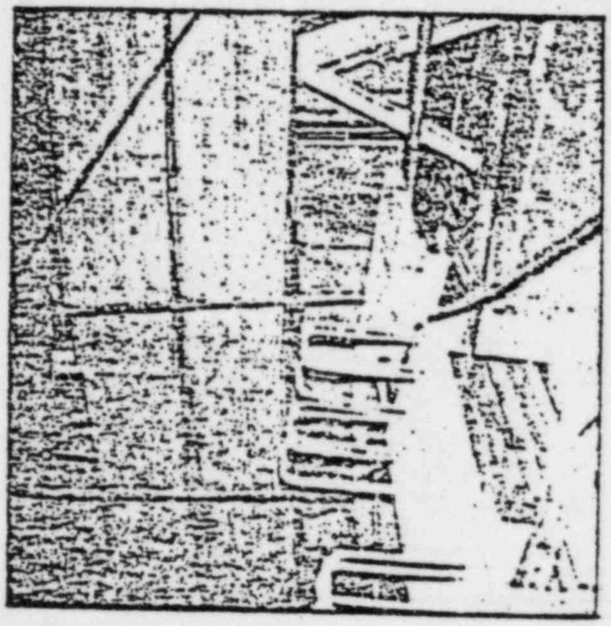
BY D J L DATE 9-18-81 SHEET ___ OF ___

CHKD. BY ___ DATE ___ OFS NO. ___ DEPT. NO. ___

CLIENT LP & L

PROJECT Waterford SES Unit No. 3

SUBJECT RCB Walkdown - Problem I.D #4



#4

Problem Identification: EFP3-43 Could perhaps fail and hit I&C lines, exp. loops and possibly cabinet C-6B (Note, FP line is above & behind exp. loops in picture) (Cabinet in pic. is C-6B, C-6A right next to it has same problem)

Location: -4.0 @ Col. 7, background wall is secondary shield wall

Resolution / Change Reqd: Per GA G-147, these cabinets are non-safety related, therefore no problem for either of the above cases. This was verified by I&C.

ATTACHMENT 4

SEISMIC PERFORMANCE OF PIPING IN PAST EARTHQUAKES

Robert L. Cloud[1]

The seismic performance of power piping can be examined in two ways. What may be expected due to the intrinsic characteristics of the piping that are built in due to design and construction practice? A second approach is to examine the performance of comparable piping in past earthquakes. In the following pages both questions are addressed.

ANSI B31.1 Code

In the United States, power piping in general is designed to meet the requirements of the ANSI (formerly USAS) B31.1 Code for Power Piping. For the present discussion, the 1967 version of this code with supplements are the issues of concern. There was little or no basic change in B31.1 between the 1967 and 1955 versions. The 1955 version, however, was a major departure from the previous issue of 1942 and supplements. In fact it was in the 1955 version of B31.1 that the basic rules and technical philosophy were established for the design of power piping that are in the main and under different labels still in use today.

The advanced features and underlying technical sophistication of the B31.1 Code have gone relatively unnoticed in this era of rapid technical change and innovation. The B31.1 approach first established in 1955 contained design rules for low cycle fatigue, incorporated the maximum shear stress theory, and contained other improvements. The ASME Boiler and Pressure Vessel Code contained none of these features at that time. In fact it was not until the Nuclear Vessel Code came out nine years later in 1964 that these technical improvements were applied to pressure vessels.

[1]Robert L. Cloud Associates, Inc.

The fundamental basis of piping design lies in developing a system that has the correct flexibility and, at the same time, is sufficiently well controlled. The concept of controlled flexibility is the key to successful piping design. The Code recognizes this with an entire section devoted to piping flexibility. The approach can be seen from the following, quoted from paragraph 119.5 of the Code:

> Power piping systems shall be designed to have sufficient flexibility to prevent pipe movements from causing failure from overstress of the pipe material or anchors, leakage at joints, or detrimental distortion of connected equipment resulting from excessive thrusts and moments. Flexibility shall be provided by changes of direction in the piping through the use of bends, loops or offsets; or provisions shall be made to absorb thermal movements by utilizing expansion, swivel or ball joints or corrugated pipe.

Explicit guidance is given to obtain balanced systems and to avoid problems of strain concentration caused by uneven flexibility. In this connection the concept of elastic followup is discussed. Design configurations vulnerable to strain concentration are explained and cautioned against.

The basic importance of the fact that piping operates in a strain range due to thermal expansion is recognized and explained. It is the strain range that is limited by the Code even though the limitation appears as a limit on calculated stress. Since piping in the thermal expansion process is in a strain controlled loading situation, the magnitude of the strain range can be controlled by a pseudo-elastic stress calculation. This subtle concept

was later adopted by ASME Section III.

The phenomena of low cycle fatigue is addressed in the design of B31.1 piping systems also. The basic allowable value of expansion stress is multiplied by a factor f which is related to the number of stress cycles. The factor functions as an allowable stress reduction factor due to fatigue service. The values of f are given below, where N is the number of stress cycles.

N	f
7,000 and less	1.0
7,000 to 14,000	0.9
14,000 to 22,000	0.8
22,000 to 45,000	0.7
45,000 to 100,000	0.6
100,000 and over	0.5

The stress range reduction factors are based upon tests of full size pipes made by Markl (1). Not only is the basic fatigue process considered, but also the deleterious effect on fatigue strength of various fittings, elbows, tees, etc. This is accomplished by a requirement to multiply the basic components of the expansion stress by " stress intensification factors" denoted by i. The numerical values of i were also derived from full scale tests and are given in the Code. The stress intensification factor bears only a nominal relation to the stress concentration factors of elasticity, rather i for a given fitting is related to the ratio of the fatigue strength for the fitting to that of straight pipe. It is in fact a fatigue strength reduction factor.

These various fatigue considerations have been condensed and codified in apparently simple terms; but it is important to keep in mind that the approach has a basis in full scale testing and where simplifications have been made they are conservative. It is also true that

today with apparently inexhaustible computer resources
ailable, a single piping system is an extraordinarily
plex structure and there are hundreds of piping systems
a power plant. It can be seen the simplifications are
t only desirable, they are necessary.

Although an evidently straight forward consideration,
e use of the shear stress instead of the normal stress
is worth mentioning. The advanced technical nature of
B31.1 can be better understood when it is realized that
e widely accepted Boiler and Pressure Vessel Code used
e less accurate maximum principal stress up until 1964.

The tabulated value of allowable stress in the hot
dition is S_h. In B31.1, S_h is based on the lower of
Yield Strength or 1/4 Ultimate Strength at operating
perature, except certain austenitic materials are
mitted S_h values at temperature up to 90% of yield
ength because of the greater toughness and ductility
these materials. These values of allowable stress are
lowest in use for any piping in the United States.
lear piping has higher allowables, as does B31.3
finery and Chemical Plant Piping. B31.4 and B31.8
Gas and Oil Transmission piping respectively permit
wable stresses up to 72% of the ultimate strength.
n nuclear plant piping was moved under the aegis of
f Section III, the safety Class 1 and 2 continued to be
igned by B31.1, however, the allowable stress for the
ted plant condition was raised to 2.4 S_h from 1.8 S_h.
ion is made of certain of these facts as an observa-
of the conservative nature of the B31.1 Code even
n compared to other codes that use the same calcula-
al basis.

B31.1 and Later Codes

The first version of the B31.1 Code was published in 1935, and a revised second edition was published in 1942. Then a third edition was issued in 1951. This was a period of rapid development in piping design methods and it was found desirable to publish another revised edition of the Code in 1955. A brief history is given in the foreword to the 1955 edition of B31.1. What is not mentioned there, however, is that the 1955 edition of the piping code had several far reaching engineering improvements, which have been mentioned earlier herein.

The development of the 1955 edition and some of the changes therein are discussed in (2). Subsequently, new editions have been published, and although there were a number of changes and minor revisions, no new concepts were introduced.

In 1969 the ANSI B31.7 Code for nuclear piping was first published. The basic philosophy of this code was to have nuclear primary system piping designed to similar criteria as nuclear primary system vessels. This required B31.7 to adopt similar approaches to the different possible types of failure and provide comparable margins as Section III of the ASME Code. The modes of failure for which protection is provided explicitly by the stress analysis and evaluation procedures of Section III are bursting, excessive plastic deformation, progressive distortion, thermal and mechanical fatigue failure. Of course other possible types of failure are considered in other areas of the Code, specifically in materials selection and fabrication guidelines.

The obvious approach to develop a piping code comparable to Section III for vessels was to attempt to adapt

0.25 g. Damage in Long Beach itself was very extensive, but there were no actual accelerometer records of the earthquake.

At the steam station site there were actually three independent plants. Plant 1 consisted of one unit and was built in 1911. It was either out of service or in intermittent service in 1933 and the building was severely damaged in the earthquake. Plant 2 consisted of 2 units and was built in 1922. Plant 3 consisted of 3 units and was built in 1928. This and subsequent information was obtained from W. F. Swiger [4] of the Stone & Webster Engineering Corporation, designers and builders of the plant. For other reasons it was necessary to re-examine the design of the plant at a later time and it was determined the plant structures were designed for lateral static forces of 0.2 g. Foundations of both plants were heavily reinforced concrete mats supported by wooden piles 3 to 60 feet long driven to hard sands. No information is available on seismic design of the piping and equipment, but considering the state of the art it is probable that either the 0.2 g static design was used, or else seismic design was not considered.

Neither plant, that is to say, none of the five units, suffered any significant damage. Some minor damage such as to lighting fixtures was reported, however the steam plants either operated through the earthquake or were shut down due to loss of load and were back in operation the same day. The important point is that 5 steam units designed with at most static methods to a g level (0.2) probably lower than actually experienced (0.25) was undamaged and in particular, no piping was damaged.

Kern County Steam Station

This oil fired 60 MW steam plant was designed and built in 1947-8. It is located on the Kern River near Bakersfield, California, about 25 miles from the epicenter of the July 21, 1952 Kern County earthquake.

This earthquake, sometimes referred to as the Taft, the Tehachapi, or the Arvin-Tehachapi, was of magnitude 7.7. It was the most severe earthquake recorded in the continental United States since that of 1906 in San Francisco. It occured along the White Wolf fault south and east of Bakersfield. Damage was extensive in Bakersfield and to oil production facilities in the area and to the Southern Pacific Railroad. The railroad tunnel near Bealville crossed the fault and was destroyed [5].

The structures of the plant were designed for 0.2 lateral load on a static basis with stress limits increased by 0.33 for combined dead, live, and earthquake loadings. Foundations are soil bearing footings at shallow depth. Anchorage systems of all major equipment including switch gear were carefully reviewed for resistance to lateral loads.

This is one of the first electric power plants to have piping designed by dynamic analysis. The Biot [6] smoothed response spectrum was used for the design of the main steam and boiler feedwater piping. The response spectrum was normalized to 0.1 g at ground level and 0.3 g at the top floor of the buildings, with linear interpolation at other levels. In this way an amplified response spectra was available at every floor, even though it was of narrow band and heavily damped compared to spectra used for nuclear plants. The spectra was applied for the steam and feed lines by calculating the first natural frequency of each span of pipe considered as a simply supported beam, then applying the appropriate lateral g forces. Based on the dynamic analysis of the main piping, -static g loads were developed for other piping systems. These loads were also used to design guides and stops and to find loads acting on the supporting structure. It is of interest to note that some guides and stops on the main steam line had gaps or rattle space of as much as two inches (5).

An acceleration record obtained at Taft, California was further from the epicenter than the Kern County Plant. Maximum acceleration recorded at Taft was 0.17 g and it is estimated that ground acceleration at the plant site was a substantial 0.25 g. The plant operated through the earthquake with no significant damage. It was shut down after the earthquake due to loss of load but was returned to service in a few hours. There was some minor damage to oil tank seals and a small house turbine thrust bearing, but no damage at all to piping systems. This is a clear example of the almost complete seismic protection that is provided by even the most rudimentary seismic design procedures (by today's standards). Of course, there was an greater inherent reserve in the piping systems due to their natural controlled flexibility.

The Alaska Earthquake of 1964 --

This earthquake of 8.4 magnitude was the largest recorded earthquake of modern times. It was centered east of the city of Anchorage, near the town of Valdez. There was widespread destruction throughout the area, not only from earth vibration, but from the tsunami, failure of poor soils, and fire.

In a panel discussion on the Nuclear Piping Code, some observations were noted of piping behavior by an experienced

piping engineer with a leading Architect/Engineer (7) who reviewed the damage at two power stations immediately following the earthquake. The power station at an air base in the earthquake zone had no damaged piping although there were some "bent hanger rods", damaged lighting fixtures and an overturned control panel due to absence of anchor bolts.

A second power plant in the earthquake zone incurred more damage to the plant, although there were no piping failures. There were failures of some equipment supports made of malleable iron, and an ash handling line connected with patented couplings is reported to have failed due to improper support.

The significant finding of the observations of reference (7) is that two power plants rode out the Alaska Earthquake with no failures of the piping, even though the exact g levels at the sites were not reported and the design basis was not given other than to say "very little was done in the way of seismic design for the protection of anything" (7).

A brief mention is made in reference (5) of the Chugach Electric Company plant in Anchorage. This fossil fueled plant of about 50 MW was built between 1949 and 1957. The plant was designed to 0.1 g by the Uniform Building Code. The buildings were of steel frame construction with corrugated panel walls. There was no damage in the turbine room nor to piping and critical equipment. There was minor damage in the boiler room consisting of bending of some bracing members and appreciable damage to framing supporting the coal bunkers. Many piping hangers on the main steam lines were broken, but the piping itself was undamaged. The plant was returned to service at full power in less than 10 days.

34

The consulting firm of Ayres and Hayakawa of Los
... les was asked to review all non-structural damage to
...uildings due to the Alaska Earthquake as part of the
...nvestigation performed by the National Academy of Sci-
...ences at the request of President Lyndon Johnson." In
...their report (8) power plants were not discussed separ-
...ately. rather observations of piping systems of all types
...were discussed on a generic basis. The discussion is
...ased on a study of large modern structures located.
...ith few exceptions. in Anchorage.

The reference report addresses general piping systems
... all types. but mainly that required in modern buildings.
...with the exception of certain fire protection piping. none
...s seismically designed. Because of the broad basis of
...e report. the following paragraph is quoted directly
...m the section entitled "Piping Systems".

> The overall damage to piping systems was surprisingly low. Many instances were reported where piping systems remained intact. despite the significant structural and nonstructural damage suffered by the building. For example. the plumbing pipes in the Enlisted Men's Service Club at Fort Richardson remained standing after the earthquake although the walls around them collapsed. Contractors also reported that most systems were put back into service when pressure-testing revealed no leaks.

The general conclusion was that piping systems are
...ically earthquake resistant. Failures occur if at
... at threaded fittings. Welded steel pipe does not
...il. One instance of power piping failure was noted.
...all steam pipe drain lines anchored to building walls
...re torn from the steam line as it responded to the
...rthquake at the Fort Richardson power plant. This is

the type of unbalanced design warned against in the piping code. Properly detailed systems had no problems.

San Fernando, California, 1971

The San Fernando Earthquake of 1971 was centered in the northern part of the San Fernando Valley. Ground accelerations of 0.1 to 0.19 g were recorded in Los Angeles at distances of 35 Km and 0.37 g at Lake Hughes. 25 Km from the epicenter. Figure 2 shows recorded g levels for the 1971 earthquake at various locations near Los Angeles. There was severe damage to a number of structures in the valley.

The Valley Power Plant is a fossil fuel plant with three units on the site located about 5 to 9 miles from the epicenter. Accelerations at the site are estimated to be in excess of 0.25 g based upon the location of various recordings. The station was designed to 0.2 or 0.25 g although actual details are not known.

In any event there was no damage to the plant. It was tripped off the line by action of sudden pressure relays and loss of load. but was back on the line inside 2 hours (9). There was significant motion of the piping and seismic hold down bars came into play (10). but other than insulation the piping itself was undamaged. This is a graphic example of the basic point that well designed piping to regular commercial practice is highly resistant to earthquake damage.

There were other power plants in the area at Playa del Rey. San Pedro and Seal Beach that were not as close to the epicenter as the Valley Plant and none of those were damaged. The San Fernando Power Plant is an old hydro plant built in 1921 and there was a structural failure the building which led to a penstock failure. There were numerous failures of electric transmission facilities due to cracking of porcelain bushings and movement of poorly anchored equipment. There were no piping failures in the San Fernando Earthquake.

Managua, Nicaragua, 1972

An earthquake of magnitude 7.5 struck Managua on December 25, 1972. There was much damage and great loss of life. The loss of life was largely unrelated to damage of industrial buildings and facilities since the earthquake occurred near midnight. A report on the damage was sponsored by the National Science Foundation and several professional societies together with the Ministry of Public Works of Nicaragua (11).

Figure 3 taken from (11) shows the fault lines along which movement occurred running through the city of Managua. The location of two industrial facilities, the ESSO refinery and the ENALUF Power Plant are also noted. The earthquake response of these two facilities will be discussed since they contain industrial piping systems of interest for present purposes.

A complete accelerograph record was obtained at the ESSO refinery. The peak measured accelerations was 0.39 g E-W and 0.34 g N-S. The design of the refinery met provisions of the Uniform Building Code for 0.2 g, including tall fractionating towers, some of which exceed several hundred feet. There was almost no damage at the refinery and none to the piping systems. Some piping jumped out of saddle supports and was pushed back into place. The facility was shut down for an inspection but was operating at full capacity within 24 hours even though there was a loss of offsite power. The refinery

provides a clear example of the seismic capacity of welded steel pipe.

Based on the earthquake magnitude, acceleration record at the refinery and the location of the ENALUF Plant immediately adjacent to the causative fault, it is probable this plant experienced accelerations on the order of 0.6 g. The power plant consists of three oil fired units, one of 50 MW and two of 20 MW. All three units were taken off-line by protective relays. The plant suffered some damage but none to the piping systems. It was one of the first industrial facilities restored to service after the earthquake. One unit was operating in two weeks, the second in three weeks. Operation of unit 3 was delayed due to turbine problems.

The specific damage to the three units is listed in Table 3. Note that no damage occurred to the piping, and that many of the problems resulted from absent or inadequate anchors. For example, turbine bearings were lost because emergency D.C. oil pumps were inoperative due to the batteries tumbling out of their racks.

The basic facts about the power piping however are that with unknown and probably no seismic design applied, the piping sustained accelerations on the order of 0.6 g ground motion with no failure. Modern welded steel piping with built in controlled flexibility is inherently highly resistant to earthquake damage.

Miyagi-Ken-Oki, Japan, 1978

The Miyagi-Ken-Oki or Miyagioki earthquake occurred on June 12, 1978 in the northeastern part of Honshu, main island of Japan. It was of magnitude 7.4 and the epicenter was located just offshore about 100 km, nearly due east of the modern city of Sendai and at a depth of 40 km. This earthquake was well characterized because of the many strong motion accelerograph stations in Japan. Fig. 4, taken from reference (12) shows the epicenter, the locations of the city of Sendai, the Fukushima Nuclear Power Plant, and several accelerograph stations.

This severe earthquake caused widespread damage in Japan. Approximately 20 km of earthen river dikes were damaged due to soil liquefaction and subsequent slumping, cracking, and settlement. Several thousand landslides and rockslides occurred both on natural slopes and artificial fill. In the modern city of Sendai, with a metropolitan area population of over one million, damage appeared to be confined to local areas, evidently related to soil conditions. Of particular importance was the fact that engineered high-rise buildings up to 18 floors that experienced 0.25 g at ground level (measured) suffered no serious damage. Several smaller, less well engineered buildings were badly damaged.

The Fukushima Nuclear Power Plant complex south of Sendai had five operating BWR plants and one under construction. The free field maximum acceleration at the site was 0.12 g. With the exception of one broken ceramic transmission line insulator, there was no damage to the site at [illegible]. Although not stated in Ref. (12), it is probable the design basis for the nuclear plants exceeded the 0.12 g [illegible] there should have been no damage. It is reassuring that there was none.

The new Sendai Thermal Plant is an oil fired facility with one unit of 350 MW (1971) and one of 600 MW (1973). The plant is located about 15 km east of Sendai. No accelerogram was obtained because the instrument at the

site was being inspected at the time of the earthquake. However, in all probability the site experienced accelerations that were at least in the 0.25 g to 0.40 g range that were felt in Sendai, 15 km further from the epicenter. A seismic alarm at the site was triggered at about 0.13 g.

The seismic design applied to the plant was not reported. Minor damage was sustained inside the boilers; evidently some "spacer" tubes were sheared and suspended assemblies within the boiler pounded nearby structures. The details of this damage are not known, but it could not have been severe; repairs were made in six days. There was no damage to the power piping, although an additional reference on this topic, Ref. (13) confirmed there were no piping failures such as leaks or cracks, but that there were some deformations and missing anchor bolts for the pipe hangers. Ref. (13) makes no reference to the boiler tubing.

As in the San Fernando earthquake, ceramic insulators in electric power substations were shown to be vulnerable. A substation near Sendai experienced major damage to the insulators, lightning arrestors, etc.

One additional facility deserves mention in this discussion on power piping performance in earthquakes. Some failures did occur when a large propane gas-holder, 38 meters in diameter, of the telescoping type collapsed and fell onto the piping systems in a gas plant. Obviously this was not a failure of the piping itself, but of the tank. This tank was located near Sendai.

Five other power plants ranging from 250 to 600 MW, Ref. (12), were affected by the Miyagioki earthquake of June, 1978. These plants experienced intensities of 3 to 5 on the Japanese scale, corresponding to IV to VIII on the MMI scale; e.g. the intensity at the New Sendai Plant

...ed above was 5 on the Japanese scale. All of these ...lants were operating at the time of the earth... ...ne were damaged. One of the five was shut ... one hour and inspected, but nothing was found.

... Steam Power Plant

... El Centro power plant is located about 5½ miles ...e epicenter of the 1979 Imperial Valley Earthquake. ...arthquake, which occured on October 15, 1979, was ... the Richter scale and there were several after... the largest of which was magnitude 5.7. The ...al Valley is an active seismic area and was the ... the 1940 El Centro record, which has been widely ... seismic engineering.

...rhaps because of the seismic activity in the area ...ery well instrumented and several strong motion ...were obtained. In fact, this is probably the best ... earthquake that has occured to date. Certainly ...the first time so much "near field" data has been ... A map of the region is given in Fig. 5, which ...the locations of the fault, the epicenter, the power ... and several motion recording stations. This figure ...produced from Ref. (14).

...igure 6 presents acceleration records from several ... sites on the map. A reasonable estimate of the ... experienced at the power plant can be obtained by ...ing that recorded at stations 8, 9, and at the ...ferential Array". On this basis, the plant experi... about .5g horizontally and about .6 g vertically. ... of the large number of records and the consistency ... especially when distance from the fault is ...ered as well as distance from the epicenter, it

The failed coupling was of an unusual design. Ba... it consists of an ordinary steel coupling with a liner of threaded fibreboard inserted. The pipes being joined are then screwed into the fibreboard. The purpose of these couplings is to eliminate stray electrical currents. Further the couplings which failed were on long spans of piping with no extra supports.

The failure of these two components, especially considering their construction and the levels of motion is hardly surprizing. Perhaps more important are the miles of piping and cable trays that did not fail or otherwise cause any problems, even though evidence of special considerations to obtain a seismically resistant design were minimal. Of special interest was the only set of hydraulic snubbers in the plant which were on the main steam line where it entered the turbine hall on the ground floor that evidently failed to lock at all, but the pipe was not damaged even though it appeared to have executed substantial vibratory displacements.

The oil tank was a thin shell structure 115' in diameter which evidently developed a vacuum due to sloshing oil and buckled. Such failures are not unknown and, in fact, might be expected. The wooden cooling tower that was damaged was 30 years old and in poor condition. Three of the four wooden towers were not damaged.

Taken altogether, it can be seen that piping and equipment in good condition with no special design features survived the earthquake. The damage that was observed can be attributed to design that is completely unsuited for seismic conditions, (the oil tank and vallett coupling) and to equipment in severely deteriorated physical condition (water pipes and cooling tower).

... for once the degree of uncertainty ... acceleration levels experienced at the site is ... zed.

The plant has four units: Unit 1 of 20 MW, built in ... Unit 2 of 33 MW, 1952; Unit 3 of 44 MW, 1957; and ... 4 of 60 MW, 1960. Units 1 and 2 were down for ...ntenance when the earthquake occurred. Units 3 and 4 ...e tripped off line evidently due to loss of load. Unit ...as restored to service 3 minutes after the main shock ... Unit 4 was restored to service five hours later. During five hour outage, leaks in the generator hydrogen ...er water supply were repaired.

The damage at the plant was surveyed by a team of ...neers from the Pacific Gas and Electric Co. [15], U.S. Nuclear Regulatory Commission [16], as well as present writer. In general, there was a great deal ...ation at the site, and various traces of the motion ... observable, e.g. skid marks of reheater feet, bent ...smic stops, etc. There were some failures; leaks ...urred in the water supply for the hydrogen coolers as ...tioned above; a two inch vallett pipe coupling failed; ... buckling failure occurred in an oil storage tank; old ...den forced draft cooling towers sustained damage to the ...den structure; and a lightning arrester broke off a ...nsformer. There was no other serious damage.

At first the most disturbing of the above was the ...ge to the hydrogen cooler water line and the failed ... coupling. The water pipes were carbon steel, 3 and ... inches diameter. There is a severe corrosion problem ... this particular piping, evidently due to the char... of the water. There had been leaks due to corrosion ... these lines before the earthquake which had been weld ...ired. The new leaks caused by the earthquake were ... similar type and were also weld repaired.

Conclusion

The available data and observations on the behavior of power piping in actual earthquakes has been reviewed. In general, it is seen that even for power plants experiencing severe ground motion, the piping remains intact. The data that have been surveyed clearly raise the question of the wisdom of designing piping for earthquake resistance by supporting it ever more rigidly. Linear analysis shows the gain of some conservatism by so doing. In the real non-linear world will this conservatism prove to be an illusion? May it even prove to be a liability, since it was obtained by sacrificing piping flexibility?

Acknowledgement

The writer would like to acknowledge the encouragement of W.J.L. Kennedy of the Stone and Webster Engineering Corporation in the early stages of this work.

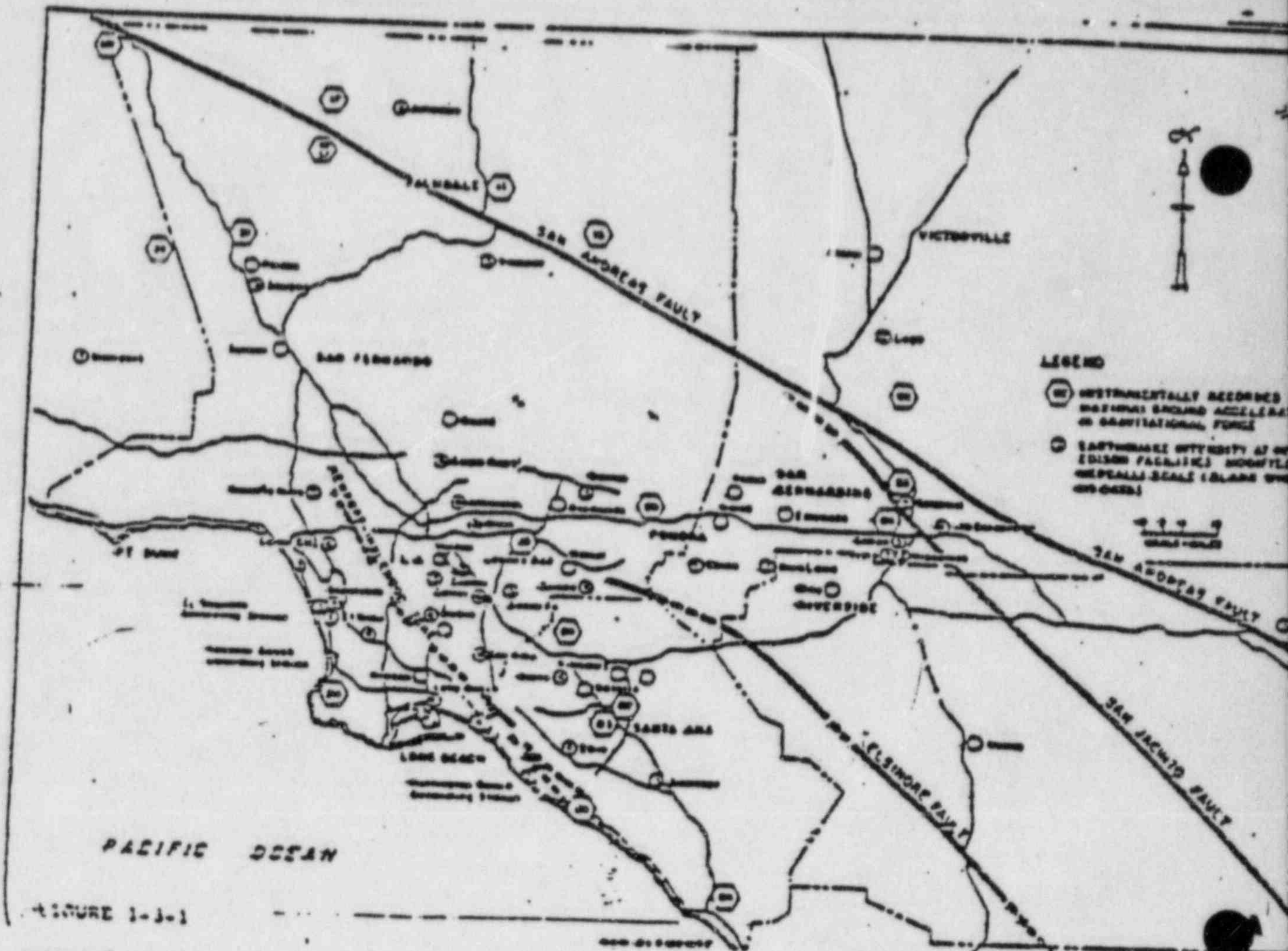


FIGURE 1-3-1

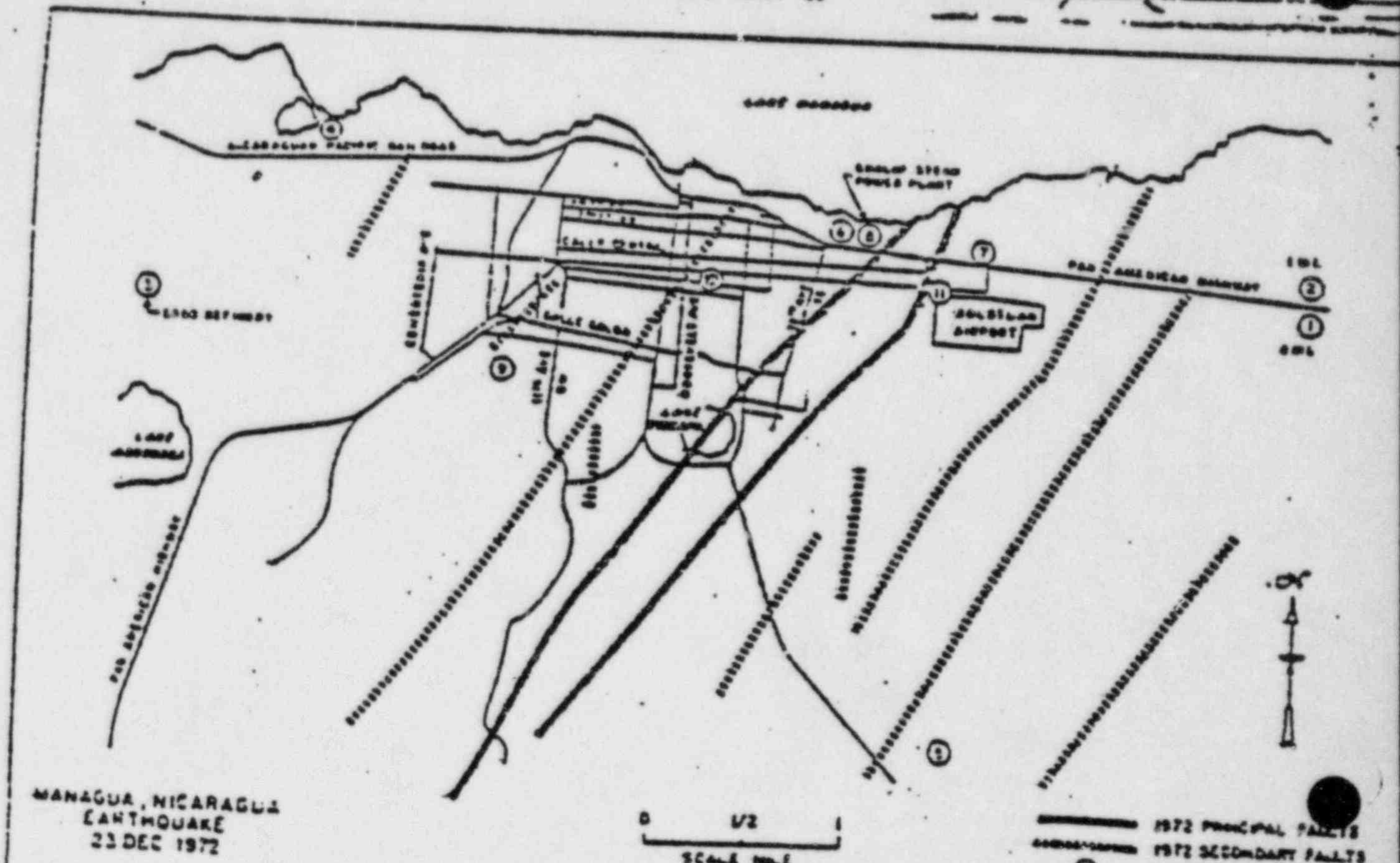
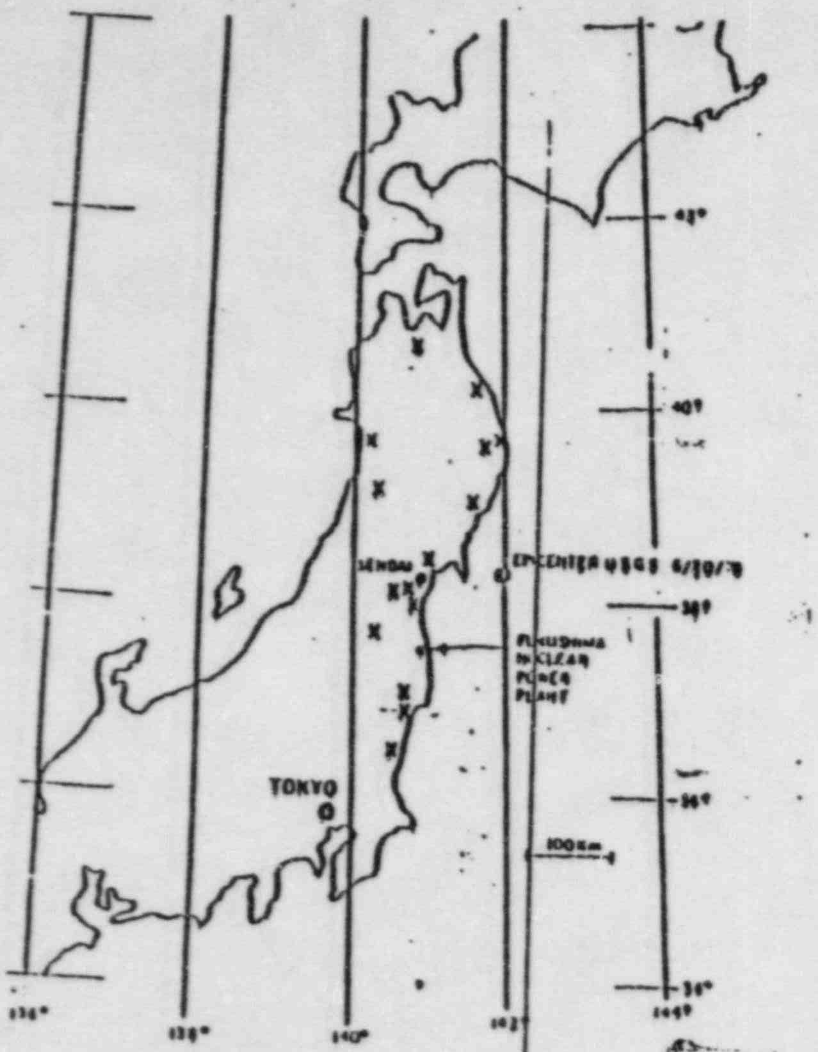


FIG 1-3-2

... OF FACILITIES AND BUILDINGS REFERRED TO IN THIS REPORT



...SMIC ACCELEROGRAPH STATION

LOCATIONS OF ACCELEROGRAPH SITES PROVIDING SIGNIFICANT RECORDINGS OF JUNE 12, 1978

FIGURE 1-3-3

...OF THE U S GEOLOGICAL SURVEY STRONG-MOTION ... FROM THE OCTOBER 15, 1979 IMPERIAL VALLEY EARTHQUAKE

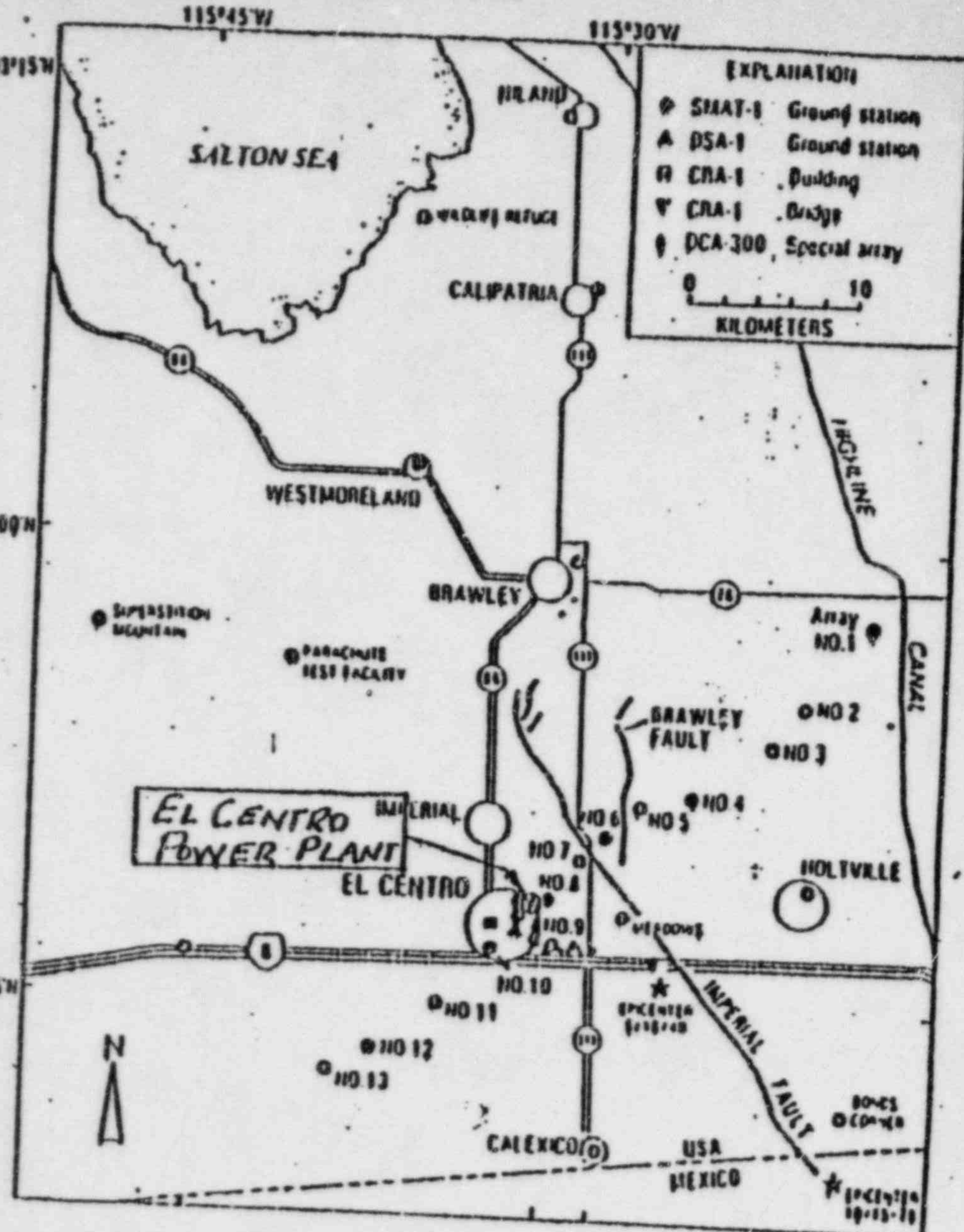


FIGURE 1-3-4

Strong-motion stations in the Imperial Valley, California.

R.L.Porcella and R.B.Matthiesen

U.S.Geological Survey Open-File Report 79-1654, October 1979

ROBERT L. CLOUD ASSOCIATES, INC.

RLC 1/7/80 | IMPERIAL VALLEY EARTHQUAKE 1979 | 1 of 1

MEASURED ACCELERATIONS, G's

SMIC STATION	DIRECTION NE-SW	DIRECTION NW-SE	DIRECTION VERT.	EPICENTRAL DISTANCE, KM
[illegible]	.40	.56	.71	28
[illegible]	.45	.72	1.74	27
[illegible]	.52	.36	.65	26
[illegible]	.50	.64	.55	27
[illegible]	.40	.27	.38	26
[illegible]	~.51	~.39	.93	26

FIGURE 1-1-5

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12. Miyagi-Ken-Oki, Japan Earthquake, June 12, 1978 Yanev, P.O., Editor, Earthquake Engineering Research Inst., December, 1978.

13. Letter, H. Hirata, San Francisco District Mgr., Toshiba International Corporation, to T. McIlraith, Pacific Gas & Electric Co, San Francisco, Ca. April 9, 1979.

14. "Newsletter", Earthquake Engineering Research Institute, David J. Leeds, Editor, Volume 13, No. 6. November 1979.

15. "El Centro Power Plant After the Imperial Valley Earthquake (6.4 M) of Oct. 15, 1979", O. Steinhart, Pacific Gas & Electric Co., San Francisco, Ca., Unpublished.

16. "Reconnaissance Reports - Imperial Valley Earthquake Oct. 15, 1979", US-NRC Earthquake Reconnaissance Team, Nov. 2, 1979, Informal Report.

ATTACHMENT 2

14Q-C-5A
D J Lott (2)

EBASCO

Interoffice Correspondence

DATE April 2, 1982 FILE REF.

TO J Padalino OFFICE LOCATION 80th Fl/2WTC

FROM D J Lott DJL OFFICE LOCATION 80th Fl/2WTC

SUBJECT LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES UNIT NO. 3
FSAR QUESTION 211.19
"NONSEISMIC PIPING OVER SAFETY-RELATED COMPONENTS"
WALKDOWN OF RAB AREAS - ADDENDUM 1

Ref: 1. D J Lott to J P Padalino, 530/198 dated 11-13-81
2. U Quinby/P Harrington to D Lott dated 11-16-81
3. D J Lott to W Yaeger/U Quinby, 530/389 dated 3-26-82

Attachments: 1. List of Area Reviewed
2. Results of Review

Reference 1 reported the results of a walkdown performed in September, 1981 looking for gravity missiles in the RCB. The following report serves as an addendum to that and documents the results of a walkdown performed March, 1982.

On March 16 and 17, 1982, J Tompeck, J Damitz, L J Liberatore, and D J Lott walked through the RAB reviewing the areas defined by Construction in Reference 2, which were supposed to be construction complete. The walkdown was conducted to either declare the areas free of problems or identify situations where nonseismic piping might damage safety-related components. Attachment 1 defines the areas walked down.

Attachment 2 are the results by area. No problems were observed, with regards to the subject, except in the CCW HX area. In that area, there was a IA or SA line coming down the wall which then comes out through instrumentation tubes. This is not an ideal situation and should be reviewed at a later time since neither the pipe or tubing was completed. In addition, some areas were so congested with construction activities that a complete review could not be done. These have been noted and should be addressed during a later walkdown.

Our general impression of this walkdown and reflecting back on the RCB walkdown, is that there are no blatant cases seen to date of non-seismic components over safety-related components which would require a fix. This is due primarily to:

A. Separation

B. The majority of supports used on small bore, non-safety lines seem to be U-bolts which preclude the possibility of the pipe falling even if it should crack or fracture.

C. Congestion! There are some areas where nothing could fall straight down, but would rather probably be stopped by larger pipes or other pieces of equipment which would not be damaged.

Reference 3 is a memo to Construction requesting them to identify additional areas in the RAB which are essentially complete so that another walkdown can be scheduled in April. A response is required before planning this next trip.

Copies of this memo and attachments have been placed in the following files:

Mechanical: III-P-1

Licensing: C211.19

Project: 14Q-C-5A

Please advise if you have any comments or questions on the above.

DJL:as
Attachments

cc: J Tompeck (w/atts)
J Hart (w/atts)
J Damitz (w/atts)
J Horvath (w/atts)
M Horrell (w/atts)
W Yaeger (w/atts)
J DeBruin (w/atts)
R Milhiser (w/atts)
C F M Trapp (w/atts)
D J Lott (w/atts
L Liberatore (w/atts)
File: III-P-1 (w/atts)

ATTACHMENT NO. 1

G-137 (El. - 35.00)

- Shutdown Heat Exchanger Areas
- Waste Tanks and Pumps
- Laundry Tanks
- Hold-up Tanks
- Hold-up Pumps Area
- Spent Resin
- Area between 3A & 5A, G and H
- Boric Acid Cond. Pump & Tanks
- Gas Delay Tanks
- Gas Compressors and Gas Surge Tank

G-136 (El - 4.00)

- Hold-up Tanks
- Boric Acid Make-Up Tanks

G-135 (El + 21.00)

- Battery Rooms and Charger Areas
- Switch Gear Room between 12 and 8A, G and H
- Hold-up Tanks
- CCW Pump and Area to North
- CCW Heat Exchanger Areas

G-134 (El. +46.00)

- Control Room & Corridor between Cols 12A and 7A, G and K
- HVAC Area between Cols 11A and 8A, K and L

ATTACHMENT NO. 2

* = To Be Reviewed Later/Again

I. EL. -35.00 (G-137)

Shutdown HX A - No problems
Shutdown HX B - No problems
Waste TK A and Pump - No S/R equipment; therefore, no problems
Waste TK B and Pump - No S/R equipment; therefore, no problems
Laundry Tanks - No S/R equipment; therefore, no problems
Hold-up Tanks (A, B, C, and D) - No access
Hold-up Pump Areas - No S/R equipment; therefore, no problems
Spent Resin TK - No S/R equipment; therfore, no problems
Area between 3A and 5A, G and H - No S/R equipment; therefore, no problems
Boric Acid Condensate Pumps and Tanks - No S/R equipment, therefore, no problems
Gas Decay Tanks A, B, & C - No problems
*Gas Decay Compressor A - Areas was dark, review at later time
Gas Decay Compressor B - No problems
Gas Surge Tank - No problems

II. EL. -4.00 (G-136)

Hold-up Tanks (A, B, C, and D) - No access
Boric Acid Make-up TAnks (A&B) - No access

III. EL. +21.00 (G-135)

Hold-up Tanks (A, B, C, and D) - No problems
Battery Rooms and Charger Areas - FP and PW piping in vicinity; however, no problems were observed
Switch Gear Area - FP and PW piping in vicinity; however, no problems were observed
*CCW HX A - Only problem observed is IA/SA thru instr. tubes
CCW HX B - No problems
CCW Pumps (A, B, and A/B) - No Problems
*Area between 7A and 4A, K and L (corrider area outside of CCW pumps) - to congested to properly review

IV. EL. +46.00 (G-134)

Control Room and Corrider Areas between 12 and 7A, G and K - No problems
*HVAC Area between 11A and 8A, K and L - to congested to properly review

14Q-C-5A

ATTACHMENT 3

EBASCO

Interoffice Correspondence

DATE June 3, 1982 FILE REF. 530/508

TO J P Padalino OFFICE LOCATION

FROM D J Lott OFFICE LOCATION

SUBJECT LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES UNIT NO. 3
"NONSEISMIC PIPING OVER SAFETY-RELATED COMPONENTS"
WALKDOWN OF RAB AREAS - ADDENDUM 2

Ref: 1. D J Lott to J P Padalino, 530/198 dated November 13, 1982
2. D J Lott to J P Padalino, dated April 2, 1982

Atts: 1. List of Areas Reviewed
2. Results of Review

The references documented results of walking down the RCB and parts of the RAB respectively.

On May 26, 1982, J Damitz, J Tompeck and D J Lott walked through the RAB reviewing the areas defined by Construction as construction complete. Attachment No. 1 defines these areas.

Attachment No. 2 are the results by area. No problems were observed. However some areas were still congested with construction activities which prevented us from doing a complete review. These areas have been noted and should be addressed in a later walkdown.

I will address a memo to Construction requesting them to identify additional areas in the RAB which are essentially complete so that another walkdown can be scheduled. A response is required before planning this next trip.

Copies of this memo and attachments have been placed in the following files:

Mechanical: III-P-1
Licensing: C211.19
Project: 14Q-C-5A

Please advise if you have any comments or questions on the above.

DJL:lw
Attachments

cc: All w/Att
J Tompeck
J Damitz
J Hart
J Horvath
M Horrell
W Yaeger
J DeBruin
R Milhiser
C Trapp
D Lott (2)
File: III-P-1

ATTACHMENT NO. 1

G-137 (El. -35.00)

- Safeguard Pump Rooms (6A to 10A, J to L)
- Emergency FW Pump Rooms (5A to 6A, J to L)
- Equipment Drain Tank (included in above area)

G-136 (El. -4.00)

- Regenerative Waste Tank and Blowdown Hx (1A to 6A, J to L)
- Volume Control Tank (included in above area)
- Boric Acid and Waste Concentrators (5A to 6A, G to H)
- Misc (1A to 3A, G to J)
- Sampling Area (8A to 12A, G to J)
- Utility Area (10A to 12A, J to L)

G-135 (El. +21.00)

- Emergency Diesel Generators (1A to 7A, J to K)
- Boric Acid and Waste Concentrators (3A to 6A, G to J)
- Drumming Control Station (1A to 3A, G to J)

G-134 (El. + 46.00)

- Chiller Room (1A to 7A, J to L)

ATTACHMENT NO. 2

* = To be reviewed again.

I. G-137 (El. -35.00)

Safeguard Pump Rooms - No problems*
Emergency FW Pump Rooms - No problems
Equipment Drain Tank - No S/R equipment, therefore no problems.

II. G-136 (El. -4.00)

Area between 1A to 6A and J to L, - No problems, only safety related components are contained in separate areas. Balance is all non-safety.

Boric Acid and Waste Concentrators - No S/R equipment, therefore no problems.

Area between 1A to 3A and G to L - No problems

Sampling Area - No S/R equipment, therefore no problems

Utility Area - No S/R equipment, therefore no problems

III. G-135 (El +21.00)

Emergency Diesel Generators A and B - No problems

Boric Acid and Waste Concentrators - No S/R equipment, therefore no problems

Drumming Control Station - No S/R equipment, therefore no problems

IV. G-134 (El +46.00)

Chiller Room - No observed problems*

[illegible] shutdowns – memo by 4/30.

G-134 (EL. +46.00)

- CHILLER ROOM 1A & 7A, J & L ✓

-135 (EL. +21.00)

- EMERG. DIESEL GENERATOR 1A & 7A, J & K ✓
- BORIC ACID CONCENTRATOR TANK 3A & 6A, G & J ✓
- DRUMMING CONTROL STN 1A & 3A, G & J ✓

-136 (EL. -4.00)

- REGENERATIVE WASTE ~~TANK~~ & BLOWDOWN HT. EXCH. 1A & 6A J & L ✓
- VOLUME CONTROL TANK ✓
- BORIC ACID CONCENTRATOR 3A & 6A, G & H ✓
- MISC. ~~HEAT~~ EXCHANGER 1A & 5A, G & J ✓
- SAMPLING ROOM ~~AREA~~ 8A & 12A, G & J ✓
- UTILITY ROOM 10A & 12A, J & L ✓

-137 (EL. -35.00)

- LPSI & HPSI 6A & 10A, J & L ✓
- EMERG. FEEDWATER PUMP ROOM 5A & 6A & J & L ✓

EBASCO

Interoffice Correspondence

DATE August 12, 1982 FILE REF 530/587

TO J P Padalino OFFICE LOCATION

FROM D J Lott OFFICE LOCATION

SUBJECT LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES UNIT NO. 3
"NON-SEISMIC PIPING OVER SAFETY-RELATED COMPONENTS"
WALKDOWN OF RAB AREAS - ADDENDUM 3

Ref:
1. D J Lott to J P Padalino, 530/198 dated November 13, 1981
2. D J Lott to J P Padalino, dated April 2, 1982
3. D J Lott to J P Padalino, 530/508 dated June 3, 1982

Att:
1. Areas Reviewed and Results
2. Balance of Areas to be Reviewed

The referenced memos document results of walkdown of the RCB and portions of the RAB.

On August 10, J Damitz and I, plus J Tompeck and J Hart part time, walked through the balance of the RAB and two elevations in the wing area. Attachment No. 1 defines these areas and documents that no problems were observed.

Attachment No. 2 defines those areas which still remain and will be addressed during the next trip.

Copies of this memo and attachments have been placed in the following files:

Mechanical: III-P-1
Licensing: C211.19
Project: 14Q-C-5A

Please advise if you've any comments or questions.

cc: (All w/Att)
J Tompeck
J Damitz
J Hart
J Horvath
M Horrell
W Yaeger
J DeBruin
R Milhiser
C Trapp
D Lott (2)
File III-P-1
14Q-C-5A
C211.19

ATTACHMENT NO. 1

RAB

G-134

LOCATION	ELEVATION	AREA	RESULTS
H-G 1A-7A	+46	LARGE ∅ MAIN STEAM & FEEDWATER PIPES	No Problems
J-H 1A-2A	+46	EM DIESEL OIL FEED TANKS A,B	No Problems
J-H 5A-6A	+46	MAINTENANCE LUBE OIL STORAGE TANK	No Problems
L-K 11A-12A	+57.5 +69.0	MACHINE ROOM	*
L-J 1A-2A	+69.0	RAB NORMAL SUPPLY (AIR) UNIT	No Problems
L-J 1A-2A	+91.00	HVAC EXP TANK ROOM COOLING WATER TANK ROOM	No Problems

*To be reviewed later.

RAB G-135

LOCATION	ELEVATION	AREA	RESULTS
L-H	+21	VESTIBULE, UNLOADING AREA	No Problems
11A-12A		AUXILIARY CONTROL PANEL H&V DUCT SPACE	No Problems
L-J	+21	SWITCHGEAR, CEDM CAB,	No Problems
8A-11A		MCC's	No Problems
K-J 8A-9A	+21	CEA DRIVE ROOM	No Problems
J-H 6A-9A	+21	CORRIDORS	No Problems
L-J 7A-8A	+21		No Problems
L-G 7A-12A	+35	CABLE VAULTS (DWG COOR: M-7)	No Problems

G-136

RAB

LOCATION	ELEVATION	AREA	RESULTS
J-H	-4	CORRIDORS, LOCAL	No Problems
3A-8A	"	CONTROL PANELS	No Problems

RAB

G-137
(Elev. -35.00)

LOCATION	ELEVATION	AREA	RESULTS
J+			
1A-2A		CHARGING PUMP A ROOM	No Problems
2A-3A	-30	A/B	No Problems
3A-4A		B	No Problems
L-J		EMERG FW PUMP (TURBINE	No Problems
4A-5A		DRIVEN) & CC WATER MAKEUP PUMPS	No Problems
H^+		BORIC ACID MAKEUP TANK ROOMS	
4A-5A		A	No Problems
5A-6A		B	*
G-H		WASTE COND TANKS & PUMPS	No Problems
8A-10A		CHEM WASTE TANK & PMPS	
H^+		OIL SEPARATOR, WASTE &	No Problems
8A-11A		LAUNDRY FILTERS	
H^+-J		CORRIDORS	No Problems
3A-12A			

*To be reviewed later.

RAB

LOCATION	AREA	RESULTS
G-144 (EI +21.0)	Wing Area	No Problems
G-145 (EI -4.0)	Wing Area	No Problems

ATTACHMENT NO. 2

AREAS TO BE RE-REVIEWED, RAB

I. D J Lott to J P Padalino dated June 3, 1982 - Addendum 2 (May 26, 1982 walkdown)

A. G-137 (El. -35.00) Safeguard Pump Rooms

B. G-134 (El. +46.00) Chiller Room

II. D J Lott to J P Padalino dated April 2, 1982 - Addendum 1 (March 16 & 17, 1982 walkdown)

A. G-137 (El -35.00) Gas Decay Compressor A

B. G-135 (El +21.00) CCW HXA, IA/SA through inst. tubes

C. G-135 (El + 21.00) Area between 7A and 4A, k and c (outside of CCW pumps)

D. G-134 (El +46.00) between 11A and 8A, k and L, HVAC area

III. August 10, 1982 walkdown

A. G-134 (El +57.5 and 69.0) Machine Room

B. G-137 (El -35.0) Boric Acid Makeup Tank B Room

C. G-143 (El +46.0) Wing Area

D. G-145 (El -35.0) Wing Area

ATTACHMENT 5

EBASCO

Interoffice Correspondence

DATE July 1, 1983 FILE REF 530/959

TO J P Padalino OFFICE LOCATION 80

FROM D J Lott OFFICE LOCATION 80

SUBJECT LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES UNIT NO. 3
"NON-SEISMIC PIPING OVER SAFETY-RELATED COMPONENTS"
WALKDOWN OF RCB AND RAB

Refs:
1. D J Lott to J P Padalino, 530/198 dated 11/13/81
2. D J Lott to J P Padalino, dated 4/2/82
3. D J Lott to J P Padalino, 530/508 dated 6/3/82
4. D J Lott to J P Padalino, 530/587 dated 8/2/82

Attached: List of Areas Reviewed with Results

The references document results of walkdowns at various times looking for non-seismic components which could fall during a seismic event and damage essential components. Since Construction is now virtually complete, a final walkdown was performed June 6 and 7, 1983 to verify no new problems had been created since the walkdowns recorded in the reference. Specifically the following was done:

A. On June 6, 1983, J Damitz, J Tompeck and D J Lott walked throughout the RCB and found only one problem. This case involved line 6NG1-50 coming down Safety Injection Tank 2A and over an instrument tube. 6NG1-50 was not properly supported and could potentially have failed and damaged the tube. Tompkins-Beckwith has been notified and will add a support thereby resolving this problem (see T-B iso 36071).

B. One June 6 and 7, 1983, J Damitz and D J Lott walked through those areas of the RAB with safety-related components. No problems were observed.

Copies of this memo and attachments have been placed in the following files:

Mechanical:	III-P-1
Licensing:	C211.19
Project:	14Q-C-5A

Please advise if you have any comments or questions on the above.

DJL:nr
Attachment

cc: (All w/atts) J Tompeck, J Hart, J Damitz, J Horvath, W Yaeger, J DeBruin, R Milhiser, ~~D Lott~~, Files: III-P-1
ME Daybook

ATTACHMENT

AREAS REVIEWED WITH RESULTS

RCB

1. Elevation +46.0 and higher

   6NG1-50 crosses over SI Tk 2A instrument line. Tompkins-Beckwith has been notified and will add a support to resolve this problem. (See TB iso 36071).

2. Elevation +21.0

   No Problems Observed

3. Elevation -4.00 and below

   No Problems Observed

Wing Area

1. Elevation +46.0 and above

   - MS/FW Penetration Area (West), no problems
   - MS/FW Penetration Area (East), no problems
   - Balance, no problems

2. Elevation +35.0

   No Access, Electrical Penetration area and cable vault, no piping, previous walkdowns found no problems.

3. Elevation +21.0

   No Problems Observed

4. Elevation - 4.0

   No Problems Observed

5. Elevation -35.0

   No Problems Observed

6. Diesel Oil Storage Tanks A and B

   No Problems Observed

RAB

1. Elevation +46.0 and above

   - Cols 1A to 2A, J to L @ +91.0, no problems observed.
   - Emergency Diesel Oil Feed Tanks A and B, no problems observed.
   - HVAC Equipment Area, Cols 1A to 11A and J to L, no problems observed.
   - HVAC Equipment Area, Cols 11A to 12A and G to K, no problems observed.
   - HVAC Room @ Elevation +69.0, no access, previous review had no problems

2. Elevation +21.0

   - Emergency Diesel Generator A, no problems observed.
   - Emergency Diesel Generator B, no problems observed.
   - Component Cooling Water Heat Exchanger A, no problems observed.
   - Component Cooling Water Heat Exchanger B, no problems observed.
   - CCW Pump A, no problems observed.
   - CCW Pump B
   - CCW Pump A/B__________
   - Corridor outside CCW Pumps and Heat Exchangers, no problems observed.
   - Battery Rooms A, B and A/B, no problems observed.
   - Switchgear Areas, no problems observed.
   - Auxiliary Control Panel Room, no problems observed
   - Auxiliary Isolation Panel Areas @ El. +35.0, no problems observed.

3. Elevation +7.0

   - HVAC Equipment Room, no problems observed.

4. Elevation -4.00

- Flash Tank, no problems observed.

- Flash Tank Pumps, no problems observed.

- Letdown Heat Exchanger and associated valves, no problems observed.

- Volume Control Tank, no problems observed.

- Purification Ion Exchangers A and B, no problems observed.

- Heat Tracing Control Panel, no problems observed.

5. Elevation -35.0

- Waste Gas Compressors and Gas Decay Tanks, no problems observed.

- Charging Pumps A, B and A/B, no problems observed.

- EFW Pumps A and B, no problems observed.

- Corridor Area including EFW Pump A/B and CCW Makeup Pumps, no problems observed.

- Boric Acid Makeup Tanks A and B, no problems observed.

- Safeguard Pump Room (North), no problems observed.

- Safeguard Pump Room (South), no problems observed.

- Valve Operating Bay A, no problems observed.

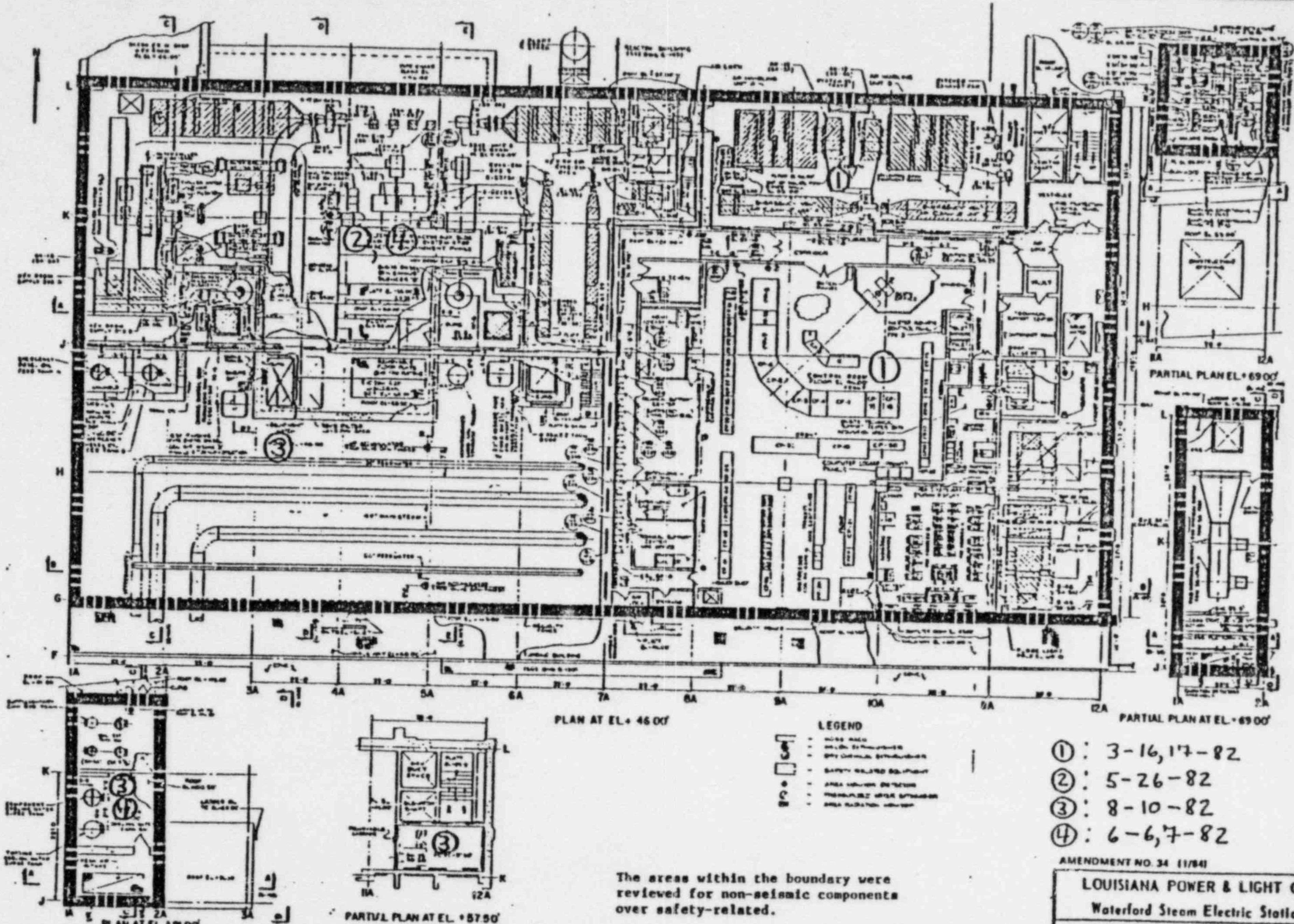
- Valve Operating Bay B, no problems observed.

- Shutdown Heat Exchanger A, no problems observed.

- Shutdown Heat Exchanger B, no problems observed.

- Corridors outside Pump Rooms and Heat Exchangers, no problems observed.

ATTACHMENT 6



The areas within the boundary were reviewed for non-seismic components over safety-related.

AMENDMENT NO. 34 (1/84)

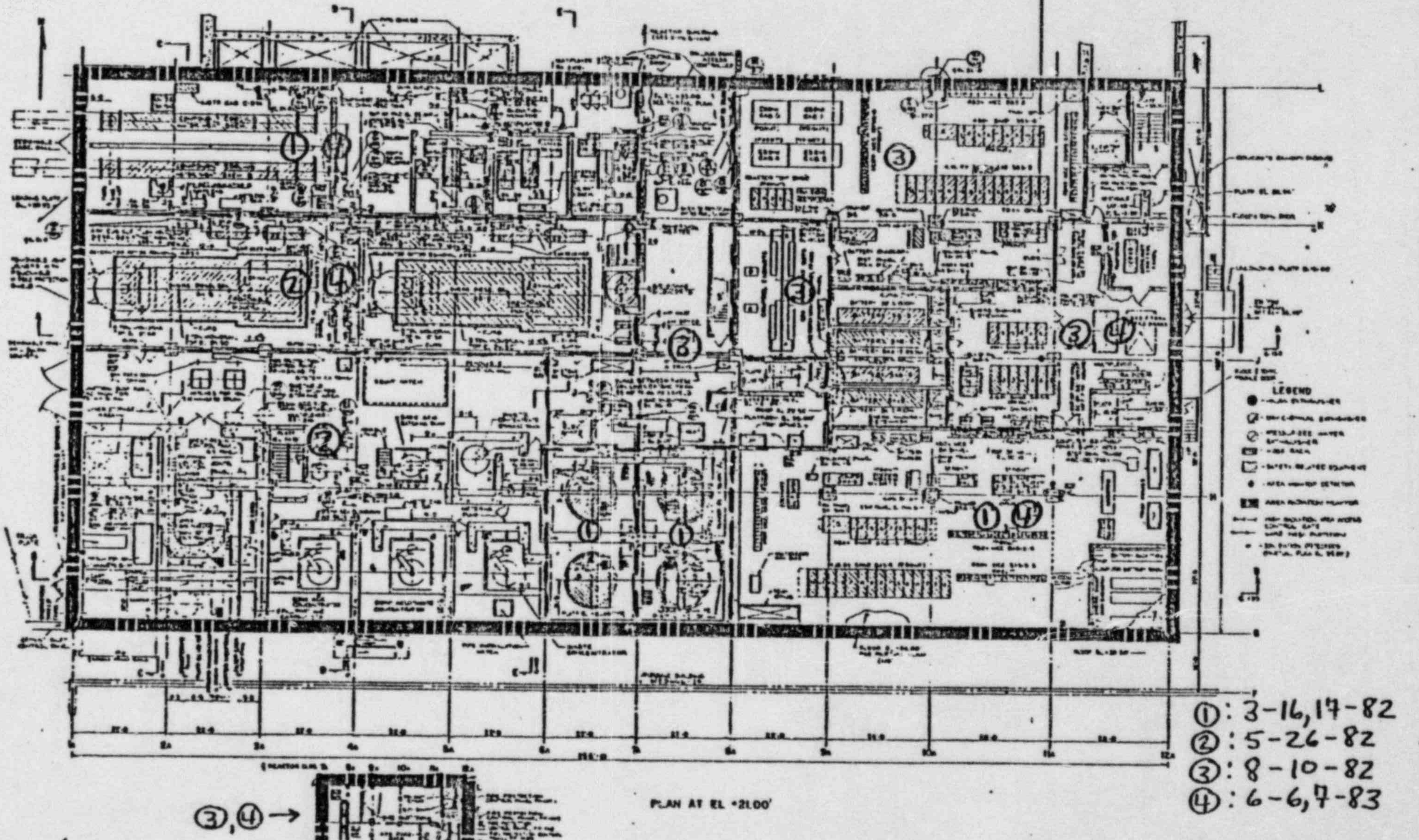
LOUISIANA POWER & LIGHT CO.

Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR AUXILIARY BUILDING PLAN EL + 46.00'

FIGURE 1.2-8

REF DWG: LOU 1564-G-134 (REV 17)



PLAN AT EL +21.00'

The areas within the boundary were reviewed for non-seismic components over safety-related.

AMENDMENT NO. 34 (1/84)

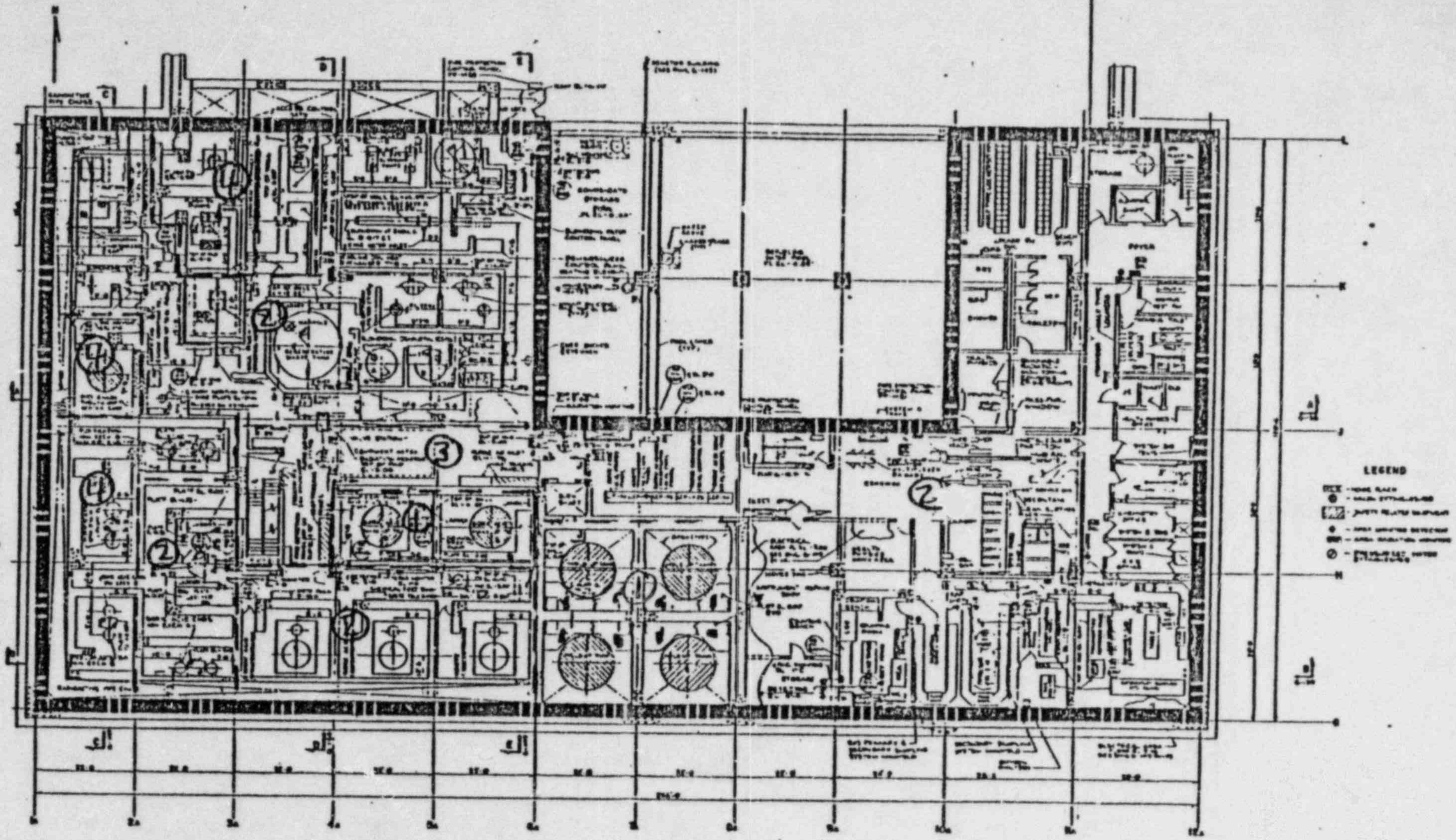
LOUISIANA POWER & LIGHT CO.

Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR AUXILIARY BUILDING PLAN EL + 21.00'

FIGURE 1.2-9

REF DWG: LOU 1564-G-135 (REV 13)



PLAN AT EL.-4.00'

①: 3-16,17-82
②: 5-26-82
③: 8-10-82
④: 6-6,7-83

The areas within the boundary were reviewed for non-seismic components over safety-related.

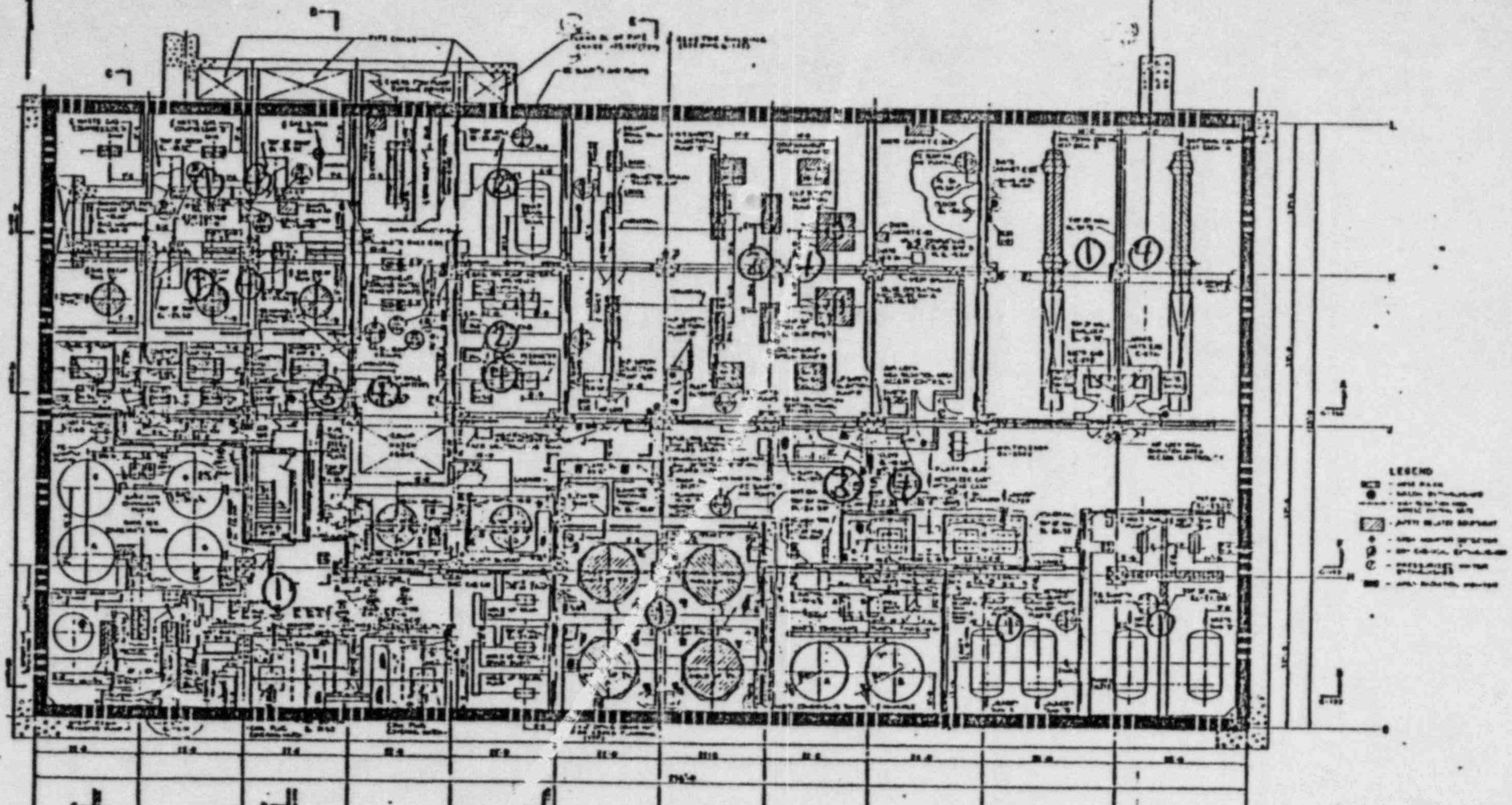
AMENDMENT NO. 34 (1/84)

LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR AUXILIARY BUILDING PLAN EL -4.00'

FIGURE 1.2-10

REF DWG: LOU 1564-G-136 (REV 13)



PLAN AT EL.-35.00'

The areas within the boundary were reviewed for non-seismic components over safety-related.

①: 3-16,17-82
②: 5-26-82
③: 8-10-82
④: 6-6,7-83

AMENDMENT NO. 34 (1/84)

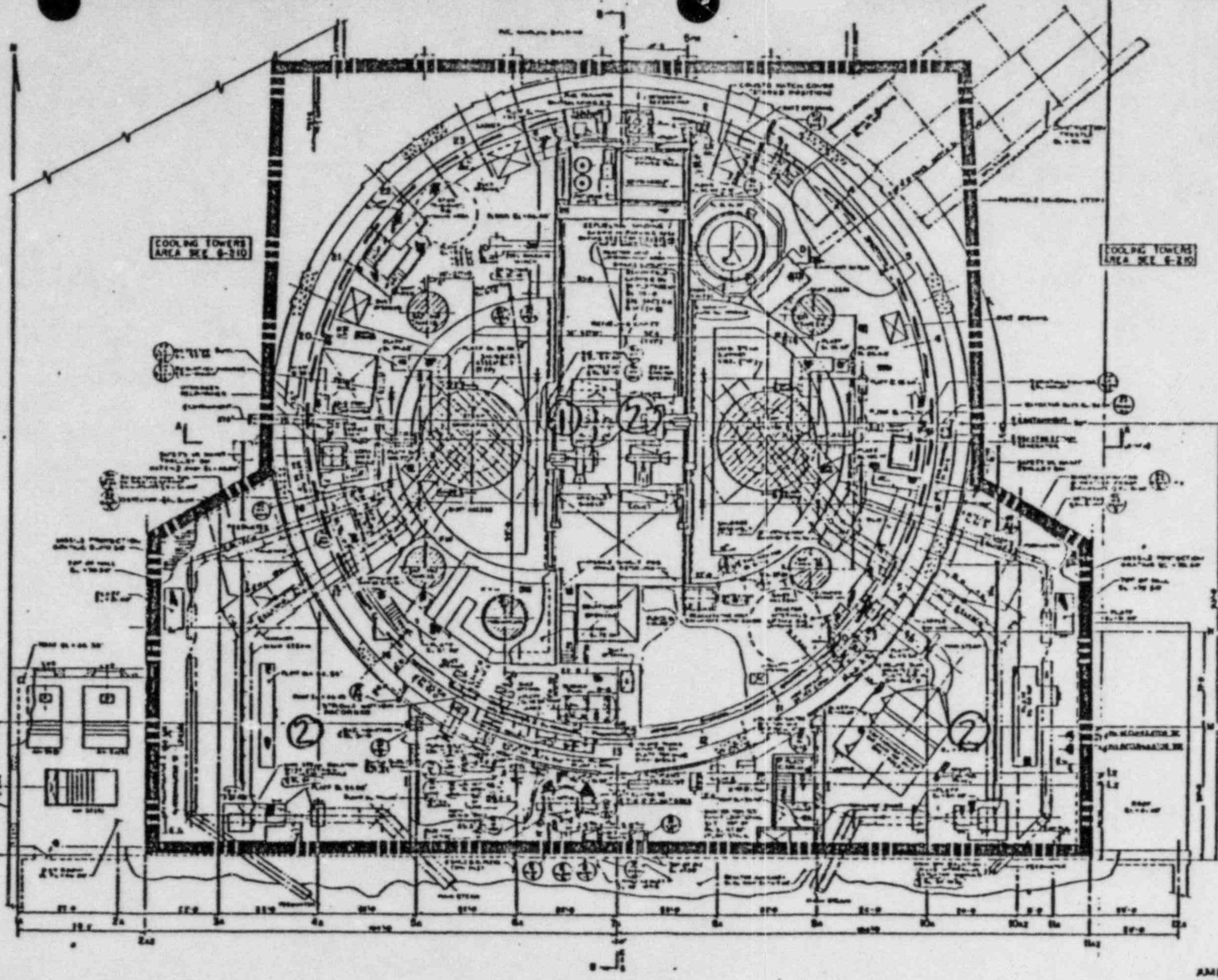
LOUISIANA POWER & LIGHT CO.

Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR AUXILIARY BUILDING PAN... EL. -35.00'

FI... 1.2-11

REF DWG: LOU 1564-G-137 (REV 13)



PLAN AT EL. +46.00'

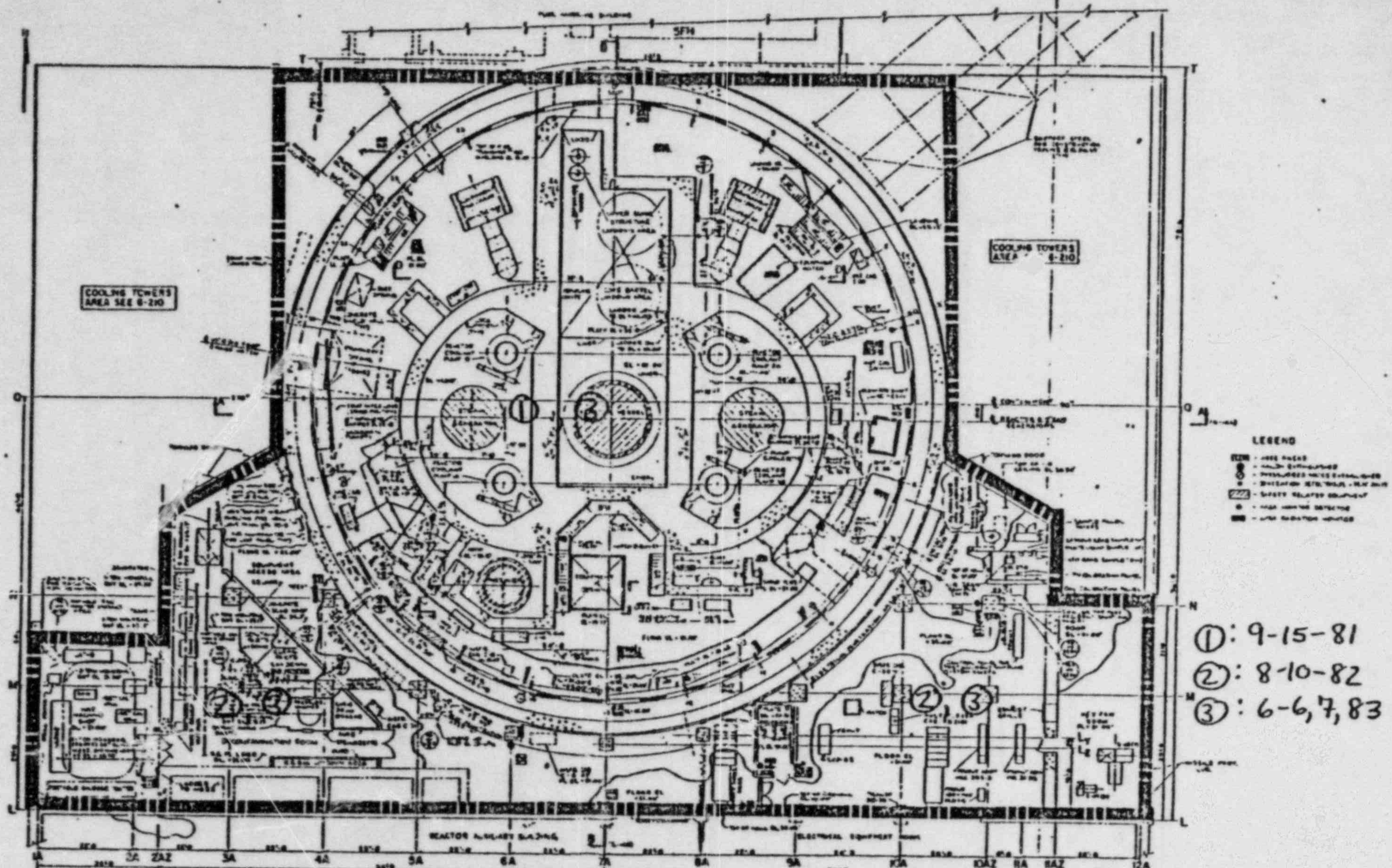
The areas within the boundary were reviewed for non-seismic components over safety-related.

AMENDMENT NO. 24 (1/84)

LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR BUILDING PLAN – EL + 46.00'
FIGURE 1.2-17

REF DWG: LOU 1564-G-143 (REV 13)



PLAN EL. +21'00"

The areas within the boundary were reviewed for non-seismic components over safety-related.

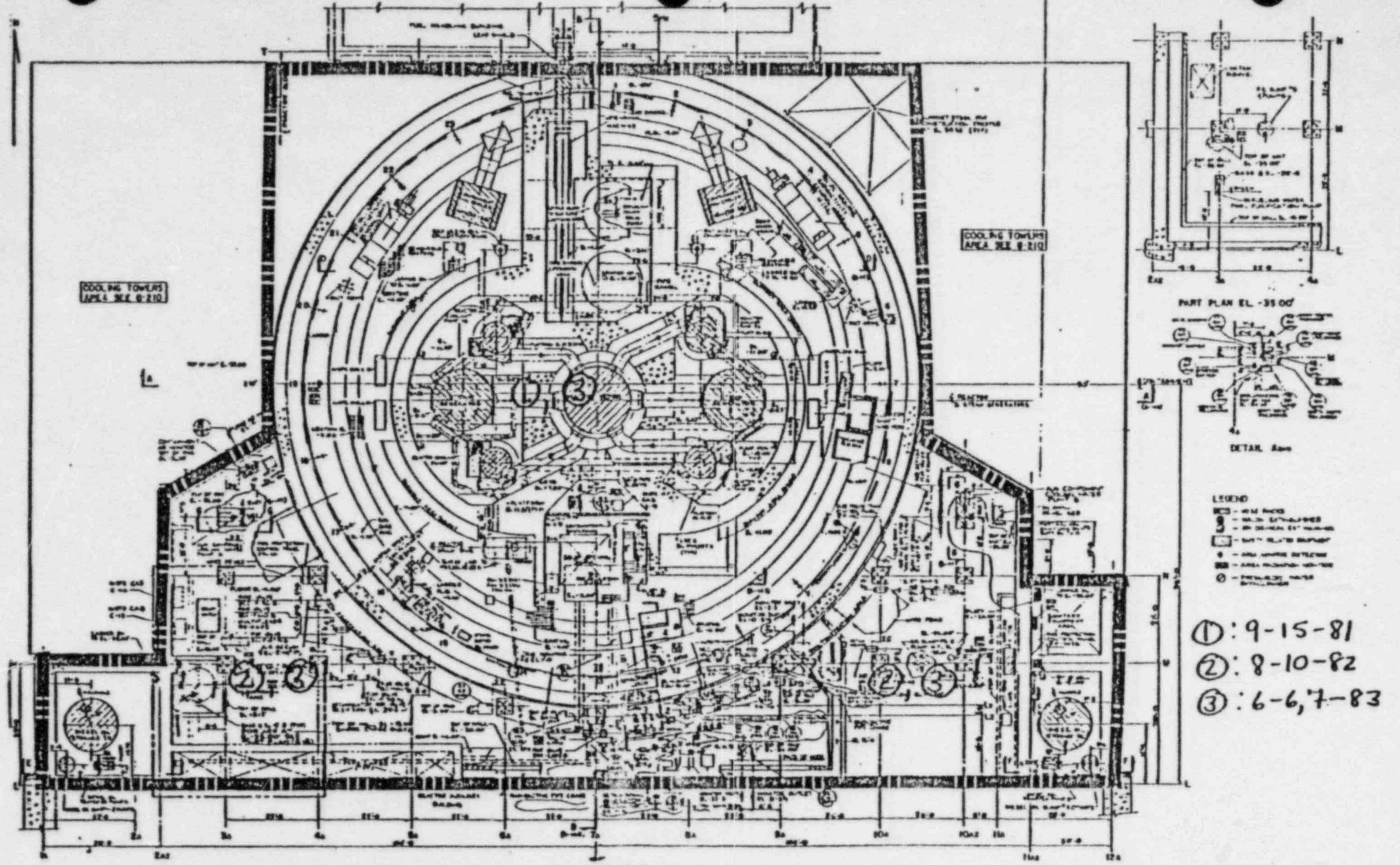
AMENDMENT NO. 34 (1/84)

LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR BUILDING PLAN EL + 21.00'

FIGURE 1.2-18

REF DWG: LOU 1564-G-144 (REV 13)



The areas within the boundary were reviewed for non-seismic components over safety-related.

REF DWG: LOU 1564-G-145 (REV 13)

AMENDMENT NO. 34 (1/84)

LOUISIANA POWER & LIGHT CO.
Waterford Steam Electric Station

GENERAL ARRANGEMENT REACTOR BUILDING – PLAN EL - 4.00'
FIGURE 1.2-19

EBASCO SERVICES INCORPORATED
Two World Trade Center, New York, N.Y. 10048

EBASCO

INCOMING

July 1, 1983
LW3-965-83
File: 14Q-C-5A

RECEIVED
JUL 11 1983
EBASCO SERVICES INC.
WATERFORD 3 FIELD

Mr L V Maurin, Vice President
Nuclear Operations
Louisiana Power & Light Company
P O Box B
Killona, LA 70066

RE: WATERFORD SES UNIT NO. 3
FSAR QUESTION 211.19
NONSEISMIC COMPONENTS OVER SAFETY-RELATED COMPONENTS

Ref: Nuclear Licensing Commitments List

Dear Mr Maurin:

FSAR Question 211.19 asked for a discussion on potential missiles and their effects on components essential for safe shutdown in the RCB. One type of missile to be discussed is the so called "gravity" missile (i.e. Non-seismic components). In the response (Amendment No. 11, 7/80), we outlined reasons as to why there would be no gravity missile problems. However, a commitment was also made to perform a field verification of gravity missiles in the RCB to confirm that no non-seismic components could damage essential components.

Ebasco on two separate occasions (September 15, 1981 and June 6, 1983) has performed a field verification of the RCB and found no cases where non-seismic components could damage essential components. Several factors contribute to this:

- There is very little non-seismic piping and what there is, is mostly two inch and smaller. This piping inherently has little potential to damage other components.

- Much of the non-seismic piping is routed around the periphery of the building, contained between columns and the containment vessel.

- All structural steel and HVAC duct is seismically supported therefore will not become missiles.

- All electrical components are seismically supported.

- I&C components are, if safety-related, seismically supported and mechanically protected by tube track and cabinets.

- Where situations occur which appear to be a problem (ex. unprotected expansion loop in instrument tube) the walkdown team evaluated the potential for a gravity missile and verified that a missile would not exist that could damage essential components.

In addition to reviewing the RCB, Ebasco felt it would be prudent to walk through the RAB to determine if any "gravity" missile problems exist. As in the RCB no problem areas were found.

The results of these walkdwons have been documented via internal Ebasco memos to J P Padalino and placed in project file 14Q-C-5A.

Attached is a draft paragraph which, if LP&L desires, could form the body of a letter to the NRC to provide positive feedback that the verification was performed. In Ebasco's opinion, such a letter is not required since the SER does not establish it as an open or confirmatory item.

We believe this adequately closes the open items in the reference. Please advise of any questions or comments.

Very truly yours,

J P EVERS
Manager of Mechanical Engineering

By: R C Rossi

DJL:lw
Attachment

cc: Central Records Records W3 (2)
Nuclear Records GO (2)
MSS Nuclear Activities
G B Rogers

In the response to FSAR Question 211.19, LP&L committed to perform a field verification after installation of components, to show that "gravity" missiles could not damage essential components in the RCB. This check has been made with no situations found where gravity missiles could damage essential components.

ALL W/ATT

LW3-965-83

bc: ~~R P Devine~~ RPD 6/30
J J Costello
J P Padalino JPP 6/30
~~J K Tenpeck~~
R C Rossi
J Umberto
R J Johnson
J Z Horvath
R L Hymes
J DeBruin
J M Brooks
R Marshall (3)
J Houghtaling
J Holwell
D J Lott DJL 6-29-83
J Damitz
J Hart
~~J Costeigo~~
File: 14Q-C-5A
Project Record File
G.G. Hofer

RESPONSE

ITEM NO.: 19 (Final)

TITLE: Water in Basemat Instrumentation Conduit

NRC DESCRIPTION OF CONCERN:

In examining the safety significance of the allegations, the NRC staff performed system walkdowns as a means of verifying the as-built conditions. During one of those walkdowns, the staff noted that there was water in an electrical conduit that penetrated the basemat. If the seals in that conduit should fail there is a potential direct path for ground water to flood the auxiliary building basement. LP&L should review all conduit that penetrates the basemat and terminates above the top of the basemat to assure that these potential direct access paths of water are properly sealed.

DISCUSSION:

During the construction period, several permanent conduits embedded in the basemat were observed to seep water at the stub-up couplings. None of them leaked in a quantity sufficient to cause flooding concerns during construction.

Silicone foam seals were placed in these conduits beginning in late 1983.

In May, 1984, a walkdown, as described in Attachment 1, was performed by Ebasco which identified 29 places where wetness due to seepage from conduits or conduits within 9 boxes plus one piezometer riser were found and 12 places where evidence of past leaking from conduits and piezometer risers were found. These cases will be addressed by LP&L by removing the existing seals and replacing them with a light density silicone elastomer which has the capability to stop the seepage as required. This work will be performed as a routine maintenance item as directed by the Plant Operations Staff, since the slow seepage through the seals is a maintenance inconvenience and not a flooding hazard. This is reflected in Attachment 1.

The 12 sheet table that is part of Attachment 1 is in fact 2 related listings. The first 2 sheets list 36 items (27 conduits including one piezometer riser and 9 pull boxes). These items were checked off in the listing as either having a leak or giving evidence of once having a leak. The remaining 10 sheets detail what conduits come into each of the 9 pull boxes listed on the first 2 sheets (Items 4,5,7,9,10,23,27,28 and 32). These 10 sheets have listed on them 56 conduits (within pull boxes) which when combined with the 27 conduits (not in pull boxes) on the first 2 sheets makes a total of 83 identified conduits. (Note: Attachment 1/Paragraph I indicates that 8 pull boxes were identified. Subsequent to issuance of Attachment 1, additional conduits and one pull box were added to the table. The first sentence of Attachment 1/Paragraph 1 requires correction. The first walkdown resulting in the memo consisted of an inventory of individual conduits which had seepage or evidence of past seepage and pull boxes containing numerous conduits which had a potential for seepage or evidence of past seepage. Subsequent to the first walkdown, the covers were removed from the pull boxes to identify individual conduits within the pull boxes with seepage or evidence of past seepage. This reduced the totals reflected in the sentence and provides the actual numbers of conduits with evidence of current or past seepage as shown in the tables.)

Temporary conduits which enter the basemat from outside, and which once allowed passage of ground water in quantities that required periodic pumping, have now all been pressure grouted as part of the normal design requirement and their temporary blockout pits filled with concrete as shown on Drawing LOU-1564-G-499 S09. Therefore, they no longer serve as leak paths for ground water.

Attachment 2 discusses the sealing of a piezometer riser and a piezometer standpipe. The piezometer riser (Item 8 of Attachment 1) consists of piezometers in a conduit down in the aquifer (surrounded by a well pipe). The conduit was internally sealed behind the piezometers and was sealed again in the portion of conduit that transverses the basemat. As recommended in Attachment 2, this conduit will be sealed with a light density silicone elastomer since two of the piezometers are still operable. The piezometer standpipe is basically a well pipe filled with water under pressure from the aquifer with piezometers attached at the -35 level. This standpipe has been pressure grouted. The location of the riser is just south of the J wall, between 5A and 6A (i.e., in corridor south of EFW pump A - see FSAR Figure 1.2-11). The location of the standpipe is north of the L wall, between 6A and 7A (i.e., in the radioactive pipe chase - see FSAR Figure 1.2-19).

CAUSE:

Except in the case of the piezometer riser, the seal material in place does not provide total waterstop characteristics.

GENERIC IMPLICATIONS:

There are no generic implications since the potential paths for ground water to flow in appreciable quantities had already been addressed.

SAFETY SIGNIFICANCE:

There was never a path for ground water to flow in sufficient quantity to flood the auxiliary building basement, even before the seals were installed and before the temporary conduits were grouted. The floor drain and sump pump system was more than adequate to handle the quantity of water which entered the building during construction, and is adequate to handle the much reduced quantity presently observed, most of which evaporates before ever reaching a floor drain. On this basis, there is no recognized reason that this issue should constrain fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

As stated above, there is no safety significance associated with this issue. Corrective action will be taken as part of good construction practice. The decision to replace the seals on the conduits will be based strictly on operating and maintenance considerations. Any replacement seals will consist of a light density silicone elastomer which has the capability to stop the seepage.

ATTACHMENTS:

(1) Memorandum ES-9160-84 of May 18, 1984

(2) Memorandum ES-9409-84 of June 1, 1984

REFERENCES:

(1) Drawing LOU-1564-G-499 S09

(2) FSAR Figure 1.2-11

(3) FSAR Figure 1.2-19

ATTACHMENT 1

MEMORANDUM

May 18, 1984
ES-9160-84

To: J. Houghtaling

From: J. T. G[illegible]

Subject: LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES - UNIT NO. 3
WATER SEEPAGE FROM CONDUITS,
ELEVATION -35

In accordance with your request, Civil and Electrical ESSE conducted a walkdown of the conduits which penetrate the mat at Elevation -35 of the RAB, FHB and Cooling towers to determine which conduits are leaking water. At the same time NTEE was requested to review the type of material that could be employed to seal the conduits and eliminate seapage of water onto the floor.

The results of this study are as follows:

I. Results of Walkdown

A comprehensive walkdown of all conduits which penetrate the Mat at Elevation -35 revealed either seepage of water or evidence that water has leaked from 76 of these conduits. The attached table provides a complete listing of the affected conduits including their location and cables contained. A large number of these conduits (53) penetrate the Mat and enter floor mounted pull boxes. There are eight such pull boxes that have been identified.

II. Results of NTEE Study

NTEE was requested to review this problem and identify the type of fix that would prevent water from penetrating these conduits. It was determined that sealing the conduits with Light Density Silicone Elastomer (LDSE) which has been provided by B&B in accordance with existing specification LOU 1564.249W will prevent the seepage of water through the conduits.

Assuming the water table to be equal to grade elevation of +17.5 feet and the affected conduits end flush with slab elevation -35 feet (worse case), the pressure on top of the conduit opening can be calculated as follows:

Pressure (PSI) = Head (ft.)/2.31(ft/psi) where
Head (ft.) = $d_1 - d_2$, therefore

Pressure (PSI) = 17.5-(-35)/2.31 or 22.7psi

A four (4) inch thickness of LDSE has been tested by B&B to be a fire rated seal and a hydrostatic seal rated for 20 psi.

Since the pressure on the conduit is 22.7psi, it is recommended that a six (6) inch thickness of LDSE in each conduit end will provide a margin for flooding at grade elevation. The existing Silicone Foam fire barrier material must be completely removed prior to pouring the LDSE. Also, upon curing the LDSE becomes hard and can only be removed by using a chisel.

It should be noted that the seepage of water onto the floor of Elevation -35 through these conduits is not an immediate hazard to the safety of the plant or its personnel, but rather a nuisance to maintenance. On this basis, it is recommended that replacement of the Silicone foam fire barrier material with the LDSE be scheduled as a post fuel load task at a time convenient to LP&L.

JTG/kw

cc: J. F. Montalbano
J. Costello
J. DeBruin
C. Ruiz
R. Vidal

CLIENT: LOUISIANA POWER & LIGHT
PROJECT: WATERFORD S.E.S. #3
SUBJECT: EMBEDDED CONDUIT INVESTIGATION

OFS NO. ____ DEPT. NO. ____
BY ____ DATE ____
CHECKED BY ____ DATE ____

ITEM NO.	LINE Nº OR BOX Nº	CONDUIT SIZE	APPROX LOCATION	DESCRIPTION LEAK	DESCRIPTION EVIDENCE	FROM / TO	CABLE TYPE	VOLTAGE	CABLE Nº
1	35075	2"ϕ	W. OF WALL ON 12A, BETW. H & J	✓		CAP NEAR J/12A / B3276-NB	-	-	-
2	30370A	4"ϕ	DITTO	✓		SWGR 3AB31S 480V(4) / CHG P "AB" (CH-3)	3/C #1/0T (075-03)	POWER	30370A
3	30873A	2"ϕ	S. OF SUMP IN WASTE TANK A	✓		B3267-NA / W DR TK SMP #11A	3/C #8 (075-09)	POWER	30873A
4	B3278 (PULL BOX)	8-2"ϕ	E. OF WALL ON 6A, INJECT. PUMP AREA "B"	✓ (1 CND)		SEE SHEET-5			
5	B3279 (PULL BOX)	11-2"ϕ	DITTO	✓ (3 CNDS)		SEE SHEET-4			
6	30863B	2"ϕ	DITTO	✓		B3276-NB / REAC DR P FD SMP #5A	3/C #8 (075-09)	POWER	30863B
7	B3753 (PULL BOX)	3-2"ϕ	W. OF WALL ON 10A, INJECT. PUMP AREA "B"	✓ (1 CND)		SEE SHEET-6			
8	4" RISER PIEZOMETER	4"ϕ	3'-0 S. OF J, 3'-0 W. OF 6A	✓					
9	B3270 (PULL BOX)	5-2"ϕ	E. OF WALL ON 6A, INJECT. PUMP AREA "A"	✓ (2 CNDS)		SEE SHEET-7			
10	B3271 (PULL BOX)	6-2"ϕ	DITTO	✓ (1 CND)		SEE SHEET-8			
11	33537	2"ϕ	S. OF WALL ON H, BETW. 4A & 5A		✓	CAP NEAR H/4A (SP) / B3279-NB	-	-	-
12	7902203 TEMP. POWER CONSTR	4"ϕ	S. OF WALL ON W, W. OF 7FH - FHB.	✓					
13	30876E	2"ϕ	W. OF WALL ON 1M, BETW. V & W - C.T.		✓	B3168-NA / B3174-NA	2/C #14 (050-03)	CONTROL	30876E, G, H.
14	30340	2"ϕ	NEXT TO N. WALL INSIDE B.A. MAKE-UP TANK "B"		✓	P201-3A(3403 / B3189-3A	1/C #4 (075-07)	POWER	30340A
15	30370A	4"ϕ	INSIDE CHARGE PUMP ROOM-AB	✓		SWGR 3AB31S 480V (4) / CHG P "AB" (CH-3)	3/C #1/0T (075-03)	POWER	30370A
16	38011	2"ϕ	S.W. OF COL LINES 5A & K	✓		CAP NEAR K/5A (SP) / CAP NEAR K/6A	-	-	-

CLIENT: LOUISIANA POWER & LIGHT
PROJECT: WATERFORD - S.E.S. #3
SUBJECT: EMBEDDED CONDUIT INVESTIGATION

OFS NO. ____ DEPT. NO. ____
BY ____ DATE ____
CHECKED BY ____ DATE ____

ITEM NO.	LINE Nº OR BOX Nº	CONDUIT SIZE	APPROX LOCATION	DESCRIPTION: LEAK	DESCRIPTION: EVIDENCE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE Nº
17	30851V	2"ø	BETW. 4A & 5A, NEXT TO SUMP.	✓		C70B-5A1 3307 CCW M-U P "A"	-	-	-
18	37102	2"ø	S.E. OF COL. LINES 4A & K		✓	B3297-SAB GOV CNTL PNL	3/C #18 SI (083-06)	LOW	315414
19	30686A	2"ø	DITTO	✓	✓	L205A NB: 3304 TE-651	3/C #14 ST (083-01)	LOW	30686A
20	30872V	2"ø	S. OF WALL ON L, EQUIP. DRAIN & SUMP PUMP.		✓	B3759-NA B30276-NA	2/C #14 (050-03)	CONTROL	30872 C, D, G, H, J
21	30872B	2"ø	DITTO		✓	EQUIP DR SMP #1B B3276-NB	3/C #8 (025-09)	POWER	30872B
22	30528A	2"ø	N. OF WALL ON L, BETW. 9A & 10A.	✓		P102-5B 3708 MV 251-V1564B4 (SI-646)	3/C #8 (025-09)	POWER	30528A
23	B3319 (Pull Box)	8-2"ø	S. OF COL. ON COL. LINE 9A & M	✓ (2 CNDS)		SEE SHEET - 9			
24	30516A	2"ø	N. OF WALL ON L. BETW. 8A & 9A	✓		B3317-5A MV 251 V809A (SI 608)	3/C #8 (025-09)	PWR	30516A
25	30516B	2"ø	DITTO		✓	B3318-5A MV 251-V809A (SI-668)	9/C #14 (050-07)	CONTL	30516B
26	38001	2"ø	N. OF WALL ON L, BETW. 7A & 8A		✓	B3319-5B (SP) CAP NR LY/7A	-	-	38001-SB
27	B3318 (Pull Box)	6-2"ø	S. OF COL. ON COL. LINE 6A & LY.	✓ (2 CNDS)		SEE SHEET - 10			
28	B3317 (Pull Box)	6-2"ø	DITTO	✓ (2 CNDS)		SEE SHEET - 11			
29	30877B	2"ø	E. OF A.D. SUMP W. OF WALL ON 12A - C.T.		✓	MCC 3B314S (51) CLG. TWR. AREA DR SMP #2B	3/C #8 (025-09)	POWER	30877B
30	33095	3"ø	S.W. CORNER OF WALLS ON 12A & S - C.T.		✓	SPARE			
31	TEMP. POWER CONSTR.	4"ø	N. OF WALL ON R, BETW. 12A & 12M - C.T.		✓				
32	B3751 (Pull Box)	3-2"ø	6A & N or J	✓ (1 CND)		SEE SHEET 12			
33	30867A	2"ø	8'E of 3A @ M	✓		B3270-NA RAB SMP #3A	3/C #8 (025-09)	POWER	30867A
34	30406A	2"ø	11'E of 6A / 11'-6 N of K	✓		B3270-NA REAC. DR. TK. P	3-1/C #8 (025-08)	POWER	30406A
35	35314	2"ø	7'E of 9A / @ K	✓		B3277-NB CAP NR. K/9A (SPARE)	-	-	-
36	38010	2"ø	SOUTH WALL OF CHG. P. RM A/B IN PIPE CHASE	✓		B3282-SAB CAP NR. J/3A (SPARE)	-	-	-

BY ______ DATE ______ CHKD. BY ______ DATE ______

CLIENT ______

PROJECT ______

SUBJECT ______

OFS NO. ______ DEPT. NO. ______

ITEM NO.		CONDUIT No.	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE No.
4		B3278·NB					
	*	30865F·NB	2	B3278·NB B3751·NA	3/C #14 (050·04)	CONTROL	30865F
		30883F·NB	2	B3278·NB B3748·NA	3/C #14 (050·04)	CONTROL	30883F
		35086·NB	2	B3278·NB (SP) CAP NEAR K/4A	-	-	-
		30884F·NB	2	B3278·NB B3457·NA	3/C #14 (050·04)	CONTROL	30884F
		35087·NB	2	CAP NEAR J/5A (SP) B3278·NB	-	-	-
		30871F·NB	2	B3749·NA B3278·NB	3/C #14 (050·04)	CONTROL	30871F
		30867F·NB	2	B3278·NB B3447·NA	3/C #14 (050·04)	CONTROL	30867F
		35097·NB	2	CAP NEAR H/4A (SP) B3278·NB	-	-	-

* = CND HAS LEAK

BY ______ DATE ______
CHKD. BY ______ DATE ______
CLIENT ______
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OFS NO. ______ DEPT. NO. ______

ITEM NO.	CONDUIT Nº	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE Nº
15	B3279-NB					
	30441A-NB	2	B3279-NB HLDP DR P	1/c #8 (D25-08)	POWER	30441A
*	33085-NB	2	CAP NEAR J/5A(SP) B3279-NB	–	–	–
	30883B-NB	2	OIL SMP #3B B3279-NB	3/c #8 (D25-09)	POWER	30883B
	30447A-NB	2	B3279-NB HLDP RCRAG P	1/c #8 (D25-08)	POWER	30442A
	30871B-NB	2	B3279-NB BA RM SMP #9B	3/c #8 (D25-09)	POWER	30871B
*	30469A-NB	2	B3279-NB BA COND P "B" (BAC-B)	1/c #8 (D25-09)	POWER	30469A
	33086-NB	2	B3279-NB (SP) CAP NEAR K/4A	–	–	–
	30867B-NB	1	B3279-NB RAB SMP #8B	3/c #8 (D25-09)	POWER	30867B

* = CND HAS LEAK

BY ______ DATE ______ Pg 5 of 12 SHEET ___ OF ___
CHKD. BY ______ DATE ______ OFS NO. ______ DEPT. NO. ______
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ITEM NO.	CONDUIT Nº	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE Nº
5	83279 (CONT.)					
	30865B-NB	2	B3279-NB SI RM "AB" SMP #7B	3/c #8 (D25-09)	POWER	30865B
*	33532-NB	2	CAP NEAR N/AA (SP) B3279-NB	–	–	–
	30884B-NB	2	B3279-NB DSL OIL STG TK OSMP #1B	3/c #8 (D25-09)	POWER	30884B

* = CND HAS LEAK

BY ______ DATE ______
CHKD. BY ______ DATE ______
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ITEM NO.	CONDUIT NO.	SIZE	FROM/TO	CABLE TYPE	VOLTAGE	CABLE NO.
7	B3753-NA					
	30866E-NA	2	B3266-NA / B3753-NA	3/C #14 050-04	CONTROL	30866E
				7/C #14 050-03	CONTROL	30866G
*	30866F-NB	2	B3275-NB / B3753-NA	3/C #14 080-04	CONTROL	30866F
	30866V-NB	2	B3753-NA / B3818-NA	7/C #14 050-03	CONTROL	30866 C, D, G, H, J.

* = SNDS HAVE LEAK ONLY AT THE FLOOR WHERE THEY EXIST. THE MAT. NOT INSIDE THE PULLBOX. (THE PULLBOX IS MOUNTED 3'-0 ABOVE THE FLOOR)

BY ______ DATE ______
CHKD. BY ______ DATE ______
CLIENT ______
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ITEM NO.		CONDUIT No	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE No
9		B3270					
	*	30884E-NA	2	B3271-NA	3/C #14 D50-04	CONTROL	30884E
				B3457-NA	2/C #14 D50-03	CONTROL	30884G
		30872E-NA	2	B3271-NA	3/C #14 D50-04	CONTROL	30872E
				B3759-NA	2/C #14 D50-03	CONTROL	30872G
		30883E-NA	2	B3271-NA	3/C #14 D50-04	CONTROL	30883E
				B3748-NA	2/C #14 D50-03	CONTROL	30883G
	*	30867E-NA	2	B3271-NA	3/C #14 D50-04	CONTROL	30867E
				B3442-NA	2/C #14 D50-03	CONTROL	30867G
		30863E-NA	2	B3271-NA	3/C #14 D50-04	CONTROL	30863E
				B3750-NA	2/C #14 D50-03	CONTROL	30863G

* = CNDS HAVE LEAK

EBASCO SERVICES INCORPORATED

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BY ______ DATE ______ SHEET 8 OF 11

CHKD. BY ______ DATE ______ OFS NO. ______ DEPT. NO. ______

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ITEM NO.	CONDUIT NO.	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE NO.
10	B3271-NA 30872A-NA	2	ED SMP #1A B3271-NA	3/C #8 025.09	POWER	30872A
	30867A-NA	2	B3271-NA RAB SMP #3A	3/C #8 025.09	POWER	30867A
*	30883A-NA	2	OIL SMP #3A B3271-NA	3/C #8 025.09	POWER	30883A
	30863A-NA	2	B3271-NA REAC DR ? FL DR SMP #5A	3/C #8 025.09	POWER	30863A
	30884A-NA	2	B3271-NA DSL OIL STG TK OSMP #1A	3/C #8 025.09	POWER	30884A
	30406A-NA	2	B3271-NA REAC DR TK P			30406A

* = CND HAS LEAK

ITEM NO.		CONDUIT Nº	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE Nº
23		B3319-5B 30542A-5B	2	P102-5B:3708 MV 2SI-V1539B1 (SI-675)	3/c #8 025-09	PWR	30542A
		38001-5B	2	B3319-5B CAP NR 4Y/7A	-	-	-
	*	30526A-5B	2	P102-5B:3708 MV 2SI-V1540B7 (SI-626)	3/c #8 025-09	PWR	30526A
		30541A-5B	2	P102-5B:3708 MV 2SI-V1549A1 (SI-615)	3/c #8 025-09	PWR MRE 601207 PO N4Y03495	30541A
	*	30528A-5B	2	P102-5B:3708 MV 2SI-V1544B4 (SI-646)	3/c #8 025-09	PWR	30528A
		30527A-5B	2	P102-5B:3708 MV 2SI-V1547B3 (SI-636)	3/c #8 025-09	PWR	30527A
		38018-5B	2	B3319-5B CAP NR 2207	-	-	-
		30525A-5B	2	P102-5B:3708 MV 2SI-V1545B1 (SI-610)	3/c #8 025-09	PWR	30525A

* = CNDs HAVE LEAK

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BY ______ DATE ______

CHKD. BY ______ DATE ______ OFS NO. ______ DEPT. NO. ______

CLIENT

PROJECT

SUBJECT

ITEM NO.	CONDUIT Nº	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE Nº
27	B3318-5A 30522B-5A	2	B3318-5A MV 2SI-V546A2 (SI-627)	9/c #14 050-07	CONTROL	30522B
*	30516B-5A	2	B3318-5A MV 2SI-V809 (SI-648)	9/c #14 050-07	CONTROL	30516B
	30521B-5A	2	B3318-5A MV 2SI-V1550A (SI-617)	2/c #18 ST 083-06	LOW LEVEL	30521M
*	30524B-5A	2	B3318-5A MV 2SI-V1548A4 (SI-647)	9/c #14 050-07	CONTROL	30524B
	30544B-5A	2	B3318-5A MV 2SI-V543B2	9/c #14 050-07	CONTROL	30544B
	30523B-5A	2	B3318-5A MV-2SI-V1542AB (SI-637)	9/c #14 050-07	CONTROL	B0523B

* = CNDS HAVE LEAK

BY ______ DATE ______

BY ______ DATE ______

OFS NO. ______ DEPT. NO. ______

CLIENT ______

PROJECT ______

SUBJECT ______

ITEM NO.		CONDUIT No	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE No
8		B3317-5A 30544A-5A	2	B3317-5A MV 2SI-V543B2	3/c #8 025-09	PWR	30544A
	*	30516A-5A	2	B3317-5A MV 2SI-V809A (SI-668)	3/c #8 025-09	POWER	30516A
		30522A-5A	2	B3317-5A MV 2SI-V1546A2 (SI-627)	3/c #8 025-09	POWER MEAG	30522A DL207 403495
	*	30524A-5A	2	B3317-5A MV 2SI-V548A4 (SI-647)	3/c #8 025-09	POWER	30524A
		30521A-5A	2	B3317-5A MV 2SI-V1550A1 (SI-617)	1/c #8 025-08	POWER	30521A
		30523A-5A	2	B3317-5A MV 2SI-V1542A8 (SI-637)	3/c #8 018-09	POWER	30523A

* = CNS HAVE LEAK

CLIENT
PROJECT
SUBJECT
OPS NO. DEPT. NO.

ITEM NO.	CONDUIT No	SIZE	FROM/ TO	CABLE TYPE	VOLTAGE	CABLE No
32	B3751-NA					
	30865B-NB	2	B3279-NB SI-RM "AB" SMP #78	3/c #8 (D25-09)	POWER	30865B
*	30865F-NB	2	B3278-NB B3751-NA	3/c #14 (D50-04)	CONTROL	30865F
	30865V-NA	2	B3751-NA B3820-NA	2/c #14 (D50-03)	CONTROL	30865C, D, G, H, J

* = CND HAS LEAK

ATTACHMENT 2

MEMORANDUM

June 1, 1984
ES-9409-84

TO: J. Houghtaling

FROM: B. Grant B.G.

SUBJECT: LOUISIANA POWER & LIGHT COMPANY
WATERFORD SES - UNIT NO. 3
WATER SEEPAGE FROM PIEZOMETERS IN BASE MAT

Reference: Memo ES-9160-84 of 5-18-84, Grillo to Houghtaling, "WATER SEEPAGE FROM CONDUITS, ELEVATION - 35"

Item 8 of the attachment to referenced memo identifies a leaking 4"ø riser for piezometers, as shown on drawing LOU-1564-G-499S09, Detail "X".

Two of the piezometers in this riser are still operating and they should continue in service so long as they give readings. Application of LDSE sealing foam as recommended in the memo will not interfere with continued service.

There is also a piezometer standpipe, No. P-23, which is shown on the same drawing, and which was not included in the referenced memo because it is not a conduit and does not leak.

This standpipe also requires sealing even though it does not leak at present, since its utility is over (it monitors a deep aquifer of no present interest) and in its present configuration (full of water under pressure) represents a potential leak path if it were to be broken by accident or corrosion.

It should be sealed by injection of pressure grout in sufficient quantity to fill it the height of the base mat, and then valved off against any minor seepage through the grout.

It is suggested that this action item be added to the list conveyed by the referenced memo.

BG/tw

cc: J. Costello
J. DeBruin
J. Grillo
R. Esnes
A. Bishara
P.C. Liu
L. Biller
B. Grant
G. Wu
ESSE File P. 83

RESPONSE

ITEM NO: 20 (Final)

TITLE: Construction Materials Testing (CMT) Personnel Qualification Records

NRC DESCRIPTION OF CONCERN:

The Inquiry Team effort included a review of the disposition of the generic problem identified during the LP&L Task Force verification relative to GEO Construction Testing (GEO) documentation for personnel qualifications in the area of CMT.

The utility should conduct a review of supporting documentation for GEO corrective action stated in Attachment 6 of NCR W3-F7-116 (Ebasco W3-6487). This review should focus on the identification of CMT personnel placed in GEO Categories 1, 2, or 3 who were apparently qualified solely on written statements by other individuals attesting to the individuals training and qualifications. For such individuals, the applicant should pursue any new information or evaluations which could provide further assurance in support of the actual past work experience and training referenced by the written statements.

DISCUSSION:

As requested by the staff, LP&L has pursued and obtained additional information on the GEO individuals performing inspections and tests as will be explained in the sections of this response entitled "Collection and Verification of Personnel Data" and "Disposition of Deficiencies". Also, evaluations have been made of work performed by GEO personnel as briefly outlined herein.

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. Assessment of the qualifications of all GEO Construction Material Testing (CMT) personnel, including those identified in Attachment 6 of Ebasco NCR W3-6497 (the NRC reference to Ebasco NCR W3-6487 is apparently a typographical error), was a part of that verification program.

The responses to Issues No. 1 and 10 discuss inspector qualifications for other Waterford 3 contractor 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, tests or data collection 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 a thorough background verification program.

Efforts were made to verify the education and work experience of 100% of the GEO-CMT QA/QC personnel by researching Waterford 3 GEO-CMT records and by contacting schools, former employers and others. While the success rate of the background verification effort for GEO-CMT 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 GEO-CMT 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 comprised of senior LP&L QA personnel. The Review Board determinations were further reviewed by 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 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, GEO 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 and were otherwise not involved in quality related work. To the extent such individuals were identified, they were excluded from the overall inspector population.

Disposition of Deficiencies

For those individuals found "unqualified" the LP&L review board initiated Corrective Action Request (CAR) EQA84-21S1 to formally disposition the identified deficiencies. Ebasco NCR-W3-6497 has been supplemented to reflect the disposition of this CAR and reclosed.

Disposition of CAR EQA84-21S1 was accomplished by 3 methods as follows:

1) Assessment of Key CMT tests and of skills required to perform these tests.

The key tests were as follows:

a) Concrete - The most important test is the final cylinder break test as this test serves to confirm the strength of the concrete actually placed in the structure. Other tests on concrete are generally either performed as measures to avoid subsequent replacement of sub-specification concrete or were performed in collecting the concrete for and preparing of the test cylinders. The break test requires minimal skill in setting up and starting a compression device which compresses a pre-molded cylinder to failure. A large gauge records the force required which is easily translated into the data required.

Further confidence in the quality of the as-built material is provided by the fact that improper operator action would tend to degrade test results, i.e., improper testing would cause the concrete to appear less strong than it actually is.

b) Soils - The most important test is the field density test as it measures whether the backfill material has been compacted to specific requirements. The field portion of the work, which was performed by the technician, consisted of digging a small hole and placing the removed soil in an airtight container, positioning a rubber balloon apparatus over the hole, inflating the balloon to a predetermined pressure and reading a volume indicator scale.

Further, confidence in the quality of the as-built material is provided by the quantity of tests conducted. As stated in the engineering report supporting the response to issue 7, to insure control of backfill placement approximately three times as many field density tests were conducted as required by the technical specifications.

c) Cadwelds - There was only one type of test on cadwelds conducted by GEO-CMT and that was the break test. This test is as simple as the concrete break test. The test specimens are secured in a tension device, tension is applied and the failure strength is read from a gauge and recorded.

It has been determined that only minimal training would be required for an unskilled individual to become proficient in performing the above tests. A single demonstration coupled with minimal practice under proper supervision is sufficient. GEO has formally confirmed that "Prior to being assigned to production work, all personnel were trained to perform the work required." On the basis of the above, though not strictly qualified to ANSI N45.2.6-1973, individuals could be considered competent to perform the technician or data collection type functions described.

2) Quality of Testing Performed by Personnel in Question

A detailed analysis was conducted of inspection/testing performed by a large sample of Level I personnel in question. This sample is felt to include the most significant exposure in terms of potential for inferior inspection/testing. Level II and III personnel either performing or directly supervising the performance of the tests described above should be competent to perform such functions.

3) Engineering Evaluation

A statistical analysis was conducted, using industry standard techniques, to evaluate test results for concrete and the class A backfill (Reference 3). In the case of concrete both the overall and within-test coefficients of variation demonstrated excellent control of the product which wo`'d not be the case had the tests not been well conducted. Backfill test resul.. also demonstrate good consistency. A review of cadweld data and test results described in Issue 11 indicates reliability of the test data and confirms the adequacy of the cadweld testing. This evaluation verifies the overall adequacy of the work of all levels, Levels (I, II and III) of GEO-CMT QC personnel.

CAUSE:

Implementation of 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." GEO and its predecessor organizations issued certifications of qualifications for testing personnel under successive programs which employed such substitutions and which became more detailed and better documented with time. The program in place since 1978 generally parallels the ANSI Standard for inspector certification. However, the verification program revealed that verification of background data was not adequate or documented, documentation of the justification for substitution of other factors for the requisite degree of training, education or experience was sometimes not provided, lacked depth, was not totally in accord with contractor procedures or the ANSI standard, 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 may have performed safety-related work, including GEO CMT personnel.

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 verification program and evaluation of the work performed by "unqualified" GEO CMT personnel provides reasonable assurance that the related installations will perform satisfactorily in service. There is no recognized reason that this issue should constrain fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

On tha basis of Reference 3, CAR EQA84-21S1 has been dispositioned.

ATTACHMENTS:

None

REFERENCES:

1. QASP 19.12, Review of Contractor QA/QC Personnel Qualification Verification
2. QAI-32, Instructions for Verification of QA/QC Personnel Qualifications
3. Engineering Evaluation of Report on the Review and Analysis of the work of GEO - Construction Material Testing.

RESPONSE

ITEM NO.: 21 (Final)

TITLE: LP&L QA Construction System Status and Transfer Reviews

NRC DESCRIPTION OF CONCERN:

The Inquiry Team assessment of the Ebasco QA disposition of LP&L QA Construction documentation and walk-through hardware findings for a sample of the sixty-seven systems transferred to LP&L operations resulted in NRC questions on the adequacy of Ebasco and LP&L QA Construction disposition of those findings. As a result of the NRC questions LP&L and Ebasco QA initiated a review to ensure that all LP&L QA Construction findings were adequately dispositioned. Ebasco QA had identified 15 systems or subsystems (Nos. 18-3, 36-1, 36-3, 43B, 43B9, 46C, 46E, 46H, 55A, 59, 69B, 71B2, 72A and 91E) where the LP&L findings may not have been properly dispositioned during the transfer of these systems to LP&L operations.

Based on the above, LP&L is requested to complete the review of all significant LP&L status and transfer review findings, such as undersized welds and other hardware walk-through and documentation findings. This review should ensure that these findings have been properly closed out or identified to LP&L operations for their closeout. For any LP&L open findings not properly identified on the status or transfer letters to LP&L operations, LP&L should determine whether this condition adversely affected the testing conducted for those systems.

DISCUSSION:

LP&L has completed its review of Construction QA system documentation and walkthrough hardware comments to ensure that these comments have been adequately dispositioned. This review included both "Status" and "Transfer" comments. All significant comments have been properly closed out or identified to LP&L Plant Staff on the Master Tracking System (MTS).

The term "Status" refers to the point at which a Startup System (SUS) becomes the responsibility of LP&L Startup. The system may not be 100% complete, but it is considered complete enough to facilitate testing by LP&L Startup. The LP&L Construction QA Status review determines whether or not the documentation accurately reflects the status of the system and whether the documentation is acceptable. The organizational elements involved in this phase are Construction, QA and Startup. Per the established startup program, Plant Staff is only involved in the Transfer phase.

The term "Transfer" refers to the conveyance of jurisdiction of a SUS from LP&L Startup to Plant Staff following construction completion and preoperational testing. The LP&L Construction QA final review and acceptance of the system documentation is a prerequisite to acceptance of the system by Plant Staff and is documented in a Construction QA letter to LP&L Startup for inclusion in the system transfer package.

During the transfer review process, comments generated by LP&L Construction QA are returned to Ebasco QA for resolution. The majority of the comments pertain to documentation deficiencies. However, any comments that are hardware impacting (i.e., requiring rework or engineering evaluation) are processed using Deficiency Notices (DN's) or Nonconformance Reports (NCR's) and are identified and tracked by the Master Tracking System (MTS) until they are formally closed. If deficiencies are still open when the LP&L Construction QA Transfer letter is issued to LP&L Startup, they are referenced in the letter. This is done in order to allow the Plant Staff to make informed decisions regarding acceptance of system jurisdiction and to assure continuity of deficiency awareness through the transfer process. The Construction QA letter is updated by the Startup Transfer Group to the time the system is submitted to Plant Staff for transfer and is included in the transfer package.

Under the above process, resolution of all significant LP&L Construction QA comments should be accomplished prior to transfer of each system.

Comments not impacting on hardware need not be resolved prior to transfer. At the time of the Inquiry Team assessment, LP&L and Ebasco were in the midst of the transfer review process. The listing of 15 systems given to the NRC during the Inquiry Team assessment included those systems preliminarily identified as having LP&L QA comments to which Ebasco had not yet responded. This listing should be corrected as follows: System 43B9 should be system 46B, system 69B should be system 60B, and system 56A was left out and should be added. Further investigation revealed that systems 46C and 72A had been adequately responded to by Ebasco QA. The remaining 13 systems had outstanding comments. These have been responded to and have been accepted by LP&L QA. Of the 13 systems, 7 were classified as "accepted with comments". This means that LP&L QA accepted the system with comments that were not considered to be hardware impacting and, therefore, need not have been responded to by Ebasco QA prior to system transfer. Of the remaining 6 systems, 46E had not yet been submitted for transfer. Three other systems (43B, 36-1 and 36-3), which had comments concerning undersized welds, were submitted for transfer on the assumption that the referenced welds had been reinspected and were accepted under the resolution of SCD 74 (which addresses such undersized welds generically). The referenced welds have now been reinspected and are acceptable. The last two systems (46B and 59) of the six were transferred because the comments were resolved prior to the LP&L Construction QA letter being written. The formal response from Ebasco had not been transmitted.

LP&L has performed an overall review of hardware and software comments generated during Status and Transfer of safety-related systems. This review of comments was to determine if there were generic implications or significant trends. There were no generic problems or trends identified other than those previously processed in accordance with Waterford-3 Site QA Program requirements (e.g. SCDs 57, 60 and 74). This review is documented in the File Memo W3K84-1148, dated 5/14/84.

Ebasco QA conducted a surveillance (SMR-84-6-1, dated 6/20/84) of their Status files which verified that Ebasco QA had submitted complete responses to all LP&L QA comments. No additional outstanding correspondence was found during this review. This was confirmed by LP&L QA.

In conclusion, LP&L found no significant open comments that were not included in the Status or Transfer letters to LP&L Startup which would have adversely affected the testing conducted for these systems. In addition, no significant comments were found which were not resolved or identified on the MTS per existing procedure at the time it was recommended to the Plant Manager that the SUS be accepted.

CAUSE:

The NRC was concerned that Construction QA comments were not being resolved in a timely fashion. The process of closing status comments was in progress at the time of the inquiry team assessment, but had not been completed.

In all cases except for undersized welds, resolution in fact was not untimely. In the case concerning undersized welds, comment responses arguably should have been provided prior to transfer. Comment responses on undersized welds were not required prior to transfer due to a misunderstanding as to the need for system specific weld reinspection because it was believed that these welds were covered by SCD-74.

GENERIC IMPLICATIONS:

None.

SAFETY SIGNIFICANCE:

A review by LP&L Startup and Plant Staff of the comments, other than those processed as DNs or NCRs, for the systems listed in the NRC concern determined that none were significant or would have impacted testing or system operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

As shown above, the Status and Transfer reviews have been satisfactorily closed-out. Furthermore, the Plant Staff will be promptly notified if and when any significant problems are subsequently identified on a system. The identification and notification will be accomplished via the CIWA (Condition Identification Work Authorization) process.

ATTACHMENTS:

1) Disposition of System Status and Transfer Reviews

2) Description of System Status and Transfer Reviews

REFERENCES:

All letters referenced in Attachment 1.

ATTACHMENT 1

DISPOSITION OF SYSTEM STATUS AND TRANSFER REVIEWS*

SUS	LP&L COMMENTS	EBASCO RESPONSE	LP&L ACCEPTANCE
18-3	W3K-83-0648 (5/18/83)	W3-QAIRG-0572 (6/20/83)	W3K84-0853 (6/22/83)
		W3-QAIRG-1405 (5/9/84)	W3K84-1271 (5/28/84)
36-1	W3K-83-0197 (2/17/83)	W3-QAIRG-0342 (2/24/83)	W3K84-1654 (7/19/84)
		W3-QAIRG-1439 (6/7/84)	W3K84-1654 (7/19/84)
		W3-QAIRG-1439 S1 (7/19/84)	W3K84-1654 (7/19/84)
36-3	W3K-82-183 (2/16/83)	W3-QAIRG-0339 (2/22/83)	W3K84-1560 (7/5/84)
		W3-QAIRG-1440 (6/7/84)	W3K84-1560 (7/5/84)
	W3K-83-210 (2/18/83)	W3-QAIRG-1448 (6/13/84)	W3K84-1560 (7/5/84)
43B	W3K-83-0195 (2/17/83)	W3-QAIRG-0346 (2/25/83)	W3K84-1561 (7/5/84)
		W3-QAIRG-1441 (6/7/84)	W3K84-1561 (7/5/84)
46B	W3K-83-0613 (5/10/83)	W3-QAIRG-0556 (6/14/83)	W3K84-1250 (6/4/84)
		W3-QAIRG-1450 (6/17/84)	W3K84-1250 (6/4/84)
	W3K-83-210 (2/18/83)	W3-QAIRG-1396 (5/4/84)	W3K84-1250 (6/4/84)
46C	W3K-83-0196 (2/17/83)	W3-QAIRG-0348 (2/28/83)	W3K84-1562 (7/6/84)
		W3-QAIRG-1399 (5/4/84)	W3K84-1562 (7/6/84)
46E	W3K-83-728 (5/31/83)	W3-QAIRG-0544 (6/10/83)	W3K84-1599 (7/12/84)
		Q.S.E.-1001 (4/11/84)	None Required
		W3-QA-28118 (4/17/84)	W3K84-1599 (7/12/84)
	W3K-83-0342 (3/17/83)	W3-QAIRG-0436 (4/14/83)	W3K84-1599 (7/12/84)
		W3-QAIRG-1372 (4/17/84)	W3K84-1599 (7/12/84)
	W3K-83-0343 (3/18/83)	W3-QAIRG-1442 (6/7/84)	W3K84-1599 (7/12/84)
46H	W3K-83-0450 (4/8/83)	W3-QAIRG-0483 (5/13/83)	W3K84-1453 (6/22/84)
		W3-QAIRG-0483 S1 (6/21/84)	W3K84-1453 (6/22/84)
55A	W3K-83-0688 (5/26/83)	W3-QAIRG-0545 (6/10/83)	W3K84-0769 (4/2/84)
		W3-QAIRG-1392 (5/4/84)	W3K84-1378 (6/7/84)

ATTACHMENT 1
(continued)

SUS	LP&L COMMENTS	EBASCO RESPONSE	LP&L ACCEPTANCE
56A	W3K-83-0477 (4/11/83)	W3-QAIRG-0480 (5/12/83)	W3K84-1563 (7/5/84)
		W3-QAIRG-1400 (5/4/84)	W3K84-1563 (7/5/84)
59	W3K-83-1353 (9/14/83)	W3-QAIRG-1403 (5/4/84)	W3K84-1421 (6/15/84)
60B	W3K-83-1936 (12/7/83)	W3-QAIRG-1395 (5/4/84)	W3K84-1564 (7/6/84)
71B2	W3K-83-1140 (8/5/83)	W3-QAIRG-1393 (5/4/84)	W3K84-1565 (7/6/84)
72A	W3K-82-0733 (11/2/82)	W3-QAIRG-0192 (12/1/82)	W3K84-1377 (6/12/84)
91E	W3K-83-1859 (11/29/83)	W3-QAIRG-1112 (1/9/84)	W3K84-1568 (7/6/84)
		W3-QAIRG-1112 S1 (5/9/84)	W3K84-1568 (7/6/84)

* This listing gives the letter numbers with issuance dates in parenthesis.

ATTACHMENT 2
DESCRIPTION OF SYSTEM STATUS AND TRANSFER REVIEWS

SUS	LP&L Letter	EBASCO Letter	INCOMPLETE RESPONSES Finding	Resolution/Answer
Walkdown 18-3	W3K-83-648 (5/18/83)	W3-QAIRG-1405 (5/9/84)	1. FW-5,6,18 and 19 not per As-built. 2. 22" separation on tubing instead of 24". 3. Flareless connectors not right.	1. Nonproblem per ASP-IV-79 2. FCR-ICP-672 written to accept this condition. 3. Reworked 12/22/83 per CIWA83E165
Walkdown 36-1	W3K-83-197 (2/17/83)	W3-QAIRG-1439 (6/7/84)	T-B undersized welds.	Generic problem addressed under SCD 74 at time of Finding.
Walkdown 36-3	W3K-82-183 (2/16/83)	W3-QAIRG-1440 (6/7/83)	1/4" fillet welds-potentially undersized.	Non-problem. This is acceptable per the ASME Code.
Walkdown 36-3	W3K-83-210 (2/18/83)	W3-QAIRG-1448 (6/13/84)	T-B undersized welds.	Generic problem addressed under SCD 74 at time of Finding.
Walkdown 43B	W3K-83-195 (2/17/83)	W3-QAIRG-1441 (6/7/84)	T-B undersized welds.	Generic problem addressed under SCD 74 at time of Finding.
Review 46B	W3K-83-613 (5/10/83)	W3-QAIRG-1450 (6/17/84)	AS-IC-1127-No spool number.	Line number wrong. Line was AC-IC-1177 and Iso. was revised to add spool number.
Walkdown 46B	W3K-83-557 (5/3/83)	W3-QAIRG-1396 (5/4/84)	OCR 1311 and 1223 had tubing with incorrect slope.	Tubing reworked by Mercury at time of Finding.
46C	W3K-83-196 (2/17/83)	W3-QAIRG-348 (2/28/83)	Non-problem. All Findings were responded to in Letter W3-QAIRG-348 (2/28/83).	
Walkdown 46E	W3K-83-728 (5/31/83)	W3-QA-28118 (4/17/84)	1. Loose Clamps. 2. High points in tubing. 3. Valve tag incorrect.	Findings 1 and 2 were added to the Area Walkdown Punchlists. 3. Reinspection found valve to be correctly tagged.
Review 46E	W3K-83-342 (3/17/83)	W3-QAIRG-1372 (4/17/84)	Various document deficiencies.	All deficiencies resolved prior to Ebasco issuing QA Transfer Letter W3-QAIRG-364RR on 11/3/83 for T-B.
Walkdown 46E	W3K-83-343 (3/18/83)	W3-QAIRG-1442 (6/7/84)	T-B undersized welds and various other problems.	SCD-74 and NCR-7680

ATTACHMENT 2
(continued)

SUS	LP&L Letter	EBASCO Letter	INCOMPLETE RESPONSES Finding	Resolution/Answer
Review 46H	W3K-83-450 (4/8/83)	W3-QAIRG-483S1 (6/21/84)	Wrong washers installed.	Ebasco rework forms were initiated at time of Finding. Rework was complete on 5/25/83.
Walkdown 55A	W3K-83-688 (5/26/83)	W3-QAIRG-1392 (5/4/84)	Various tubing problems.	W3-NCR-7147 and 7146 were written on 10/12/83 to address these problems. Both were closed on 11/7/83.
Walkdown 56A	W3K-83-477 (4/14/83)	W3-QAIRG-1400 (5/4/84)	1. Coupling not shown on Iso. 2. SW6R1 to 90° El. not flange.	1. Iso. revised per FCR-MP-219. 2. Correct. FW6R2 was to flange.
Walkdown 59	W3K-83-1353 (9/14/83)	W3-QAIRG-1403 (5/4/84)	1. FW not per CIWA814747. 2. No documentation for CIWAs 82A705 and 825039.	1. DN-SQ-745 (written 9/15/83) and CIWA83C259 were written at time of Finding to rework the FW. 2. CIWA82A705 was part of NCR-4552 and CIWA825039 was Non-Safety and in the CIWA Vault.
Review 60B	W3K-83-1936 (12/7/83)	W3-QAIRG-1395 (5/4/84)	OCR 2036 and 2037 had open 9.1s and 9.2s.	OCR-2036 was resolved 5/24/83. OCR-2037 was resolved 11/12/83.
Walkdown 71B2	W3K-83-1140 (8/5/83)	W3-QAIRG (5/4/84)	Various	NCR-7111 was written 10/6/83 to address Findings. L-CIWA004871 was written to perform rework. NCR closed 3/27/84.
72A	W3K-82-733 (11/2/82)	W3-QAIRG-192 (12/1/82)	Non-problem. All Findings were responded to in Letter W3-QAIRG-192 (12/1/82).	
Review 91E	W3K-83-1859 (11/29/83)	W3-QAIRG-1112S1 (5/9/84)	Various F&M documentation deficiencies.	Documentation problems were resolved mainly by obtaining additional information from F&M.

RESPONSE

ITEM NO.: 22 (Final)

TITLE: Welder Qualifications (Mercury) and Filler Material Control (Site Wide)

NRC DESCRIPTION OF CONCERN:

The staff reviewed in process weld records for the installation of instrumentation systems by Mercury Company. Systems reviewed included Reactor Coolant, Safety Injection, Component Cooling Water, Main Steam, Main Feed, and Charging Water. The staff selected welders from these records and reviewed their qualifications to the welding process used during the time frame of actual welding.

Based on the staff's review it appears that some Mercury welders were not qualified. Problems included: welders not qualified to the correct welding procedure; welders qualified for a specific process, even though they were not tested for that process; actual dates on qualification records appeared questionable, the welder may have welded prior to being tested. The staff concludes that there are questions relative to the Mercury welder qualification status.

Also during this review the staff evaluated the controls being used to control filler material. The staff found that the requirements for "rebaking" of low hydrogen electrodes did not meet the requirement of the ASME and AWS Codes. The Codes require low hydrogen electrodes to be rebaked at temperatures of 450° to 800°F for two hours. The site practice for all site contractors was to rebake at 200°F for eight hours. Justification for this Code deviation has not been provided by LP&L.

LP&L shall (1) Attempt to locate the missing documentation and determine if the welders were properly qualified, or (2) If the documentation to support proper qualification cannot be located, LP&L shall propose a program to assure the quality of all welds performed by questionably qualified welders.

LP&L shall also provide engineering justification for the allowance of "rebake" temperatures and holding times that differ from the requirements of the ASME and AWS Codes.

DISCUSSION:

Welder Qualifications

LP&L has performed a review of all Mercury welders for proper qualification. This review was initiated in October 1983 as a disposition to NCR-W3-7218. It concluded that, with a single exception, all Mercury welders making safety and seismic weldments were properly qualified, and had welded only in processes for which they were so qualified. The single exception was identified, corrected, and dispositioned via NCR-W3-7219. A separate concern not covered in this response, involving the adequacy of the tube track welding process, is addressed in SCD 84 (NCR-W3-6159). Since the NRC's special review, NCR-W3-7218 has been supplemented with an attachment which provides clearer and more auditable documentation of the review.

As a result of concerns regarding discrepancies in Mercury welder qualification records noted by the NRC during the special review, and brought to LP&L's attention during a meeting on May 18, 1984, NCR-W3-7724 was opened. As a disposition to this NCR, a review was conducted that confirmed that the documentation to support the proper welding procedure qualification of all Mercury welders was in order with the exception of three minor discrepancies which have been corrected.

Although the review conducted by LP&L via NCR-W3-7724 covered all Mercury welders, a specific response to questions regarding the qualifications of the 13 welders identified by the NRC during the special review, is contained in Attachment 1. Included in this attachment are the three documentation discrepancies noted and corrected.

In the case of the 13 welders cited by the NRC, documentation supports the fact that all welded in processes for which they were qualified, except for M315 (See Attachment #1, item 1H); this welder did perform a weld out of his qualification. The weld, however, was rejected in process by the Mercury QC inspector, and the weld was redone by a qualified welder.

Filler Material Control

The Waterford 3 site procedures for filler material control were designed to preclude the need for drying ("rebaking") as used or defined by the ASME and AWS Codes and did not include provisions for "rebaking". The site procedures and corrective action taken in the isolated cases of deviation from site procedures were adequate to maintain the moisture content limitations specified by the codes for low hydrogen electrodes.

The AWS D1.1, Structural Welding Code (paragraph 4.9), states that low hydrogen, type E-7018, electrodes should be dried ("rebaked") when either of the following conditions exists:

1. If electrodes are not purchased in hermetically sealed containers

2. or if the hermetically sealed container shows evidence of damage

3. or if electrodes are not used within four (4) hours of removal from a drying or storage/holding oven.

   Condition 3 is also addressed in ASME Section III, NX-2440, Storage and Handling of Welding Materials which states "Suitable storage and handling of electrodes, flux, and other welding materials shall be taken to minimize absorption of moisture by fluxes and cored, fabricated, and coated electrodes."

Low hydrogen electrodes used at Waterford were specified to be purchased in hermetically sealed containers. This practice eliminated the need to dry the electrodes for condition 1) above.

Ebasco Discrepancy Notices were reviewed to find conditions of damage to hermetically sealed containers. Attachment 6 includes all DNs found which noted seal damage to low hydrogen electrode containers. The disposition and corrective action in all cases attached was to scrap or return the electrodes to the manufacturer for replacement. This practice eliminated the need to dry the electrodes for condition 2) above.

Site procedure ASP-IV-18, "Receiving, Storage, Issuing, and Control of Welding Electrodes and Filler Metals", Attachment 3, and individual contractor procedures (such as Tompkins-Beckwith's TBP-3, "Weld Material Control Procedure", Attachment 4), were written with the intent to control the welding materials in a manner that would minimize absorption of moisture or exposure to ambient conditions.

ASP-IV-18 and TBP-3 required that low hydrogen electrodes, upon removal from sealed containers, be placed in holding ovens for eight (8) hours at 200°F minimum prior to issue and that when these electrodes were issued that they were to be held in "point-of-use" ovens (rod caddies) prior to use. The site procedures for holding oven temperature (200°F minimum) comply with ASME's recommendation of 50°F to 250°F above ambient (ASME Section II, Part C, SFA 5.1, Table A.1, 1977 Edition) but do not comply with the AWS D1.1 250°F minimum (AWS D1.1-75, Paragraph 4.9). Although the wording of other site contractor procedures may have varied from the attached two procedures (i.e. leather pouches versus rod caddies), the moisture absorption of filler material was addressed and controlled in a similar fashion.

We believe, under the conditions above and through compliance with the site procedures, even with the holding temperature variation from AWS, that the electrodes would not have absorbed excessive amounts of moisture and that adequate filler material control, to meet condition 3) above, was present.

To identify and evaluate representative cases where deviations from weld rod control procedures occurred, all Ebasco Nonconformance Reports and Tompkins-Beckwith Discrepancy Notices were reviewed. Isolated cases were found which pertain to rod ovens and associated problems and are shown in Attachment 5. The corrective action for these cases consisted of either returning the electrodes to the holding ovens for the eight (8) hours or scrapping.

To justify the adequacy of corrective action, the two conditions, of those in Attachment 5, where low hydrogen electrodes could have potentially absorbed the greatest amount of moisture (T-B Discrepancy Notices W-339 and W-742) were evaluated. Both of these DN's noted conditions where holding ovens lost power over the weekend with the electrodes possibly exposed to ambient conditions for approximately forty-eight (48) hours. Ambient conditions for these two (2) DN's would be similar to that shown in Attachment 7. To determine the effects of this exposure, the following tests were performed:

1. The manufacturer, Alloy Rods Division of Chemetron Corporation, of the majority of the low hydrogen electrodes used at the site was contacted and submitted product literature on moisture absorption of E-7018 electrodes (see Attachment 8). The curves shown on page three (3) of the attachment indicate that the electrodes noted in the two (2) T-B Discrepancy Notices (if they were the "new" moisture resistant style electrode) would not have exceeded the ASME allowable moisture content of 0.60% (ASME Section II, Part C, SFA 5.5, Table 7, 1977 Edition).

2. In consideration that Attachment 8 applied to Alloy Rods Division's new moisture resistant coating (in use in mid 1981) and that the T-B DN's were prior to this date, the manufacturer was requested to test moisture absorption of the "old" style electrodes. Alloy Rods performed two separate tests of the old style electrodes to confirm our position that the effects of the conditions and subsequent corrective action taken in the case of the DN's was adequate and that drying or "rebaking" was not required.

The first test directly exposed the electrodes to a humidity cabinet for forty-eight (48) hours at 60°F and 80% relative humidity. The moisture content at the start was 0.10% and at the end of forty-eight (48) hours had increased to values between 0.56% to 1.26%, depending on electrode position in the bundle. The bundle was then placed in a dry rod oven for eight (8) hours at 250°F. The moisture content at the end of this time varied between 0.19% and 0.26%, which was well below the allowable 0.60%.

The second test simulated the conditions that occurred at site. A holding oven, Phoenix Type 300, was unplugged for forty-eight (48) hours. The moisture content at the start was 0.08% and at the end of the 48 hours had increased to 0.23%, which was still below the allowable 0.60% without subsequent reconditioning at 250°F for eight (8) hours.

The test results of the both tests are shown in Attachment 9.

The literature and testing performed by the manufacturer, confirm that the control of low hydrogen welding electrodes, even considering the isolated deviations from site procedures, was adequate.

The adequacy of the Waterford 3 Welding program was further confirmed by the satisfactory results of project and NRC NDE efforts.

In summary, LP&L's position is that 1) the weld material control program at Waterford meets the intent of both ASME and AWS Code requirements. 2) that the site procedures were designed to avoid the need for rebaking. 3) in the isolated instances where deviations from site procedures occurred, the corrective action was adequate to maintain the moisture content limitations specified by the codes for low hydrogen electrodes. 4) the adequacy of the weld material control program is substantiated by the acceptable results of the NDE examination, when performed, of welds where low hydrogen electrodes were used.

CAUSE:
The apparent cause for this concern is the complexity in understanding welder qualification hierarchy; improper placement of a "rebake" sign on an Ebasco rod oven; and lack of specific justification on corrective actions in some instances in which specified holding temperatures were not maintained.

The Mercury welders and their qualifications are in order and the site filler metal control procedures were adequate to limit the moisture content of the low hydrogen electrodes. Minor deviations from literal code interpretations are justifiable.

GENERIC IMPLICATIONS:

As discussed above, the review of Mercury's record confirmed that the documentation to support the proper qualification of Mercury welders is in order. The concern related to the control of moisture content in low hydrogen electrodes was treated generically in that procedures for all site contractors were reviewed and found to be acceptable.

To ensure that welding performed under the Plant Maintenance Program, was and will be properly accomplished, an audit of that program was conducted. The findings initiated Potentially Reportable Deficiency (PRD) No. 179 and were found to be without safety significance and closed by the NRC in Inspection Report 84-45. However, these findings identified the need to review and update, as necessary, administrative welding control procedures, welding procedures, as well as welding procedure specifications to ensure total compliance with ASME Section IX. Additionally, a permanent Plant Staff position for a qualified welding engineer has been established and filled.

Adequate controls for receiving, storage, and issuing of welding electrodes were present.

SAFETY SIGNIFICANCE:

Documentation exists to support the qualification of all specific welders called into question. All other Mercury welders also had documentation to support their qualification. There were three minor discrepancies which have been corrected.

Deviations from Code requirements for control of moisture content of low hydrogen electrodes were justifiable.

There is, therefore, no affect on plant safety and this issue should not pose a constraint to fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

NCR-W3-7724 addressed and resolved welding procedure qualification errors for welders M101, M109 and M85. NCR W3-7218 attachments 4 and 5 showed that Mercury welders making safety related and seismic weldments were certified within the time frame they performed welding at Waterford 3.

ATTACHMENTS:

Attachment 1 Specific Responses to NRC Mercury Welder Qualification Concerns

Attachment 2 Mercury Procedure Cross-Qualification Chart

Attachment 3 Procedure ASP-IV-18, Receiving, Storage, Issuing and Control of Welding Electrodes and Filler Metals

Attachment 4 Tompkins-Beckwith Procedure TBP-3, "Welding Material Control Procedure".

Attachment 5 Ebasco Non-Conformance Reports and T-B Discrepancy Notices on Weld Material Control. (Available at the Waterford 3 Site)

Attachment 6 Ebasco Discrepancy Notices on Damaged Electrode Containers. (Available at the Waterford 3 Site)

Attachment 7 Weather Conditions for February, 1979.

Attachment 8 Alloy Rod's Division, "It's A Fact", dated September 30, 1981.

Attachment 9 Letter dated 9/4/84, Alloy Rod Incorporated to Ebasco Services.

REFERENCES:

ASME Boiler and Pressure Vessel Code, Section III, Paragraph NX2440, 1977 Edition.

AWS Structural Welding Code, D1.1-75 Paragraph 4.9.

ATTACHMENT 1

SPECIFIC RESPONSES TO NRC MERCURY
WELDER QUALIFICATION CONCERNS

1. NRC Concern - Individual not qualified to the correct procedure.

Welders involved:

A. M44 Concern - Qualified to WPSB. Form retyped showed welder qualified to WPSY.

Response - Welder left the site on 12/7/79. Clerical error, showing qualification to WPSY, was made on 11/26/82. Qualification to WPSB is in welder M44 qualification folder not WPSY. A review of the Filler Metal Withdrawal Authorizations (FMWAs) confirms that M44 welded in the WPSB process only.

B. M177 Concern - No qualification test for WPSY. Welded to WPSB and WPSE.

Response - Qualification test for WPSY is in M177 qualification folder. Qualification to WPSY allows welder to perform welding to WPSB and WPSE. See Attachment 2.

C. M34, 85, 130, 211, 212 Concern - Qualified to WPSD but welded in WPSY.

Response - Qualification tests for WPSD and WPSY are in welder qualification file.

D. M142 Concern - No qualification tests for WPSY or WPSD.

Response - Qualifications for WPSY and WPSD are in welder qualification file.

E. M109 Concern - Qualification to WPSY in file. Voided qualification on 10/22/83.

Response - Welder left the site on 2/8/80. Clerical error, showing qualification to WPSY, was made on 11/26/82. Welder qualified to WPSB and WPSD. WPSY was used for qualification testing only. It was not specified for production welding. NCR-W3-7724 documented error and provided corrective action. NCR is closed.

F. M101 Concern - Welder qualified to WPSB. Added sheet shows welder qualified to WPSY.

Response - Welder left the site on 3/21/80. Clerical error, showing qualification to WPSY, was made on 11/26/82. Welder qualified to WPSB. WPSY was used for qualification testing only. It was not specified for production welding. NCR-W3-7724 documented error and provided corrective action. NCR is closed.

SPECIFIC RESPONSES TO NRC MERCURY
WELDER QUALIFICATION CONCERNS

G. M129 Concern - No qualifications to WPSD.

Response - Qualification test for WPSD dated 3/14/80 was not signed by QC inspector. However, valid qualification test for WPSG is in welder qualification file which qualifies welder to weld in the WPSD process. See Attachment 2.

H. M315 Concern - Not qualified to WPSD. Welder used process.

Response - M315 made tack welds for FW 13 on instruments PT-RC-161 and PT-RC-0162. The Mercury Q.C. Inspector rejected the tack welds because the welder was not qualified and the tacks were cracked. The weld FW-13R was redone by M-41 who was qualified to WPSD. A review of FMWAs confirms that M315 did not perform any other welds in WPSD.

I. M343 Concern - No documentation that welder qualified to WPSD. Welder used process. (Ref: Mercury NCR 3149).

Response - Qualifiaction to WPSD dated 8/3/82 is in file. Mercury NCR 3149 was written when welder qualification was misplaced. Subsequently file was put back in place.

2. NRC Concern - Individual qualified to a specific WPS process but could not find documentation that he actually took test.

Welders involved:

M129 Concern - No completed qualification test reviewed for WPSD (test not signed).

Response - See Item 1G. Qualified to WPSG on 3/14/80 which qualifies the welder to WPSD. All WPSD welding performed by this individual, was done after this date. See Attachment 2.

M44 Concern - No qualification test reviewed for WPSY.

Response - See Item 1A. Welder M44 did welding only to WPSB not WPSY (See 1A). WPSB qualifications in welder file.

M101 Concern - No qualification test reviewed for WPSY.

Response - See Item 1F. Welder was qualified to WPSB only. Welder did not qualify and did not weld to WPSY (See 1F). NCR-W3-7724 documented error and provided corrective action.

M142 Concern - No qualification test reviewed for WPSY or WPSD.

Response - See Item 1D. Qualification for WPSY and WPSD are in file.

ATTACHMENT 1 (cont'd)

SPECIFIC RESPONSES TO NRC MERCURY
WELDER QUALIFICATION CONCERNS

M177 Concern - No qualification test reviewed for WPSY.

Response - See Item 1B. Qualification for WPSY are in file.

M109 Concern - No qualification test reviewed for WPSY.

Response - See Item 1E. Welder was qualified to WPSB and WPSD. Welder did not qualify and did not weld to WPSY (See 1F). NCR-W3-7724 documented error and provided corrective action.

M34, 85, 130, 211, 212 Concern - No qualification test reviewed for WPSY.

Response - See Item 1C. Qualification tests for WPSY on these welders are in their qualification folders.

M85 Concern - No valid qualification to WPSD on file.

Response - Valid qualification record for WPSD was voided in error on 11/8/83 by Mercury's Welding Engineer. NCR-W3-7724 documents this error and reinstates the record as valid.

3. NRC Concern - NRC asked for certification documentation on an individual, initially none found. Record that was later presented appeared to be someone else's with name typed over. Welder involved: M177

   Response - A review of welder qualification records on welder M177 determined validity of document. While it is evident that the qualification record had a name error and correction, the welder number block and all other information had not been changed.

4. NRC Concern - Individual failed a qualification test, he was declared qualified at a later date. Could find no record of a test or means by which he was qualified. Welder involved - M197.

   Response - The welder qualified to WPSD for 3/8" O.D. and greater on 1/23/81. This qualified the welder to use the GTAW process for welds on 3/8" O.D. and larger material. On 6/18/81 the welder took an additional test for WPSD to weld ¼" O.D. and failed. The welder continued to weld 3/8" O.D. and larger material per his qualifications. A review of the FMWAs and the weld data packages confirm M197 did not weld on 1/4" OD.

ATTACHMENT 2

MERCURY COMPANY WELDING PROCEDURE
CROSS QUALIFICATION CHART

Procedure	Process	Qualifies to Weld*
WPSY	Dual P1-P1 SMAW and P1-P1 GTAW	WPS-B and WPS-E
WPS B	P1-P1 SMAW	WPS B
WPS E	P1-P1 GTAW	WPS E
WPS D	P8-P8 GTAW	WPS D and WPS G
WPS G	P8-P1 GTAW	WPS G and WPS D

* The above qualification chart shows those procedures and processes the welder was normally qualified to weld to in Mercury's program. ASME Code allowances are more liberal in the area of welder qualification.

ATTACHMENT 3

EBASCO SERVICES INCORPORATED

WATERFORD STEAM ELECTRIC STATION - UNIT NO 3

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

PROCEDURE FOR: RECEIVING, STORAGE, ISSUING, AND CONTROL OF WELDING ELECTRODES AND FILLER METALS	PROCEDURE NUMBER: ASP-IV-18

ISSUE SUMMARY

ISSUE/DATE	PREPARED	APPROVED	REMARKS
"G" Draft 2/20/79	J. L. Bezfamilny		Revised 6.2.2
G Issue 4-20-79	J. L. Bezfamilny	J. Crnich	- -
"H" Draft 4-6-79	J. A. Chapman		Revisions as indicated
H Issue 4-25-79	J. A. Chapman	J. Crnich	
"I" Draft 7-26-79	J. A. Chapman		Added 6.3.2
I Issue 9-6-79	J. A. Chapman	J. Crnich	-
J Draft "J" Issue 10-19-79	J. A. Chapman J. A. Chapman	J. Crnich	Revised 6.4.5.2 -
"K" Draft 11-19-80	W. R. Pieren	-	Revised 6.2.2, 6.3.1
K ISSUE 1-19-81	W. R. Pieren	R. J. Milhiser	Revised 6.2.5, Rewrote 6.4, 6.4.1, 6,4,2, 6,4,3, 6.4.4, 6.4.5, 6,4,6, 6.4.7, and 6.4.8 Added a new 6.5, Renumbered 6.4.6 and 6.4.7 to 6.6 and 6.7, Revised "Approval" on Form ASP-IV-18-2. Changed title of Form ASP-IV-18-1.

For Information Only

FORM NO. ASP-III-1-3 (10-13-75)

EBASCO SERVICES INCORPORATED

WATERFORD STEAM ELECTRIC STATION - UNIT NO 3

PROCEDURE FOR:

RECEIVING, STORAGE, ISSUING, AND CONTROL OF WELDING ELECTRODES AND FILLER METALS (m)

PROCEDURE NUMBER: ASP-IV-18

ISSUE SUMMARY

ISSUE/DATE	PREPARED	APPROVED	REMARKS
"A" Draft 5/21/76	D. H. Lack		
A 6/1/76	D. H. Lack	J. O. Booth	
"B" Draft 01-19-77	D. H. Lack		
"B"/ 01-31-77	D. H. Lack	J. O. Booth	Revisions as indicated
C/7-20-77	D. H. Lack	for J. O. Booth	Revisions as indicated
"D" Draft 3-7-78	H. Bourque		Revisions as indicated
"D" Issue 5/3/78	H. Bourque	J. Crnich	
"E" Draft 7-13-78	H. Bourque		Revised paragraph 3.2, 6.1.2, 6.2.2 through 6.2.7.
"E" Issue 7-15-78	H. Bourque	J. Crnich	
"F" Draft 1-19-79	J. Chapman		Revised 6.2.1, 6.4.7.
F/1-19-79	J. Chapman	J. Crnich	

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

For information only

NOTATIONS IN THIS COLUMN IND TE WHICH CHANGES HAVE BEEN MADE

1.0 PURPOSE

The purpose of this procedure is to establish the responsibilities and set forth the methods to be followed in receiving, storage, distribution and control of welding electrodes and filler metals to assure compliance to the site Quality Program.

2.0 STORAGE

This procedure shall apply to all welding electrodes and filler metal used at the construction site and contains the requirements that are to be fulfilled by the construction organization that receives, stores, and issues these items for this project.

3.0 REFERENCES

3.1 ASP-IV-10, Material Receiving, Warehousing and Control

3.2 ANSI N45.2.2

3.3 Ebasco Quality Assurance Manual ASME Section III

4.0 DEFINITIONS

4.1 Area Rod Room - A centrally located room or building for storing welding materials received in bulk quantity from the construction warehouse and where those materials may be issued to individual welders employed by Ebasco.

5.0 RESPONSIBILITIES

The Weld Rod Room Attendant reports to the Warehouse Materials Supervisor, and is responsible for receipt, storage and issuance of all welding material.

6.0 PROCEDURE

6.1 Receipt of Covered Electrode, Bare Filler Metal and Consumable Inserts

6.1.1 Covered Electrode containers shall be inspected to verify that they are properly sealed and no damage has occurred in shipment. Verify mill test certification papers are correct and cans are identified with the heat and lot number.

6.1.2 Bare filler metal and consumable inserts will be inspected to verify that containers have not been damaged and are properly identified for traceability. Verify mill test certification papers are correct and containers are identified with the heat number. Bare rod will be examined to insure proper flagging.

For information only

NOTATIONS IN THIS COLUMN IN[DICAT]E WHICH CHANGES HAVE BEEN MADE

6.2 Storage of Covered Electrode, Bare Filler Metal and Consumable Inserts

6.2.1 Covered electrodes, bare filler metal and consumable inserts shall be stored in a central location on site. The storage room shall be weather proof, clean and dry. All containers shall be stored off the floor. Storage areas shall be in accordance with Level C storage requirements of ANSI N45.2.2.

6.2.2 All low hydrogen electrodes shall be stored in ovens at a minimum temperature of 200°F for approximately 8 hours following removal from container and prior to use. All covered electrodes are not to be exposed to ambient temperature for more than 4 hours. Covered electrodes which are not used within the r hour period are to be returned to ovens for 8 hours drying at a minimum temperature of 200°F. The maximum holding oven temperature shall not exceed 350°F. Bare filler metal shall be stored in dry, clean areas and shall not be used in an oxidized or dirty condition.

6.2.3 Stainless steel covered electrodes shall be stored in ovens at 155° to 205° for a minimum of 8 hours after removal from containers and immediately prior to issue or re-issue. If these covered electrodes are exposed to ambient temperatures for more than four hours, they are to be returned to the ovens for 8 hours of drying at 155°F to 205°F.

6.2.4 Cellulose type (E60xx) covered electrodes shall be stored in ovens at 50°F to 105°F after sealed shipping container is open for a minimum of one-hour prior to issue or re-issue.

6.2.5 There will be no more than one type of grouping of welding electrodes in the same oven. The ovens will have identification as to heat and/or lot number of electrodes which are stored in the ovens and the time the electrodes were placed in the oven in order to determine the required 8 hour period.

6.2.6 Electrodes coming in direct contact with water or other contaminating elements should be discarded. Furthermore, electrodes with chipped, cracked, or otherwise damaged flux should be also scrapped.

6.2.7 When weld rod containers have been damaged the electrodes shall be extraordinarily examined to insure the integrity of the flux as per Paragraph 6.2.6.

For information only

6.3 Issue of Bulk Welding Material to Contractors and Area Rod Rooms

6.3.1 Contractors that have an approved Quality Control Program and require welding materials for this Project, and Ebasco Area Supervisors requiring welding materials, shall submit a Requisition on the Warehouse or the Filler Metal-Electrodes or Consumable Inserts Requisition (Form ASP-IV-18-2) to the Special Processes Group for review and approval. Following approval, the warehouse shall issue the welding materials in bulk quantity - (meaning large). The materials to remain in original packages). Each contractor shall be responsible for the subsequent control, storage, and issuance of the welding materials.

6.3.2 The requisition shall be filled out with the following applicable items completed in accordance with ASP-IV-10, Form No. ASP-IV-18-2. Items marked N/A (not applicable) are those for which specific information cannot be supplied due to the varied application available to the recipients of bulk issued material.

A) System N/A
B) Isometric of Drawing Number N/A
C) Weld Number N/A
D) Weld Procedure Number N/A
E) Welder's Name N/A
F) Welder's Symbol N/A
G) Signature
H) Quantity
I) Type
J) Size

Q 6.4 Issuance of Welding and Brazing Materials from the Warehouse to Individual Welders Employed by Ebasco. (See form ASP-IV-18-2 and Attachment 7.3, Instruction to Form ASP-IV-18-2.)

Q 6.4.1 In order to receive welding or brazing materials from the warehouse, a welding materials requisition, Form No. ASP-IV-18-2, shall be initiated and authorized by the craft supervisor or his designee. Each item of the form must be completed, except for the lot or heat number, and then the requisition shall be submitted to the Q.C. Supervisor or his designee for review and approval prior to the issuance of any material. A list of authorized signatures for welding material requisitions shall be furnished to the warehouse clerk by lead craft supervisor and will be maintained by the Rod Issue Clerk.

Q 6.4.2. The review of the requisition by the Q.C. Supervisor or designee shall include verification that the welder who is to use the material is currently qualified for the welding procedure specified on the requisition by referring to the Welder's Qualification and Status Record of CP-684 and that the welding material specified is in accordance with the requirements of the welding procedure. Approval shall be indicated by signature on the requisition by the Q.C. Supervisor or his designee. He will also verify that the weld number, or part identification is properly indicated.

6.4.3 When welding material is to be issued by the warehouse, the welder receiving the material shall identify himself by presenting his welder identification card (refer to CP-684) and he shall have an approved welding material requisition. At the time the welding material is issued, the warehouse clerk shall enter the lot or heat number on the material requisition. A copy of the requisition shall be furnished to the welder and shall be available for examination at the work station or location.

6.4.4 Each welder shall weld only with those materials issued specifically to him. The welder shall neither share or borrow welding materials with/from other welders. Additionally, only one type of covered electrode or one type of bare filler wire, not including a consumable insert, shall be issued to a welder at any one time. One type of bare filler wire and one typed of covered electrode may be issued simultaneously if these materials are specified by the applicable welding procedure.

6.4.5 Covered electrodes (with the exception of E-6011 electrodes) shall be issued in a portable electrode oven (rod caddy). Each welder shall be assigned a specific, numbered portable electrode oven. While in the field, the portable electrode oven shall be connected to a 110 volt power supply. If this is not possible or if the portable oven in inoperative or if the electrodes are otherwise exposed to ambient conditions, the portable over and all of the remaining electrodes shall be returned to the warehouse within four hours. (If the portable oven is inoperative, this condition shall be reported to the warehouse clerk so that the unit can be removed from service and repaired).

6.4.6 If the covered electrodes are maintained at the required temperatures as specified in Paragraphs 6.2.2, 6.2.3, and 6.2.4, the electrodes can remain in the field for periods longer than four hours. The portable electrode oven and any remaining undamaged electrodes shall be returned to the warehouse at the end of each shift. Electrode or rod stubs and damaged electrodes shall be deposited only in designated, controlled containers that are stationed at various locations in the field.

6.4.7 Straight lengths of bare filler wire, normally thirty-six inches long, shall have a material identification flag attached, to both ends. Lengths less than approximately eighteen inches need be flagged on one end only. A welder shall not weld using a bare filler wire without identification on one end.

6.4.8 Consumable insert material normally has the alloy type imprinted in the wire approximately every three feet. However, to be assured that the identity of the material cut for an insert is not lost, one end of the consumable insert shall be flagged when a length of the material is removed from the coil by the warehouseman. Only enough insert material, with a reasonable overage to allow for trimming, shall be issued for one pipe joint per material requisition.

6.5 Issuance of Welding and Brazing Materials to Individual Welders Employed by Contractors that do not have a Quality Control Program.

6.5.1 Each contractor who does not have a Quality Control Program shall be required to work to the Ebasco Quality Control program.

6.5.2 A list of those authorized to prepare requisitions for welding and brazing materials and a list of the currently qualified welders and brazers shall be furnished to the warehouse clerk and to the Special Processed Group by each Contractor.

6.5.3 The contractor's requisitioner shall complete all of the items on the requisition form, ASP-IV-18-2, except for lot or heat number. This latter information shall be entered by the warehouseman at the time the welding or brazing materials are issued.

6.5.4 The requisition for welding or brazing materials shall be reviewed and approved by the Special Processed Group before welding or brazing materials are to be issued to the welder. The approval shall signify that the welder is currently qualified for the specified procedure and that the welding or brazing materials requested are in compliance with the requirements of the procedure.

6.5.5 The requirements of the following paragraphs shall apply, also, to the contractor and his welders: 6.4.3, 6.4.4, 6.4.5, 6.4.6, 6.4.7, 6.4.8, and 6.4.9.

NOTE: In paragraph 6.4.4 there is reference to a welder identification card. Each contractor shall be responsible for assigning identification to his welders and for furnishing the required documentation.

6.6 The Weld Room Attendant shall verify proper electrode storage oven temperature once per shift and maintain a log as evidence of verification (Form ASP-IV-18-1). At this time, he should verify that only calibrated thermometers are in use.

For Information Only

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

6.7 All electrode stubs, and rejectable electrodes shall be deposited in a controlled container until removed from the site in a predetermined manner. They shall not be discarded in trash containers in the general work areas.

7.0 ATTACHMENTS

7.1 Form No. ASP-IV-18-1

7.2 Form No. ASP-IV-18-2

7.3 Instruction to Form No. ASP-IV-18-2

For Information only

ELECTRODE STORAGE OVEN TEMPERATURE LOG

TEMP/OVEN #	DATE:	TIME:	THERMOMETER #	WAREHOUSEMAN

FORM NO. ASP-IV-18-1 5/12/76

ATTACHMENT 7.2
FORM # ASP-IV-18-2

CONSTRUCTION WAREHOUSE

CONTRACTOR NAME ________ (1) ________

Subcontractor ________ (2) ________ Date ________ (3) ________

FILLER METAL-ELECTRODES OR CONSUMABLE INSERTS REQUISITION

5536

System ________ (4) ________ Iso or Dwg. No. ________ (5) ________

Weld No. ________ (6) ________ Weld Procedure no. ________ (7) ________

Welder's Name ________ (8) ________ Symbol ________ (9) ________

Authorized Signature ________ (10) ________

Approved by QC Supervisor/Inspector ________ (11) ________ Date ________ (12) ________

1. Bare Rod:
   (A) Quantity: ________ (13) ________ Type ________ (14) ________ Size ________ (15) ________ Lot or Heat ________ (16) ________

   Quantity Returned ________ (17) ________

2. Covered Electrodes
   (A) Quantity ________ (18) ________ Type ________ (19) ________ Size ________ (20) ________ Lot or Heat ________ (21) ________

   Quantity Returned ________ (22) ________

3. Consumable Inserts
   (A) Quantity ________ (23) ________ Type ________ (24) ________ Size ________ (25) ________ Lot or Heat ________ (26) ________

   Quantity Returned ________ (27) ________

Issued by ________ (28) ________ Date ________ (29) ________

FORM NO. ASP–IV–18-2(6-1-76)

Q C COPY

For Information only

Attachment 7.3
ASP-IV-18

INSTRUCTION TO FORM NO. ASP-IV-18-2

Item No.	Description	Individual Responsible for Entry
1	Ebasco Services Ind.	Craft Supvr. or designee
2	Name of Contractor as specified in para. 6.5.	Supervisor or designee
3	Date as required	Craft Supvr. or designee
4	Start-up designation or process (Ex: Temporary)	Craft Supvr. or designee
5	Design document number detailing the work to be performed (where applicable)	Craft Supvr. or designee
6	Unique weld numbers for all Class 1, 2, 3, ASME III NF component and only Seismic Class 1 full penetration weld. For all other Seismic Class I applications record the unique drawing no. that specifies the welding requirements. For all other welding applications enter the words "all welds".	Craft Supvr. or designee
7	As Applicable	Craft Supvr. or designee
8	As Applicable	Craft Supvr. or designee
9	As Applicable	Craft Supvr. or designee
10	Applicable Authorized Signature	Craft Supvr. or designee
11	Special Process Group Designee	As Required
12	Date of Approval	As Required
13 - 29	To be completed by Weld Rod Room Attendant	As Applicable

NOTE: Items not applicable shall be denoted N/A.

ATTACHMENT 4

QA VAULT

TOMPKINS-BECKWITH, INC.
Waterford S.E.S. Unit 3
Louisiana Power & Light Co.
Killona, Louisiana

Proc. No. TBP-3 Rev. "J"

Page No. 0-6

Title: WELD MATERIAL CONTROL PROCEDURE

TOMPKINS - BECKWITH INC.
CONTROLLED DOCUMENT
NOV 13 1980
Document Accountable & Return
Control Number D-3-1
(TB Doc. Control Stamp)

PROCEDURE COVER SHEET

DATE	COMMENTS	Changes Concurred By:
5-12-80	Procedure Revised due to QAM Revision	

EBASCO SERVICES INCORPORATED

QUALITY ASSURANCE ENGINEERING

This Document is:

☑ Reviewed Without Comments

☐ Reviewed With Comments as Noted; Incorporate Comments, and Resubmit; Proceed With Order.

☐ Rejected; Revise and Resubmit

NOTE:

Review of this document, with or without comments, is for general conformance with the applicable specification and shall not relieve the manufacturer or contractor from full responsibility for delivery of all materials, equipment, services and documentation in strict accordance with the Purchase Order.

By: [signature]

Date: 5-12-80

FOR INFORMATION ONLY

PREPARED BY:

SIGNATURE	DATE	TITLE
[signature]	5/12/80	QA SUPERVISOR

APPROVED BY:

SIGNATURE	DATE	TITLE
[signature]	5/12/80	PROJECT ENGINEER
J. B. Gore	5-12-80	QA SITE MANAGER

TOMPKINS-BECKWITH, INC.
Jacksonville, Florida

Proc. No. TBP-3

Rev. "I" J LWR 8/12/80

Page 1 of 6

TITLE: WELD MATERIAL CONTROL PROCEDURE

1.0 PURPOSE

1.1 The purpose of this procedure is to delineate the measures that have been established for meeting the requirements for Nuclear Power Plant Weld Material Control for Waterford #3.

2.0 SCOPE

2.1 The measures herein established are to assure that the requisite quality of all weld material received and accepted by the Company at the jobsite is preserved from the time the weld materials are removed from Ebasco control until incorporated into the completed systems.

3.0 REFERENCE

3.1 Quality Assurance Criteria for Nuclear Power Plants, 10 CFR 50, Appendix B.

3.2 Quality Assurance Requirements for Control of Procurement of Items, ANSI N45.2.13.

3.3 Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (during the construction phase), ANSI N45.2.2.

3.4 Tompkins-Beckwith, Inc. Quality Assurance Manual.

3.5 Tompkins-Beckwith Procedure TBP-8 Audit Procedure.

4.0 DEFINITIONS

4.1 Classification - the organization of items according to their type, grade or code.

4.2 Documentation - any written or pictorial information describing, defining, specifying, reporting or certifying activities, requirements, procedures or results.

4.3 Item - any level of unit assembly, including structure, system, sub-system component, part or material.

4.4 Handling - an act of physically moving items by hand or mechanical means, but not including transport modes.

4.5 Storage - the disposition of material from the time the item(s) is/are received on the construction jobsite until the item(s) is/are released from storage facilities for fabrication or installation.

4.7 Weld Material - electrodes, consumable inserts, filler wire, etc.

4.8 Authorized Withdrawal Individual (AWI) - the Welding Supervisor or a person designated by him.

4.9 Rod Room - specific area designated for storage and issuance of weld material.

5.0 RESPONSIBILITY

5.1 The Quality Assurance Supervisor, or his designee, is responsible for the inspection and reporting of quality activities defined in this procedure.

5.2 The Welding Supervisor is responsible for:

A. Assuring that only welding materials which have been tested and certified as appropriate for the intended heat treating, are used on welds requiring post weld heat treatment and impact testing.

B. Requisitioning weld materials from Ebasco.

C. The issuance of weld materials to the Construction forces.

5.3 The QC Engineer is responsible for reviewing the documentation for welding materials used to verify that they are in compliance with the Code.

5.4 The Quality Control Inspectors are responsible for performing receipt inspection and verification of the welding materials at the weld joint.

6.0 INSTRUCTIONS

6.1 Weld materials are purchased, received, inspected and warehoused by Ebasco Services, Inc.

6.2 Withdrawal of welding materials from the Ebasco Warehouse shall be accomplished in the following manner:

A. The Welding Supervisor, or his designee, shall prepare Ebasco Form # ASP-IV-18-2 (Exhibit #1). All pertinent information will be included.

B. Upon presentation of Ebasco Form # ASP-IV-18-2, the Ebasco Warehouseman will issue the material requested and sign the form in the space provided.

C. Quality Control will verify that the weld material requisitioned from Ebasco's Warehouse is correct and tagged with an Ebasco QC Accept Tag. QC acceptance will be denoted by the inspector initialing Ebasco's Form ASP-IV-18-2.

D. One copy of Ebasco Form ASP-IV-18-2, will be forwarded to the QA Document Controller for filing in the QA Master File. Three copies will be retained by Ebasco.

E. Weld materials withdrawn from Ebasco's control for bulk storage are warehoused in a lock and key controlled area.

6.3 Control of Bulk Storage Weld Material

6.3.1 Weld material is requested from the bulk storage by the Welding Supervisor, or his designee, on Filler Metal Electrodes or Consumable Inserts Requisition, Form 8009, which is approved by the Materials Controller, or designee, for transfer to the Rod Room.

6.3.2 The Welding Supervisor, or his designee, shall determine the need for additional weld material by visual inspection of bulk storage stock and/or maintaining a running account of the quantity of weld material issued for field use and shall re-requisition additional weld materials from Ebasco as necessary.

6.4 Control of Rod Room Weld Material

6.4.1 The Rod Room Clerk retains a key to the Rod Room and issues weld material only upon receipt of a Filler Metal Electrodes or Consumable Inserts Requisition, Form 8009, prepared by the Welding Supervisor, or his designee. The individual preparing the Requisition for filler material to be used in pipe welds will indicate at "System" (Item #1 on Forms Guide) the System Name and the System Class. For Example: SYSTEM CS, Class 2

6.4.1.1 The Rod Room Clerk will utilize the Welder Qualification Summary to ascertain that the Welder requisitioning weld materials is qualified to weld to the Procedure listed on Form 8009.

6.4.1.2 For Class 1, 2, 3, 4, 5 and all chrome moly piping welds, the Form 11009 is presented to the Rod Room Clerks so that he may verify that the Weld Procedure Number and filler metal on the Controlled Weld Joint Record (Form #11009) and the Filler Metal Electrodes or Consumable Inserts Requisition (Form 8009) match.

NOTE: Rod will not be issued until this determination has been made.

6.4.1.3 The Welding Supervisor or his designee, collects the 8009 Forms daily from each rod room for welding material issued and returned. The Welding Supervisor distributes the original to the QA Document Controller with a copy being sent to QC ~~Welding~~. LWR 5/12/80

6.4.2 Materials requiring heating after opening shall be placed in ovens capable of maintaining proper temperatures for classifications involved.

6.4.3 Weld rod of the same size, but with different heat numbers shall not be heated in the same oven.

6.5 Control of Weld Material in the Field

6.5.1 At the point of usage the QC Inspector shall verify the classification of rod utilized.

6.5.2 The quantity of coated electrodes issued to a welder is only sufficient for his use during that shift. Excess electrodes are to be returned to the issuing point at the end of a welder's shift. Returned rods are weighed to the nearest 1/4 pound by the Rod Room Clerk.

6.5.3 Bare rod will be issued to the welder in tube type containers. Excess bare rod not utilized will be returned to the issuing point.

6.5.4 The Foreman and welder shall maintain the control and proper use of weld materials and are subject to monitoring by the Welding Supervisor and verification by Quality Control at the weld joint.

6.5.5 Damaged, damp or unidentifiable materials shall be placed in a locked container until they are removed from the jobsite or deposited in a controlled scrap or dumping area at the project site.

6.5.6 All weld rod stubs are placed in small containers. These containers are returned to the rod room and dumped into 55 gallon drums, which are secured by lock and key, until the weld rod stubs are removed from the jobsite.

6.6 Ovens

6.6.1 Each oven used for bulk storage shall be assigned an identification number. They shall be of (or equal to) the following manufacture:

A. Phoenix Type 300

B. Phoenix Type 900

6.6.1.1 For bulk storage all low hydrogen electrodes and submerged arc fluxes shall be stored in ovens at 250° F (plus or minus 50° F) for approximately 8 hours following removal from containers and prior to use. All coated electrodes and fluxes issued to the field are not to be out of rod caddies for more than 4 hours. Coated electrodes and fluxes taken out of rod caddies that are not used within 4 hours, are to be returned to ovens for 8 hours drying at 250° F, plus or minus 50° F. All stainless steel covered electrodes after removing from sealed container will be stored in ovens at 180° F ± 25° F. When these electrodes are exposed to the ambient temperature for more than four (4) hours, the electrodes shall be returned to the ovens for eight (8) hours at 180° F ± 25° F.

6.6.1.2 The temperature of each bulk storage oven shall be monitored daily by the Rod Room Clerk and recorded on the Electrode Oven Temperature Log (Exhibit #2).

6.6.2 Each oven used for "point of use" storage shall be assigned an identification number and be of (or equal to) the following manufacture.

A. Phoenix Type 10 Series

B. Phoenix Type 50A

6.6.2.1 Point of use ovens shall be checked by Quality Control daily on a random basis to ascertain that the temperature of subject ovens is sufficient to maintain the rods in a moisture free environment. Daily inspection results will be documented on Surveillance Report Form GP-723-12.

6.6.3 Each individual entering data on the Electrode Oven Temperature shall initial where indicated. Logs are sent to QA Document Controller for filing in the QA Master File.

6.7 Gases

6.7.1 Welding and cutting gases are furnished by Ebasco.

6.7.2 Should Tompkins-Beckwith, Inc. purchase the above items, the Vendors will be required to furnish verification of quality and purity.

7.0 AUDITING

7.1 The implementation of this procedure will be audited by Quality Assurance in accordance with Tompkins-Beckwith Inc. Procedure TBP-8.

8.0 EXHIBITS

8.1 Ebasco Form ASP-IV-16-2, Exhibit #1 (Forms Guide attached)

8.2 Exhibit #2 - Electrode Oven Temperature Log (Forms Guide attached)

8.3 Form 8009 Rev. 1 - Filler Metal Electrodes or Consumable Inserts Requisition. (Forms Guide attached).

8.4 Form GP-723-12 - Surveillance Report (Forms Guide attached)
Rev. 1

CONSTRUCTION WAREHOUSE EXHIBIT #1

CONTRACTOR NAME ______ (1) ______

Subcontractor ______ (2) ______ Date ______ (3)

FILLER METAL-ELECTRODES OR CONSUMABLE INSERTS REQUISITION

10005

SAMPLE

System ______ (4) ______ Iso or Dwg. No. ______ (5)

Weld No. ______ (6) ______ Weld Procedure no. ______ (7)

Welder's Name ______ (8) ______ Symbol ______ (9)

Authorized Signature ______ (10)

Approved by QC Supervisor/Inspector ______ (11) ______ (12) ______ Date ______ (13)

1. Bare Rod:
   (A) Quantity: ______ (14) ______ Type ______ (15) ______ Size ______ (16) ______ Lot or Heat ______ (17)
   Quantity Returned ______ (18)

2. Covered Electrodes
   (A) Quantity ______ (19) ______ Type ______ (20) ______ Size ______ (21) ______ Lot or Heat ______ (22)
   Quantity Returned ______ (23)

3. Consumable Inserts
   (A) Quantity ______ (24) ______ Type ______ (25) ______ Size ______ (26) ______ Lot or Heat ______ (27)
   Quantity Returned ______ (28)

Issued by ______ (29) ______ Date ______ (30)

FORM NO. ASP—IV—18-2(6-1-76)

Q C COPY

FORMS GUIDE FOR
FORM ASP-IV-18-2

FILLER METAL ELECTRODES OR CONSUMABLE
INSERTS REQUISITION

Items 1 through 10 are completed as applicable by the Welding Supervisor or his designee.

Items 11 and 13 are completed by Ebasco.

Item 12 is completed by Tompkins-Beckwith Quality Control.

Items 14 through 28 are filled in by the Welding Supervisor, as applicable, except for items 17 22 27 29 and 30, which are completed by Ebasco

TOMPKINS-BECKWITH, Inc.
2160 [illegible] Blvd.
• P. O. Box [illegible] •
Jacksonville, Florida [illegible]

Phone [illegible]

EXHIBIT #2

ELECTRODE OVEN TEMPERATURE LOG

Page ____ of ____

				TEMPERATURE				QC/QA
DATE	TIME	No.	No.	No.	No.	No.	No.	Initials

FORMS GUIDE FOR ELECTRODE OVEN TEMPERATURE LOG

This form is completed and initialed by the Rod Room Clerk when monitoring the temperature of the ovens used for bulk storage.

This form is completed and initialed by Quality Control when verifying proper oven temperature on "Point of Use" ovens.

Form 8009 Rev. 1
Part A

TOMPKINS-BECKWITH, INC.
P.O. Box 390
HAHNVILLE, LOUISIANA 70057

Serial No.__________

FILLER METAL ELECTRODES OR CONSUMABLE INSERTS REQUISITION

SYSTEM ____ 1 ____ ISO or Dwg. No. ____ 2 ____

Weld/Hanger No. ____ 3 ____ Weld Proc. No. ____ 4 ____

Welder's Name ____ 5 ____ Symbol ____ 6 ____

Authorized Signature ____ 7 ____

1. Filler Materials:

Quantity __ 8 __ Type __ 9 __ Size __ 10 __ Lot & Heat No. __ 11 __

Quantity __ 8 __ Type __ 9 __ Size __ 10 __ Lot & Heat No. __ 11 __

Quantity __ 8 __ Type __ 9 __ Size __ 10 __ Lot & Heat No. __ 11 __

2. Consumable Inserts:

Quantity __ 8 __ Type __ 8 __ Size __ 8 __ Lot & Heat No. __ 11 __

ISSUED BY ____ 12 ____ Date ____ 13 ____

SAMPLE

Form 8009 Rev. 1
Part B

Serial No.__________

FILLER METAL RETURNED:

1. Filler Materials:

Quantity______ Type______ Size______ Lot & Heat No.______

Quantity______ Type______ Size______ Lot & Heat No.______

Quantity______ Type______ Size______ Lot & Heat No.______

2. Consumable Inserts:

Quantity______ Type______ Size______ Lot & Heat No.______

Checked By____________ Date__________

FORMS GUIDE FOR

FILLER METAL ELECTRODES OR CONSUMABLE INSERTS
REQUISITION

FORM 8009 REV. 1

Part "A"

Lines 1-10 are completed by the Welding Supervisor, or his designee, as applicable. Lines 11, 12 and 13 are completed by the Rod Room Clerk, upon issuance of the material. One copy is placed in the Traveler and one goes with the rod caddy (coated electrodes only) or welder

Part "B"

Upon return of the form from the field, Part "B" is completed by the Rod Room Clerk and forwarded to the Welding Supervisor for filing, per Ebasco contract requirements:

Contract No. : W3-NY-11 Section: 884-75TA

Remaining copies of the form are distributed to the Welding Supervisor, QC Engineer and QA Document Controller.

NOTE: The Form will have sequential serial numbers preprinted.

TOMPKINS-BECKWITH, INC.
Waterford SES - Unit 3

SURVEILLANCE REPORT

W3-NY-11
Contract

Category:
- [ ] Final
- [ ] In-process

Area & Elev

QC Welding-Inspector

Shift

Date

Dwg./Iso Number	Weld No.	Welder ID	Weld Proc.	Acc.	Rej.	Rod Cnd. Ck. No.	Rod Cnd. Ck. Reslt	Preheat	Interpass	Remarks

SAMPLE

Form QP-723-12 Rev. 1

INSTRUCTIONS FOR COMPLETING THE SURVEILLANCE REPORT (FORM GP-723-12 REV. 1)

Category	Piping category being inspected.
Final	For use on non-safety related piping category which requires a 10% inspection of final welds.
In-Process	For use on items being inspected during welding: Amp check, Rod caddie check, In-process checks of Preheat & Interpass temp. etc.
Area and Elevation	Building or area the inspection is being performed and the elevation.
QC ~~Welding~~ LWP 5/12/80 Inspector	The person responsible for initiating and completing all data pertinent to this form.
Shift	1st, 2nd, etc.
Date	The date the report is initiated.
Drawing/ ISO No.	Record the ISO No. as the primary designation wherever possible.
Weld No.	The unique number given to each field or shop weld on each isometric drawing. (When Applicable)
Welder Identification	The welder (s) stamp as marked near the actual weld.
Welding Procedure	The T B welding procedure being used during the surveillance inspection (If Applicable)
Accept/Reject	The QC ~~Welding~~ LWR 5/12/80 Inspector initials either the accept or reject block.
Rod Caddy Check	Record the rod caddy number, and result.
Preheat	The QC ~~Welding~~ LWR 5/12/80 Inspector will check the preheat and record same. Inspection of preheat is during in-process of welding.
Interpass	The QC ~~Welding~~ LWR 5/12/80 Inspector will check the interpass temperature and record same. Inspection of interpass is during in-process of welding.
Remarks	Any additional information which may be of use may be listed here.

ATTACHMENT 5

EBASCO NON-CONFORMANCE REPORTS AND

T-B DISCREPANCY NOTICES ON WELD MATERIAL CONTROL

(AVAILABLE AT WATERFORD-3 SITE)

ATTACHMENT 6

EBASCO DISCREPANCY NOTICES ON

DAMAGED ELECTRODE CONTAINERS

(AVAILABLE AT WATERFORD-3 SITE)

ATTACHMENT 7

FEBRUARY 1979
NEW ORLEANS, LOUISIANA
NAT WEATHER SERVICE MET OBSY
NEW ORLEANS INT'L AIRPORT

Local Climatological Data

MONTHLY SUMMARY

FEBRUARY 1979 NEW ORLEANS, LOUISIANA

LATITUDE 29° 59' N LONGITUDE 90° 15' W ELEVATION (GROUND) [illegible] FT. STANDARD TIME USED: CENTRAL WBAN #12916

Date	Temp. Maximum	Temp. Minimum	Temp. Average	Departure from normal	Average dew point	Degree days Heating	Degree days Cooling	Weather types on dates of occurrence	Snow, ice pellets or ice on ground at 06AM (in.)	Precipitation Water equivalent (in.)	Snow, ice pellets (in.)	Avg. station pressure (in.) elev. 30 feet m.s.l.	Wind Resultant dir.	Wind Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Fastest mile Direction	Sunshine Minutes	Sunshine Percent of possible	Sky cover Sunrise to sunset	Sky cover Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	43	31	37	-7	18	28	0		0	0	0	30.32	23	8.0	8.8	14	08	550	88	6	7	1
2	57	38	48	-6	34	17	0	8	0	0	0	30.21	12	7.5	8.3	13	13	82	14	10	10	2
3	68	55	62	8	55	3	0	2 8	0	.46	0	30.04	18	4.2	8.5	13	17	3	0	10	10	3
4	57	48	52	-2	51	13	0	2 8	0	.94	0	30.11	03	5.2	5.8	14	04	0	0	10	10	4
5	48	43	46	-8	38	20	0	1 8	0	2.11	0	30.10	06	14.3	14.4	20	07	0	0	10	10	5
6	53	43	48	-6	42	17	0	1 8	0	4.15	0	29.76	07	8.0	12.2	18	29	0	0	10	10	6
7	47	42	45	-10	35	20	0	1	0	0	0	29.85	31	12.3	13.4	20	28	48	7	10	10	7
8	55	40	48	-7	38	17	0	1 8	0	0	0	30.17	24	4.2	7.3	14	25	420	65	9	9	8
9	50	33	42	-15	28	23	0	8	0	0	0	30.38	35	12.5	14.0	23	35	609	82	1	1	9
10	48	24*	37*	-18	24	28	0	8	0	0	0	30.38	08	4.8	6.7	8	05	646	88	0	0	10
11	63	27	45	-10	30	20	0	8	0	0	0	30.33	18	3.4	3.7	8	18	642	97	1	1	11
12	71	35	53	-2	42	12	0	1 8	0	0	0	30.23	23	1.4	3.7	8	28	541	81	4	2	12
13	70	48	58	4	52	8	0	1 8	0	.01	0	30.16	17	3.8	4.8	8	17	70	11	10	9	13
14	77	58	68	12	57	0	3	2 8	0	T	0	30.08	21	8.3	8.8	18	23	413	62	3	4	14
15	76*	58	68	13	58	0	4	2 8	0	0	0	29.87	20	8.8	8.5	18	23	480	72	6	6	15
16	73	48	61	5	54	4	0	1 8	0	T	0	30.07	35	5.4	8.2	18	35	61	9	10	10	16
17	48	43	46	-10	38	19	0	1 8	0	T	0	30.18	04	10.4	10.8	14	04	0	0	10	10	17
18	53	38	46	-10	37	19	0	1 8	0	.47	0	30.22	36	12.1	12.5	18	36	280	43	10	10	18
19	53	38	46	-10	34	19	0	8	0	T	0	30.35	09	5.2	8.1	13	08	251	37	10	10	19
20	58	48	53	-3	48	12	0	1 8	0	1.85	0	30.17	09	5.4	5.6	15	12	0	0	10	8	20
21	72	53	63	7	56	2	0	2 8	0	0	0	30.08	29	3.8	5.5	12	17	150	23	10	10	21
22	76	62	69*	12	61	0	4	3	0	.57	0	30.04	15	7.7	8.3	18	18	82	12	10	10	22
23	76	60	68	11	62	0	3	23 8	0	1.[illegible]	0	29.95	13	2.7	6.4	20	34	17	2	10	10	23
24	72	53	63	8	58	2	0	1 3 8	0	.88	0	29.85	16	3.1	6.6	22	27	150	23	10	8	24
25	58	44	51	-6	37	14	0		0	0	0	29.87	31	18.1	18.8	23	31	623	91	4	3	25
26	58	40	50	-7	30	15	0		0	0	0	30.13	32	9.1	9.4	17	34	687	100	0	0	26
27	65	35	50	-7	37	15	0	8	0	0	0	30.08	14	3.5	5.2	12	18	556	81	7	5	27
28	75	50	63	5	54	2	0	1 8	0	0	0	29.94	18	7.8	8.6	15	18	375	54	7	8	28

Weather types: 1 Fog; 2 Heavy fog; 3 Thunderstorm; 4 Ice pellets; 5 Hail; 6 Glaze; 7 Duststorm; 8 Smoke, haze; 9 Blowing snow

Sum 1735	Sum 1239				Degree days Total 347	Total 14	
Avg. 61.8	Avg. 44.1	Avg. 52.9	Dep. -2.7	Avg. 45	Dep. 48	Dep. -21	
					Season to date Total 1212	Total 14	
					Dep. 84	Dep. -49	

Number of days

Maximum temp ≥ 90°	Maximum temp ≤ 32°	Minimum temp ≤ 32°	Minimum temp ≤ 0°
0	0	3	0

Number of days	
Precipitation ≥ .01 inch	10
Snow, ice pellets ≥ 1.0 inch	0
Thunderstorms	3
Heavy fog	8
Clear 3	Partly cloudy 8	Cloudy 17

Precipitation total	12.49
Snow, ice pellets total	0
Dep.	7.87
Greatest in 24 hours and dates: Precipitation	5.29 5-6
Snow, ice pellets	0
Greatest depth on ground of snow, ice pellets or ice and date	0

For the month: station pressure 30.11; resultant wind 34 1.3; average speed 8.0; fastest mile 22 31; date 25+

Sunshine: Total 7795 | % for month [illegible] | 1970[illegible] 42

Sky cover: Sum 208 | 188; Avg. 7.4 | 7.[illegible]

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT
+ ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 = CALM.
DATA IN COLS. 6 AND 12-15 ARE BASED ON 8 OBS.

MORE OBSERVATIONS PER DAY AT 3 HOUR INTERVALS.
FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY.

SUMMARY BY HOURS

Hour (LST)	Sky cover (tenths)	Station pressure in.	Air °F	Wet bulb °F	Dew pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind Direction	Resultant wind Speed m.p.h.
00	6	30.12	50	46	42	75	8.6	03	1.3
03	7	30.10	48	45	41	77	8.3	01	2.8
06	8	30.12	47	44	40	77	8.3	01	2.5
09	7	30.15	51	47	43	76	8.6	04	3.0
12	8	30.14	56	51	45	67	10.8	02	1.5
15	7	30.08	58	52	45	63	10.1	02	.7
18	7	30.08	56	50	44	67	9.0	08	1.0
21	6	30.11	52	48	44	73	8.4	28	.7

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

Date	A.M. 1	2	3	4	5	6	7	8	9	10	11	12	P.M. 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									
2																									1
3					T	T	T	T		T															2
4											.06	.01		.08	.05	.01	.04	.01	.06	.08	.05	T	T		3
5	.08	.18	.08	.05	.03	.04	.05	.03	.02	.01	.04	.05	T	T	.01	.02	.04	.11	.07	.05	.04	.06	.08	.09	4
6	.35	.53	.52	.45	.28	.38	.35	.22	.20	.20	.10	.08	.04	.03	.03	T	T	.02	.14	.28	.29	.21	.21	.29	5
7													.02	.01	.06	.04	.07	.07	.13	.10	T				6
8																									7
9																									8
10																									9
11																									10
12																									11
13																									12
14	T											T	T	T	T				T	.01					13
15																									14
16																									15
17										T															16
18	.05	.04	.04	.02	T	.17	.02	.08	.04	.01	T											T	T	T	17
19																									18
20																				T	T		T	T	19
21							.01	.18	.12	.20	.12	.02	.24	.16	.18	.24	.22	.14	.01	T					20
22	T	T		T	T	T			T	T															21
23				T															T	.05	.08	.27	.17		22
24	.02	T	.27	.51	.22	T							T	T	.33	.07	.02	.04		.14	1.02	.05	.05	.03	23
25																	T	T	.06	T					24
26																									25
27																									26
28																									27
																									28

SUBSCRIPTION PRICE: $2.55 PER YEAR INCLUDING ANNUAL SUMMARY. FOREIGN MAIL [illegible] EXTRA. SINGLE COPY [illegible] CENTS FOR MONTHLY [illegible] ANNUAL ISSUE. [illegible] MINIMUM CHARGE OF $1.00 FOR EACH ORDER OF SINGLE STOCKED ISSUES OF PUBLICATIONS. MAKE CHECKS PAYABLE TO DEPARTMENT OF COMMERCE, NOAA. SEND PAYMENTS, ORDERS, AND INQUIRIES TO NATIONAL CLIMATIC CENTER, FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801.

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noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

ENVIRONMENTAL DATA AND INFORMATION SERVICE

Daniel B. Mitchell
DIRECTOR, NATIONAL CLIMATIC CENTER

ATTACHMENT 3

IT'S A FACT

ATOM ARC 7018
MOISTURE RESISTANT LOW HYDROGEN ELECTRODES

A NEW MOISTURE RESISTANT COATING

One major concern in the welding of steel is hydrogen embrittlement. Excessive atomic hydrogen trapped in hardenable steel can exert enough pressure to cause critical defects such as underbead cracking and delayed brittle fracture.

One source of hydrogen in the arc atmosphere is moisture in the electrode coating, and for this reason Alloy Rods exercises extreme control in the production of low hydrogen elecrodes. All Atom Arc Low Hydrogen electrodes are manufactured to contain moisture levels below .2% before they are packed in hermetically sealed containers. In addition, Atom Arc 7018 electrodes are now manufactured with a flux coating that effectively **resists** moisture pickup for many hours **after** the container is opened. This improved coating provides an extra degree of reliability, especially for electrodes exposed to high temperature — high humidity working conditions.

This new moisture resistant coating is now standard for all sizes of Atom Arc 7018 electrodes. The improved coating was carefully formulated not only to resist moisture pick-up but also to retain the fine operating characteristics and consistent dependability for which the entire Atom Arc line is so well recognized. In the future, the moisture resistant coating will become the standard for the entire Atom Arc line.

MOISTURE TESTING AND RESULTS

The AWS D1.1 Structural Code and the Military MIL-E-22200/1E specifications allow a maximum of .4% moisture content for E70XX low hydrogen electrodes. Testing by Alloy Rods under specific combinations of relative humidity and temperature has demonstrated that the improved Atom Arc 7018 electrode satisfies this low moisture requirement for exposure times beyond those normally allowed in field use. In fact, under certain conditions, the moisture resistant Atom Arc 7018 electrode remained below the .4% max. level even after 72 hours of exposure.

TEST METHOD

The method of moisture testing chosen by Alloy Rods is that described in **AWS A5.5, Section 25.** The reasons for choosing this method are two-fold. First, it is the method required to satisfy AWS A5.5 and D1.1 specifications. Secondly, this test is sensitive **only** to water, and it is the most accurate and reliable method of moisture determination currently in use.

It should be noted that even though Atom Arc 7018 electrodes resist moisture pickup longer than ever before, **no** moisture resistant electrode will eliminate the need for storage and rebake ovens and the necessity to follow code requirements for allowable exposure times.

TYPICAL MECHANICAL PROPERTIES

	As Welded	Stress Relieved 2 hrs. @ 1150°F.
Yield Point (psi)	68,500	62,000
Tensile Strength (psi)	75,000	72,000
% Elongation (2")	31	32
% Reduction of Area	75.5	77

TYPICAL CHARPY V-NOTCH IMPACT VALUES

Temperature	As Welded	Stress Relieved 2 hrs. @1150°F.
72°F.	125 ft.-lbs.	130 ft.-lbs.
−20°F.	70 ft.-lbs.	75 ft.-lbs.

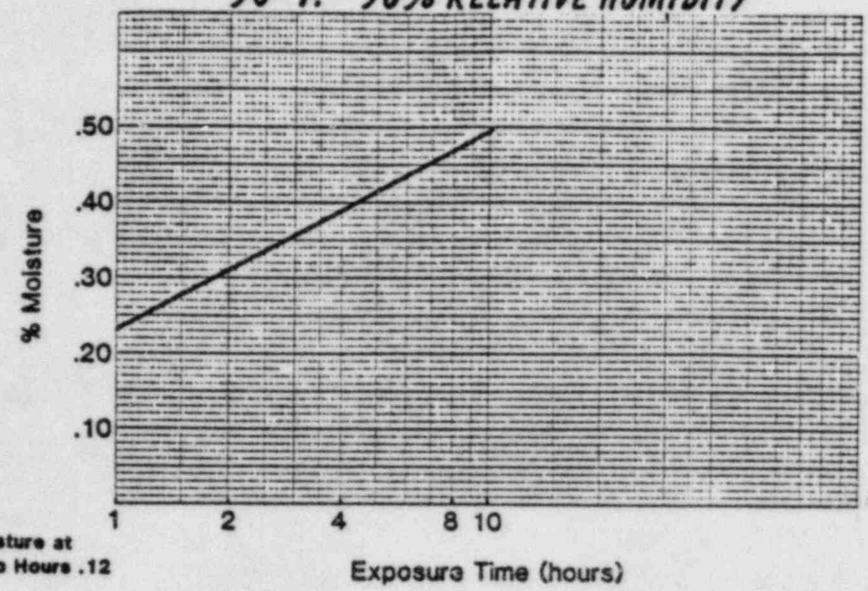
TYPICAL CHEMICAL ANALYSIS OF WELD METAL

C	Mn	Si
0.06%	1.10%	0.50%

CODE AND SPECIFICATION DATA

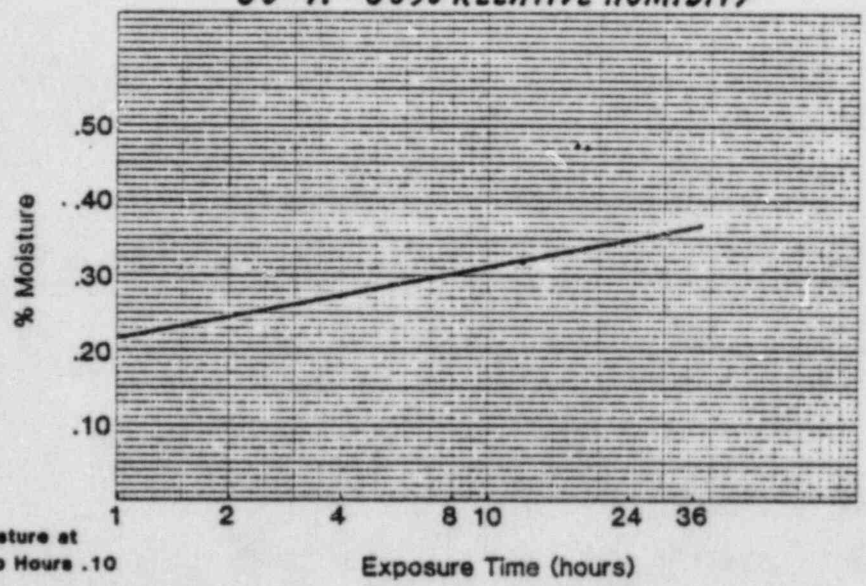
AWS: A5.1, Class E7018
ASME: SFA 5.1
Military Specification: MIL-E-22200/1E, MIL 7018
American Bureau of Shipping: 2Y
Det Norske Veritas: 3YHH
Lloyds Register of Shipping: 3H

90° F. - 90% RELATIVE HUMIDITY



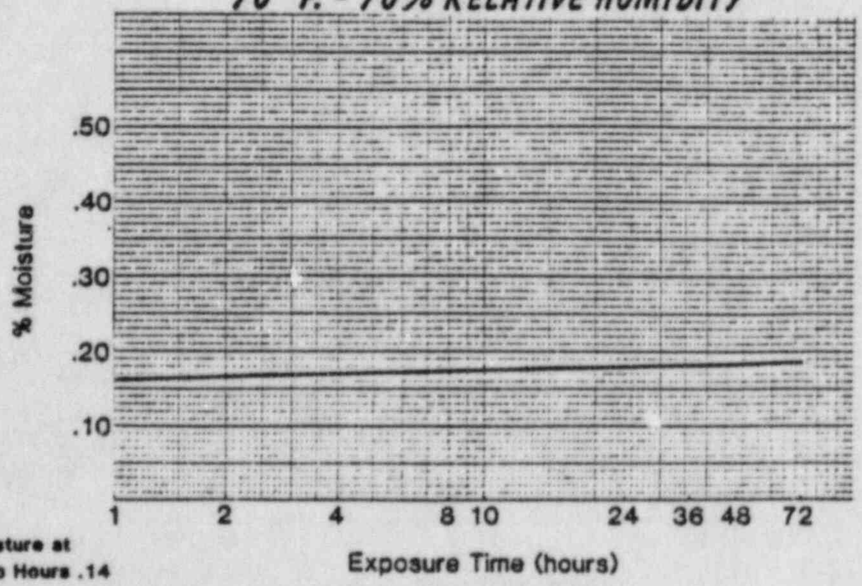
Moisture at
Zero Hours .12

80° F. - 80% RELATIVE HUMIDITY



Moisture at
Zero Hours .10

70° F. - 70% RELATIVE HUMIDITY



Moisture at
Zero Hours .14

The data presented on the preceding pages is _TYPICAL_ and is not to be construed as guaranteed values. Tests were performed in strict accordance with AWS procedures, but individual results may differ depending on test variables.

Alloy Rods Division
CHEMETRON CORPORATION
HANOVER, PA 17331 U.S.A.

THE SPECIALIST IN WELDING METALLURGY
An Allegheny International Company

ATTACHMENT 9

ALLOY RODS, INC.

ALLEGHENY INTERNATIONAL

Wilson Avenue
P.O. Box 517
Hanover, PA 17331 USA
717/637-8911
TWX 510-657-4171

September 4, 1984

EBASCO CORPORATION
P. O. Box 70
Killona, LA 70066

ATTENTION: Mr. U. Quimby

Dear Mr. Quimby:

The ATOM ARC electrodes which were used by your company for fabrication work in 1979 and 1980 were of a vintage prior to our moisture resistant formula. This pre-moisture formula is no longer being produced and was replaced with the M.R. formula over a period of time starting in 1981.

We have a small inventory of some of the pre-moisture resistant electrodes on hand; primarily for reference work when one of our people will check weldability to our present product.

The electrodes used for the tests are 1/8" diameter, produced in April of 1981. The electrodes were in a fifty (50) pound can which had been opened in June of 1981 and have been laying on our warehouse shelf since that time. For information only, we ran a moisture content of this coating, prior to conditioning, and it was 1.20%.

All of the electrodes used in the following tests were reconditioned at 800°F for 1/2 hour. The electrodes were then tied into two separate bundles with the depth of the electrodes varying from 10 to 12 deep. These electrodes were then submitted to the following tests.

TEST NO. 1

(A) One bundle was exposed in our humidity cabinet for 48 hours @ 60°F and 80 percent relative humidity.

Coating moisture prior to exposure 0.10%

	COATING MOISTURES AFTER EXPOSURE				
Location in Bundle -	Top	1/4	Middle	3/4	Bottom
	1.26	0.92	0.56	0.86	1.14

TEST NO. 1 (Continued)

(B) This same test bundle of electrode was then placed in a dry rod oven which was set at 250°F, and remained in the oven for 8 hrs. and samples taken at the end of this period.

COATING MOISTURE AFTER 8 HRS. IN OVEN

Location in Bundle -	Top	1/4	Middle	3/4	Bottom
	0.19	0.25	0.26	0.18	0.20

Test No. 1 Terminated.

TEST NO. 2

(A) This bundle of electrodes was placed in a holding oven set at 250°F and then the electric power plug was pulled with electrodes remaining in this oven for 48 hours.

The coating moisture prior to test was 0.08.

COATING MOISTURES AFTER 48 Hrs. IN OVEN

Location in Bundle	Top	1/4	Middle	3/4	Bottom
	0.23	0.17	0.23	0.20	0.21

(B) The bundle of electrodes was left in the oven and the electric power was restored to the oven and samples taken after 14 hours.

COATING MOISTURES AFTER 14 Hr. OVEN BACK ON

Location in Bundle	Top	Middle	Bottom
	0.12	0.16	0.16

Test No. 2 Terminated.

We hope that this information will be of value to you and if, for any reason, you need clarification of the results contained herein, please do not hesitate to call.

Very truly yours,

Paul M. Krieger

Paul M. Krieger
Senior Research Engineer
RESEARCH AND DEVELOPMENT

PMK/cer
ATTACHMENT
CC: S. E. Ferree, C. B. Marshall
C. R. Zimmerman

EQUIPMENT USED

"DRY ROD"

ELECTRIC STABILIZING OVEN
TYPE 300 MODEL PP3 TEMP. RANGE 175-550
MFG. PHILIP RODEN CO., MILWAUKEE, WISCONSIN

PHOENIX - DRY ROD

TYPE 300 MODEL 16A - St. Temp Range 100-550
MFG. PHOENIX PROD. CO., MILWAUKEE, WISCONSIN

HUMIDITY CABINET

BLUE M-
MODEL CFR-75520 SER. NO. 62-207
TEMP RANGE 38°F to 200°F R.H. RANGE- 40 to 98

RESPONSE

ITEM NO.: 23 (Final)

TITLE: QA Program Breakdown Between Ebasco and Mercury

DESCRIPTION OF CONCERN:

The staff review included evaluation of the implementation of the QA programs of LP&L, Ebasco, and Mercury. The staff performed a follow-up on the previous 1982 NRC review that resulted in NRC enforcement action and a civil penalty. The most recent staff review indicated that LP&L, Ebasco, and Mercury did not followup on the corrective action commitments made to the NRC.

Additionally, LP&L, Ebasco, and Mercury failed to audit the entire QA programs as required (LP&L only performed one-third of their scheduled audits for a five year period). The audits that were conducted identified some problems, however, the required corrective actions were not completed. Management audits, performed by outside consultants, identified problems and concerns that LP&L also failed to take corrective action on.

The results of the NRC task force effort indicate that an overall breakdown of the QA program occurred. Most problems identified by the NRC had been previously identified by the QA programs of LP&L, Ebasco and Mercury. But the failure to determine root cause and the lack of corrective action allowed the problem to persist.

LP&L shall provide an assessment of the overall QA program and determine the cause of the breakdown, together with corrective action to prevent recurrence. This overall assessment is necessary to provide assurance that the QA program can function adequately when the plant proceeds into operations.

DISCUSSION:

Issue #23 stands apart from the other NRC concerns with Mercury Company of Norwood in addressing, primarily, the circumstances surrounding the 1982 NRC enforcement action and civil penalty. To paraphrase the NRC concern, issue #23 centers on whether or not the cause of the Mercury problems that led to Enforcement Action 82-109 was identified, corrective action implemented, and recurrence prevented. The central issue is derived from the following specific NRC concerns:

1. LP&L failed to determine the root cause of the Mercury problems (Section II.A);

2. LP&L/Ebasco/Mercury did not followup on corrective action commitments (Section II.B);

3. LP&L/Ebasco/Mercury failed to audit the entire QA program (Section II.C);

4. The audits that were done identified problems but corrective actions were not implemented (Section II.D);

5. Management audits identified problems on which LP&L failed to take corrective action (Section II.D);

6. The failure to determine root cause of the Mercury problem, and the lack of corrective action, allowed the problem to persist into an overall QA breakdown (Section II.B);

7. On the assumption that an overall QA breakdown occurred, the NRC concludes that an assessment of the overall QA program is necessary, including a determination of the breakdown cause and corrective action to prevent recurrence (Section IV).

Based on the present review, LP&L has concluded that an overall QA program breakdown has not occurred at Waterford 3.

The discussion which follows is not intended to minimize the seriousness of the concerns regarding Mercury. Nor is LP&L maintaining that there were no areas needing improvement in the QA program--such areas will be addressed under the "collective significance" assessment of the 23 NRC concerns. While, in retrospect, there may have been more effective means to resolve the Mercury situation, what deserves emphasis is that a situation such as existed with Mercury has not recurred and furthermore, under the present management philosophy and implementation of quality assurance, adequate assurance exists that such a situation would be unlikely to recur.

I. Background - Identification of the Mercury Problem

During the spring of 1982 the first major piping and instrumentation safety-related systems were approaching construction completion. The first four such systems submitted by Ebasco for turnover were reviewed and rejected as a result of the LP&L Construction QA audits of system turnover packages.[1] The following excerpt from NRC Inspection Report 50-382/82-14 dated December 6, 1982 characterizes the results of the Construction QA audits:

> "LP&L learned that, although Ebasco QA had represented the systems as being ready for turnover and had included statements that the quality records had been reviewed, LP&L found that Ebasco QA had not actually compared the records with the as-built systems and that, in fact, the records did not actually represent a true status of the systems at that time. In addition, the turnover packages contained statements by contractors and Ebasco QA indicating that portions of the turnover packages were incomplete and not QA/QC acceptable."

During subsequent review LP&L reported potential significant construction deficiencies related to inadequate instrumentation and control system installation and turnover documentation for the four systems in question. In July, 1982 LP&L reported to the NRC through Significant Construction Deficiency (SCD) 57 that a significant construction deficiency existed and outlined corrective actions. On December 6, 1982 the NRC, via Enforcement Action 82-109, provided formal notification of a Level III Violation and civil penalty with regard to the turnover package deficiencies. The Enforcement Action noted, in part, that "[w]hile we recognize that the quality assurance program did not totally breakdown, there was a breakdown in the subtier programs of your contractor and subcontractor." The NRC further noted that the penalty was mitigated: "[t]he bases for this mitigation are the corrective action you have initiated (the extensive revision of your system turnover process) and your role in identifying and reporting the breakdown of quality assurance programs to the NRC."

---

[1] It is worthy of note that the four subject systems were the first safety-related instrumentation system documentation packages submitted by Mercury for turnover acceptance. Prior to the time of submittal of the documentation packages each of the instrumentation installations was still in an "in-process" status (i.e. not accepted by the Mercury QA organization).

II. Current NRC Concerns

A. Source of the Mercury Problems

Consistent with the Notice of Violation LP&L acknowledged (LP&L letter W3I83-0001 dated January 4, 1983) that a partial Quality Program breakdown occurred at Waterford 3 at the subtier levels involving contractor/subcontractor organizations.

In the present concern, the NRC has stated that there was a "...failure to determine root cause..." of the Mercury situation. However, during a meeting with the NRC in November, 1982 (as documented in NRC letter from J.T. Collins to L.V. Maurin dated December 6, 1982) LP&L identified the principal cause of the breakdown as "... insufficient participation by LP&L in the implementation of quality assurance programs. LP&L failed to exercise adequate oversight and control over contractors to whom implementation of quality assurance programs had been delegated, and dedicated only minimal LP&L resources to quality assurance programs."

This root cause finding was further refined in the LP&L response to the Notice of Violation (W3I83-0001 dated January 4, 1983):

> "Deficiencies noted in Inspection Report 50-382/82-14, were due to insufficient overview and support activities, (i.e., training) necessary to assure compliance to specified quality requirements.
>
> Specifically, areas which contributed to the noted violation are as follows:
>
> a. Training - training of craftsmen, QC Inspectors and reviewers was apparently insufficient to provide adequate guidance/direction to assure quality results within the principal contractor organization and two subcontractor organizations.
>
> b. Staffing - staffing of personnel was inadequate, and as a result, personnel were extended beyond their capability to adequately address quality inspections and reviews within the principal contractor organization and two subcontractor organizations.
>
> c. Walkdowns of completed systems were inadequate as a result of Items a and b."

These root cause findings were factored into the Mercury corrective actions described in the following section.

B. Corrective Actions

As to corrective actions, the NRC notes that "[t]he most recent staff review indicated that LP&L, Ebasco, and Mercury did not followup on the corrective action commitments made to the NRC." However, LP&L is confident that corrective action commitments in respect to Mercury and the Notice of Violation were implemented in an effective manner to produce quality hardware installations.

During walkdowns conducted by LP&L and Ebasco in preparation for turnover of certain Mercury-installed systems in the Spring of 1982, numerous installation deficiencies were identified to Mercury. Despite repeated walkdowns with Mercury and meetings with Mercury management, problems continued to exist to the extent that none of the Mercury systems were acceptable for turnover. Consequently, on June 23, 1982, with the Mercury bulk construction approximately 90% complete, project management ordered Mercury to cease installation of safety related systems - equivalent to a Stop Work Order (SWO), which will be referred to as such in the following discussion.

Based on LP&L's conclusions relative to the significance of the partial QA breakdown in the Ebasco/Mercury organizations, and taking into account the root cause determination, an extensive corrective action plan was initiated and executed. This plan met or exceeded the corrective action commitments made in response to the Notice of Violation. A summary of the immediate (June, 1982) corrective actions initiated in conjunction with the SWO follows:

a. Development and implementation of a retraining program involving Mercury personnel including craft, foremen, field engineers, QC inspectors and supervision.

b. System by system walkdowns on the basis of the startup schedule of all safety class installations for the purpose of identifying hardware deficiencies for evaluation and rework, plus updating the as-built drawings. This effort was initially a joint LP&L, Mercury and Ebasco effort using retrained personnel.

c. Implementation of extensive organizational changes within Mercury, including assignment of Ebasco Management personnel and engineers to Mercury.

d. A dramatic increase in the number of Mercury QC Inspectors and QA Engineers. (Questions as to the qualifications of Mercury Inspectors are addressed in the response to NRC Issue #1.)

e. Mobilization of an Ebasco QA Management Team to support and oversee the Mercury Program.

f. Other corrective actions taken not specifically related to Mercury, included the increase in LP&L and Ebasco QA Staff, formation of Ebasco QA surveillance and quality analysis groups, and enlargement of the scope and size of the Ebasco QA records review group.

Attachments 1 and 3 provide detailed discussions of these immediate corrective actions and subsequent corrective actions taken as the Mercury problem became well defined.

It is important to point out that prudence dictated that Mercury be retained as the N stamp holder of instrumentation systems to preserve the documentation and installed system ASME Code integrity until another stamp holder could take over the work in a phased manner. Because Mercury continued to be unable to support the project schedule, and due to management concern with respect to the effort required for future quality installation, the Mercury work scope was gradually reduced through June, 1983 when Mercury was relieved of P3-P8 tubing work and all seismic support work including review. Mercury was directed, at that time, to only complete and code stamp P2 instrumentation installation. Ebasco, meanwhile, had obtained an ASME Code Installer's Stamp, allowing them to complete subsequent Code work.

Following the completion of Mercury's initial retraining program Mercury was released to resume safety related installations. However, only personnel successfully completing the retraining program were selected for safety related work.

Throughout the period subsequent to the SWO until Mercury was fully demobilized in November of 1983, LP&L and Ebasco maintained an exhaustive management and QA overview relative to Mercury's overall performance. This scrutiny resulted in the following:

a. Continuation of management and organization changes within Mercury.

b. A continuous reduction in Mercury's work scope. Refer to Attachment 1 for details.

c. An improvement in new system installation quality and documentation for work activities initiated after the June, 1982 SWO. Refer to Attachment 2 for details.

d. Imposition of program changes, both administrative and quality related, on Mercury by LP&L and Ebasco. Refer to Attachment 3 for details.

e. Decisions on the part of LP&L and Ebasco to remove Mercury from the quality records review program. Refer to Attachment 5 for a discussion of the Ebasco QA records review process and statistics.

As a result of the continued oversight of LP&L and Ebasco the corrective action commitments made in response to the Notice of Violation were completed. The specific commitments and their resolutions are discussed in Attachment 3.

The issue #23 concern states that "...failure to determine root cause and the lack of corrective action allowed the problems to persist." As previously noted, root cause was identified and corrective action implemented. LP&L believes that the partial QA Program breakdown did not persist; programmatic corrective action to prevent recurrence of the construction deficiencies in any subsequent work activity was prompt and decisive.

The initial rejection of the four major piping and instrumentation safety-related systems by LP&L and the resulting corrective action is indicative of a working quality management system. The four rejected systems were not unique. Many other Mercury systems were nearing completion in July, 1982. Although deficiencies were identified in subsequent Mercury system packages, the deficiencies were due to similar reasons as the first four on work completed prior to initiation of corrective action. Having identified serious problems with four Mercury systems it was expected that some degree of the same types of problems would exist in other Mercury systems that were substantially completed at the time of the SWO. However, with the initiation of corrective actions those problems were identified and reworked after the SWO at the Ebasco/Mercury level resulting in generally acceptable turnover packages to LP&L.

In initiating corrective action on all Mercury systems, manpower availability was taken into account. Ebasco proposed, and LP&L agreed to, an orderly approach on a system by system basis rather than addressing all Mercury systems at once. This systematic approach was thorough but also extended the time required to close SCD-57 and NRC Inspection Report 50-384/82-14 into the Spring of 1984. It is possible that this approach may have given the appearance of a continuing Mercury problem to the NRC Inspectors.

In actuality, Non-Conformance Reports (NCRs) continued to be written for some time on Mercury work completed prior to July, 1982. Attachments 2, 3 and 3F provide details and a graphic presentation of the Mercury NCRs. Referring to Attachment 3F, the prominent peaks in the number of NCRs at 11/82 and 3/83 are a manifestation of the continuing walkdowns of old (i.e. work completed prior to July, 1982) Mercury work as opposed to an indication of a continuing problem.

A sampling of construction packages was taken to provide evidence that the majority of NCRs written on Mercury systems were related to work completed prior to July, 1982. The results of this review are contained in Attachment 2, providing further confirmation that the partial breakdown with Mercury did not persist; actually, because of the corrective actions taken, the quality of Mercury work improved. It must be emphasized that the timing of the NCRs is not significant except that it could give the appearance of a continuing problem. Corrective actions proceeded, and were completed, in an orderly fashion on a schedule consistent with the startup schedule of Waterford 3.

The final phase of corrective action is, of course, verification of installation adequacy. Although addressed in part in various attachments to this response, the bases for Mercury installation verification are collected together in Attachment 5. Based upon the multiple levels of satisfactory review and corrective actions taken, LP&L now has a high degree of confidence that Mercury installations will perform in accordance with design requirements. This is being further confirmed by the reinspections in progress in response to NRC Issue #1.

In summary, the root cause of the Mercury problem was identified and corrective action was implemented both to correct Mercury work prior to July, 1982 and to prevent recurrence. Once the Mercury problem was identified, and corrective action begun, the problems did not persist to the degree that existed prior to the SWO. In fact, the Mercury quality performance improved. Deficiencies in work prior to July, 1982 were identified and reworked on a system by system basis resulting in an extension of the corrective action duration.

C. Audit of Mercury Installations

The NRC has raised the question that:

> "...LP&L, Ebasco, and Mercury failed to audit the entire QA program as required (LP&L only performed one-third[1] of their scheduled audits for a five year period). The audits that were conducted identified some problems, however, the required corrective actions were not completed."

LP&L committed to perform a documented schedule of audits based upon the status and safety importance of the activities to be audited. The audits were to be initiated early enough to assess and assure effective control of quality. LP&L maintained a monthly audit schedule and revised it as necessary to assure that the coverage and schedule reflected current activities and delays in construction scheduling. In the case of Mercury, during the life of the Mercury contract (approximately 4 years) LP&L scheduled

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[1] Audits were often deferred from month to month (e.g. due to slippage in construction schedule; higher priority audits; QA support of NRC inspection audits; etc.). As an example, upon completion of one audit scheduled in each of four consecutive months, the appearance of a 25% completion rate of scheduled audits would be given. The audit schedule was a guide to provide LP&L QA management overview of construction activities.

twenty-eight audits of the contractor. Twenty-four of the audits (85% of those scheduled) were completed. Although not a commitment in the QA program, thirteen unscheduled surveillances of the Mercury program were also conducted. LP&L delegated the routine auditing of the Mercury QA program to Ebasco Services.

The Ebasco QA program was structured with an audit schedule based upon a yearly audit of applicable 10CFR50, Appendix B criteria. Over the course of the contract, Ebasco went beyond the minimum requirement in performing 114 audits of Mercury. Surveillances which supplemented the audit program were also performed on Mercury activities.

The Mercury program commitments were to perform a minimum of one Internal Audit on each auditable section of the QA manual each calendar year. Mercury performed seventy-four audits during the life of their contract. In preparation of this response, the Mercury audit schedule was reviewed and shown to be deficient in not completing audits of all QA Manual sections in 1981, prior to the SWO. Following the SWO Mercury met their commitments to the end of their contract.

Additional detail as to the audit activities of LP&L/Ebasco/Mercury is provided in Attachment #4.

All audits conducted by LP&L and Ebasco of Mercury activities, including audits performed by Mercury, were reviewed for completion of required corrective action. This review was performed by LP&L QA in conjunction with the preparation for this response. The review revealed that corrective actions required to close identified audit findings were completed.

During the review of the Mercury Audit File the LP&L reviewer had difficulty determining if findings were closed because files were not organized for ease of followup. It appears that this file organization led to the NRC reviewer's assertion that "[t]he audits that were conducted identified some problems, however, the required corrective actions were not completed." The file has since been re-organized to contain audit packages together with the supporting information, and is available for NRC review.

LP&L management questioned if pre-June, 1982 audits could have identified the overall Mercury problem prior to the SWO. The early audits identified many of the individual Mercury problems. However, in retrospect, the collective implication of these audit findings on Mercury was not systematically assessed and therefore the root cause and generic significance were not adequately addressed in corrective actions. Identification of this approach, whereby the individual problem/solution was addressed rather than overall significance, is a major lesson learned from the Mercury situation.

D. Management Assessments by Outside Consultants

Issue #23 states that "[m]anagement audits, performed by outside consultants, identified problems and concerns that LP&L also failed to take corrective action on."

It appears that the management audits referred to by the NRC concern are in actuality management assessment evaluations requested by the executive management of LP&L to provide an independent assessment of nuclear project performance during the early years (1977-1980) of construction. These assessments were evaluated by the appropriate LP&L management and actions taken where it was deemed appropriate. Of the concerns noted during these assessments, the majority dealt with organization and staffing matters that were later implemented. LP&L has previously stated before the ACRS in May, 1982 that management was slow to respond to some of the assessment results.

LP&L management, in recognizing the value of independent management audits, contracted Management Analysis Company (MAC) in 1982 to assist in auditing the Waterford 3 plant training program. Audit findings were promptly presented to management and addressed in a timely fashion. As a result of the audit, the plant training program was improved.

III. Lessons Learned

While the corrective actions required because of Mercury's poor performance were adequate to resolve the quality problems and prevent recurrence, in retrospect, LP&L management would proceed differently today. The listing which follows summarizes the lessons learned from the Mercury experience (both pre- and post-SWO). They will be further addressed in the "collective significance" submittal for the 23 NRC concerns.

1. Delegation to a contractor of the routine QA auditing overview of a subcontractor without adequate utility involvement inhibits the timely recognition by the utility of quality problems.

2. More emphasis should be placed on a QA management overview designed to distinguish generic problem trends and root causes of audit findings from isolated occurrences.

3. Staffing levels should have been higher.

These lessons learned were mainly addressed during the Mercury corrective actions. For instance, LP&L/Ebasco/Mercury QA organizations were increased and LP&L took an active QA role in the review of contractor/sub-contractor programs. Presently, the QA Program reflects lessons learned from the construction phase in the inclusion of requirements for evaluation of root cause and generic significance of audit findings, and the implementation of a trending program to identify and correct adverse quality trends. These subjects are expanded upon in the "collective significance" submittal.

IV. Conclusions

This issue concentrates on the implementation and adequacy of the corrective action commitments made by LP&L to the NRC in response to Enforcement Action 82-109.

There were aspects of the documentation and historical development which may have been difficult to follow. As noted in Section II.C the manner in which the Mercury audit file was organized did not clearly reflect the completion of audit corrective actions. The management decision to address the Mercury work prior to July, 1982 on a system by system basis rather than as a whole could give the appearance of a persisting problem with Mercury due to the continuing number of NCRs written, the majority of which were actually written against pre-July, 1982 Mercury work.

As demonstrated in this response, however, LP&L is confident that corrective action commitments resulting from Enforcement Action 82-109 were effectively implemented to assure quality hardware installation. The Mercury problem, which gave rise to the Enforcement Action, did not persist nor has it recurred. An overall QA program breakdown has not occurred.

LP&L has established a comprehensive program for quality assurance during the operating phase of Waterford 3. The QA Program, which includes provisions for requisite staffing and program audits, is described in Chapter 17.2 of the Waterford FSAR and the LP&L Quality Assurance Manual. Control of all quality related work, a key element of the QA Program, includes use of Condition Identification and Work Authorization (CIWA) procedures. These procedures apply whether work is conducted by LP&L employees or vendors. Procedure implementation was initiated several months ago, along with appropriate training, to ensure worker and supervisor familiarity and capability to maintain the tight quality control required in an operating environment. Due to the tighter quality controls and the direct LP&L authorization, review and closure of CIWA items, there is reasonable assurance that a partial QA program breakdown of the Ebasco/Mercury type should not occur during plant operations. A more detailed description of how the QA program and procedures function and reflect lessons learned during the construction phase and from resolution of the twenty-three NRC issues will be found in the "collective significance" response.

CAUSE:

The essence of NRC issue #23 is that, relative to the Mercury problems previously identified by LP&L, there may have been a failure to determine root cause and implement corrective actions thereby allowing the problem to persist resulting in an overall QA breakdown. This review concludes that an overall QA breakdown did not occur.

GENERIC IMPLICATIONS:

With respect to the Mercury deficiencies, this issue has been treated generically. From the initiation of corrective actions following the SWO the generic implications for other contractors were taken into account. For instance, as noted in Attachment 3, the LP&L Task Force charged with physical verification walkdowns of pre-June, 1982 work covered installations by 15 contractors other than Mercury. The Quality Assurance Installation Review Group software review was directed at all site contractors. Given the quality controls existing in the operations phase QA Program the potential for recurrence of a Mercury type partial QA breakdown has been minimized. Generic implications with respect to the current LP&L QA Program will be appraised in the LP&L response regarding the collective significance of the 23 NRC issues.

SAFETY SIGNIFICANCE:

In view of the adequate corrective actions initiated in response to the Notice of Violation as summarized in this submittal there is no current safety signficance associated with Issue #23.

CORRECTIVE ACTION:

There is no further corrective action outstanding for this issue. The Mercury corrective actions were extensive and effective in preventing the continuation of the partial QA program breakdown. Corrective actions for other identified Mercury concerns (e.g. issues 1, 6) are documented in the responses to those concerns. Several significant lessons learned from the subject of issue #23 have been factored into the post-SWO corrective actions and are reflected in the present QA Program. The current status of the LP&L QA Program will be further discussed in the "collective significance" submittal.

ATTACHMENTS

1. Chronology of Organizational/Management and Scoping Changes for Instrumentation Activities
2. Analysis of Mercury Tubing, Tube Track and Support Installation Records
3. Corrective Action Status
4. Audit of Mercury Installations
5. Verification of the Acceptability of Mercury Installations

ATTACHMENT 1

Chronology of Organizational/Management and Scoping Changes for Instrumentation Activities

I. General

The following Sections II-III contain a summary description of the organizational and management changes implemented in the Ebasco and Mercury Organizations as a result of the deficiencies identified in SCD 57 and Enforcement Action 82-109. Section IV discusses the reduction in Mercury work-scope following June, 1982.

II. Chronology

June 1982:

Ebasco notifies Mercury of the documentation discrepancies associated with systems 59, 60A, B, & C. Mercury is ordered to cease safety related activities. Agreement is reached to assign Ebasco personnel within the Mercury organization, reporting to Mercury. Three (3) Ebasco Craft Supervisors are assigned to Mercury.

July 1982:

As a result of meetings and discussions amongst LP&L, Ebasco, and Mercury, it is determined that the overall problem is a result of poor communication and inappropriate management action in Mercury's organization. Mercury agrees to replace their key personnel, but they are unable to provide replacements. Ebasco provides personnel for the key positions of Project Manager and Construction Superintendent. In order that Mercury could retain legal control of their obligations (financial), Mercury establishes a new position of Project Administrator to handle personnel and billings.

The most significant organization change is implemented at this time. The Joint Walkdown Teams (initially 5 teams) are established consisting of an individual from the following: Mercury Engineering, Mercury QC, Ebasco Engineering, LP&L (or Ebasco) QA, and LP&L Start-up.

August 1982:

It is agreed that the personnel supplied by Ebasco to the Mercury organization are temporary, in that, if and when Mercury could supply qualified personnel, then the Ebasco personnel would be returned. To facilitate this move, Mercury establishes the position of General Superintendent (filled by Ebasco personnel) while the position of Construction Superintendent is reassigned to a Mercury employee. LP&L Start-up develops a reasonable level of confidence in the walkdown effort resulting in the removal of their members from the Joint Walkdown Team.

September 1982:

QA/QC reorganizes below the QA/QC Site Manager. Supervisors are assigned to assist in Field Inspection, Records, and Administration. By this time Mercury has added (from Ebasco) 3 Construction Supervisors, 12 Engineer/Designers, and 3 Schedulers. Additionally, Mercury hires 37 QA/QC personnel and 9 engineering personnel.

October 1982:

At this time, while it appears that the quality-related issues are being addressed, Mercury is still not supporting the project schedule. For this reason, Ebasco assigns a small Task Force with members from Construction Management, Design Engineering, and Quality Assurance to work closely with the various organizations and personnel to determine if improvements could be developed. One of the Task Force's initial actions is to increase the Joint Walkdown Teams from 5 to 8.

A position of Project Coordinator is established to provide a means of communicating status to other organizations and communicating priorities within Mercury. Also, an additional Craft Supervisor is assigned to Mercury.

November 1982:

As a result of evaluating the causes for missing completion schedules on open items identified by the Joint Walkdown Teams, the following changes are implemented:

System Administrators are assigned to Mercury, reporting to the Project Coordinator. They are assigned a particular system and responsibility to track all items for that system through the various groups to completion while providing status information to other groups.

It is agreed that the key to getting Mercury on track is to define the remaining scope of work. Therefore the Joint Walkdown Team is again increased to 12 to expedite identification of status.

December 1982:

Because of the release of Mercury's Project Engineer and the resignation of Mercury's QA/QC Site Manager in November, and because Mercury has difficulty finding qualified replacements, the following reassignments are implemented:

Mercury's Construction Manager assumes the position of Project Manager. The Project Manager assumes the position of Project Engineer. The Project Administrator position is eliminated and the individual is reassigned as Assistant Project Manager. Mercury's Corporate QA Manager is sent to the site and assumes the responsibilities of the QA/QC Site Manager.

A new Mercury position of Lead System Administrator is established.

January 1983:

After considerable discussion concerning the QA/QC Site Manager, Mercury assigns the V.P. of F&M Technical Services, as Manager. This new Manager resigns after approximately 2 weeks on the project. An acting QA/QC Site Manager is temporarily assigned and proves capable of retaining the position.

February 1983:

Mercury releases Ebasco personnel assigned as General Superintendent and Assistant to the Construction Superintendent.

March 1983:

Ebasco assigns a new Construction Manager.

August 1983:

Mercury releases the last assigned Craft Supervisor back to Ebasco.

III. Staffing

In addition to the organizational changes described above, the following covers Mercury staffing levels during this time period.

	Manual	Non Manual
June 1982	140	100
July 1982	125	110
August 1982	150	130
September 1982	135	145
October 1982	140	175
November 1982	180	215
December 1982	160	200
January 1983	190	175
February 1983	110	175
March 1983	90	195
April 1983	95	160
May 1983	85	150
June 1983	80	135
July 1983	70	120
August 1983	45	75
September 1983	15	15
October 1983	0	7
November 1983	0	5

IV. Reduction in Mercury Work-Scope

Because Mercury continued to be unable to support the project schedule, and due to management prudence with respect to the effort required for future quality installation, the Mercury work-scope was gradually reduced over the following year. In order to preserve the documentation and installed system ASME Code integrity until another stamp holder could take over in an orderly manner, Mercury was retained on the job.

Shortly after Mercury resumed safety-related work (June/July, 1982) at Waterford 3 the ANSI B31.1 work was reassigned from Mercury to Ebasco. This was accomplished in several ways: 1) by changing the responsibility of work items on Start-up System Punchlists during daily Start-up meetings, 2) by assigning the Completion Verification Sheets of DCNs/FCRs to Ebasco instead of Mercury, and 3) by assigning CIWAs to Ebasco instead of Mercury.

By early 1983, Mercury had been directed not to perform any work in the Turbine Generator Building or the Yard Areas, such work being reassigned to Ebasco. In March, 1983 Mercury was informed that Secondary Sampling System work would be performed by Ebasco and that LP&L would install six temperature elements in the Reactor Coolant System.

In April, 1983 a significant portion of work, installation of instrument drain lines, was deleted from Mercury's scope and transferred to Ebasco. Additionally, the responsibility for performing integrity tests of ANSI B31.1 installations in the Turbine Generator Building was removed from Mercury and assumed by LP&L/Ebasco.

Concurrently, from June, 1982, Ebasco was preparing to assume Mercury responsibilities. Ebasco had assigned a separate group of Construction Engineers, Supervisors, and Quality personnel to prepare procedures, develop detail sketches, work packages, etc. in order that work could be deleted from the scope of Mercury's contract. By July, 1982 Ebasco had initiated procedure preparation; by September, activities were progressing in the field; and by early 1983 Ebasco had received an ASME Survey and "N" Stamp.

As a result of this concurrent ongoing program, in July, 1983 Mercury was relieved of further responsibilities save for ASME P2 work. All other work including engineering and documentation review would be performed by Ebasco. Finally, in late July, Mercury was requested to terminate all work except turnover of QA records and other relevant documentation. The P2 work was accepted by the ANI in July/August of 1983 and Mercury was relieved of further scope. Mercury's last craft personnel were on-site September 13, 1983. The last non-manual and QA personnel were on-site November 22, 1983.

ATTACHMENT 2

Analysis of Mercury Tubing, Tube Track and Support Installation Records

As a result of the corrective actions initiated in response to the Mercury problems which led up to the June, 1982 Stop Work Order, an improvement in Mercury's quality performance, with respect to hardware installation, is expected. It is reasonable to expect this assumption to be reflected in the Mercury QA records documentation submitted to Ebasco for review. This analysis is intended to provide confirmation of the accuracy of this assumption.

Documentation records for the 19 Mercury OCRs (installation travellers) which were initiated for new system installation begun after the SWO on tubing, tube track and support installations were compared to 19 Mercury OCRs on system work near completion (other than subsequent corrective rework) at the time of the SWO. The 19 post-SWO OCRs comprise the entirety of new Mercury tubing, tube track and support safety-related instrumentation system installations initiated after the SWO.

Two aspects of the documentation were analyzed:

1. Documentation deficiencies were categorized and the quantities of deficiencies for the pre- and post-SWO packages were compared (see the following Section I).

2. The Mercury Non-Conformance Reports (NCRs) written against the systems comprising the 19 pre-SWO OCRs were identified and categorized as to when the work was completed (see the following Section II).

Based on the present review, adequate documentation exists to confirm a definite improvement in the quality of Mercury work following the SWO and initiation of corrective actions. In addition, confirmation was obtained that during the period 6/82 - 8/83 the majority of Mercury NCRs were written against work completed prior to the SWO.

I. The 38 OCRs were reviewed for documentation deficiencies in two areas - tubing installation and tube track/support installation.

The documentation categorization and review results are as follows:

TUBING INSTALLATION

Category	Description
A	Software discrepancies requiring no QC reinspection or rework to resolve (minor paperwork problems).
B	Software discrepancies requiring Ebasco QC reinspection to resolve; no rework required (e.g. verify support type or heat number).
C	Documentation discrepancies which were upgraded to discrepancy notices or NCRs.

Results

Category	Installation Prior to 7/1/82	Installation After 7/1/82
A	40 (31%)	183 (90%)
B	62 (48%)	8 (4%)
C	27 (21%)	10 (5%)
TOTAL	129	201

TUBE TRACK/SUPPORT INSTALLATION

Category	Description
A	Support or tube track documentation packages with no deficiencies.
B	Support or tube track documentation packages with documentation deficiencies which required Ebasco QA reinspection to resolve; no rework required.
C	Support or tube track installations with missing or incomplete documentation; reinspection required.

Results

Category	Installation Prior to 7/1/82	Installation After 7/1/82
A	109 (51%)	147 (65%)
B	48 (23%)	39 (17%)
C	55 (26%)	39 (17%)
TOTAL	212	225

A comparison of the significant documentation deficiencies, Categories B and C, indicates improved quality performance. The improvement is particularly evident with respect to tubing installations. Although this comparison is limited by the number of OCRs that represent completely new (post-SWO) work, the data suggest that corrective action measures and continued management overview of Mercury were effective in bringing about an improvement in Mercury's quality related activities with respect to hardware installations.

II. Using the same pre-SWO OCRs as the previous section, a review was conducted to identify all NCRs written against the OCRs. During the review, NCRs were categorized according to the following scheme:

Category	Description
1	NCRs written prior to 6/23/82 against work performed prior to 6/23/82.
2	NCRs written subsequent to 6/23/82 against work performed prior to 6/23/82.
3	NCRs written subsequent to 6/23/82 against work performed subsequent to 6/23/82.

Category 1 reflects NCRs written prior to corrective action; Category 2 covers those NCRs written during the corrective action walkdowns of pre-SWO Mercury work; and Category 3 NCRs are those written against work performed following corrective action.

The review results are as follows:

Category	NCRs on Installations Primarily Completed Prior to 6/23/82
1	25
2	65
3	37
TOTAL	127

Of importance is the relationship between Category 2 and Category 3 NCRs - nearly a 2 to 1 ratio betwen NCRs written on pre-SWO work and NCRs written on post-SWO work. The present review supports the position that the majority of Mercury NCRs written during the 6/82 - 8/83 period (see Attachment 3H) were actually written during the corrective action phase against Mercury work completed prior to 6/23/82 and are not indicative of a continuing problem with Mercury.

ATTACHMENT 3

Corrective Action Status

In response to the Mercury problems encompassed by Issue #23 a number of corrective actions were implemented, several of which went well beyond the Mercury concern by addressing generic problems. The following material details Mercury corrective actions. To assist in identifying those which were commitments to the NRC in response to the Notice of Violation, the table in Attachment 3A is provided.

1. Mercury Company, as a result of the Stop Work Order on 6/23/82, reassigned craft off safety-related system work and began developing a reindoctrination/reorientation program. LP&L QA was directly involved in the development of the documented retraining program which was completed and approved on June 25, 1982. The Mercury program included training for record reviewers, QC inspectors, craft and engineering personnel. The program was submitted and documented in Mercury Letter WA-964 dated June 25, 1982 and reviewed/approved by Ebasco letter F-58853 dated June 25, 1982. The implementation of the retraining of reinspection/rework teams began on June 26, 1982. Verification is available in Ebasco letter F-58490-AST dated June 28, 1982. The Ebasco/LP&L concurrence of proper execution of the retraining program was accomplished on June 29, 1982 and is documented in Ebasco letter F-58490-AST dated June 28, 1982 which released Mercury on safety-related work by retrained personnel. The Mercury retraining program continued through March, 1983.

2. Following the Stop Work Order, Mercury began implementation of corrective action commitments. Concurrently, Ebasco mobilized a QA Management Team on 7/6/82 to support and oversee the Mercury program. On 7/7/82 the Team outlined an action plan which assigned, to Ebasco QA Managers, responsibilities in the areas of:

    A. Improvement in tracking and timely completion of Significant Construction Deficiencies, Nonconformance Reports, Deficiency Notices and Audits.

    B. Increased contractor QA Surveillance (actual as-built verification by assigning a QA Surveillance Engineer to Mercury).

    C. Reorganization of Ebasco QA auditing functions and organization to improve the quality and content of sub-contractor oversight.

    D. Establishment of a QA Records Turnover Review system and organization, by assigning an Ebasco QA Records Group to work parallel with the Contractor's QA reviewers.

While the action plan of the QA Management Team was initiated in response to the problems identified with Mercury, the scope of the plan included all sub-contractors. Additionally the action plan provided for an increase in the Ebasco document review, QC and supervisory staffs and retraining of personnel involved in documentation review.

The action plan items were implemented as follows:

Area A - established by week 8/30/82.

Area B - established by week 8/30/82 (for detailed information see Item #4 below).

Area C - established by week 7/26/82.

Area D - Ebasco QA Records Coordinator was assigned on 7/26/82.

3. With LP&L concurrence, Ebasco formed a Quality Assurance Surveillance Group (Action Item B, above) to increase involvement in the in-process construction activities including hardware installation, system turnover, walkdown inspection and system testing.

Actions taken after formation of the Surveillance Group include:

A) Issuance of a new procedure QAI-15 "Surveillance of Site Contractors" Rev. 0, 7/26/82.

B) Issuance of a new procedure QAI-16 "Qualification of Quality Surveillance Personnel" Rev. 0, 7/30/82.

C) The QA Surveillance personnel were trained and recertified to the new procedures.

D) A QA Surveillance Plan and Schedule was completed on 8/17/82.

The concept of full time QA surveillance of site contractor activities can play an important role in the construction management process. The extent and effectiveness of the surveillance group in identifying deficiencies which addressed not only Mercury but other site contractors is evidenced by the surveillances conducted, and resulting nonconformances identified, which were then resolved by the Site Quality Program. For example, a total of 48 surveillances were conducted on Mercury from 8/82 thru 5/83 which identified non-conforming conditions such as undersize welds (Ref. SH-1, 12/21/82 & TM-1, 12/27/82) and unacceptable welder qualifications (Ref. NB-17, 10/11/82). A listing of the Mercury surveillances is included in Attachment 3B.

4. The Quality Programs and Procedures of affected organizations were reviewed and revised, as applicable.

Mercury Company during the time period from March, 1982 thru June, 1983 revised 32 of the existing 48 approved procedures for use on Waterford 3. This involved a total of 70 actual procedural revisions. Included in these revisions were installation procedures, QA program auditing and process control traveler preparation and control (see Attachment 3D).

Ebasco during the time period from May, 1982 thru May, 1984 revised, voided or issued a total of 30 procedures which are listed in Attachment 3C. The program revisions/additions included the following which are detailed in other corrective action responses or available on site for review:

A. Establishment of a QA Surveillance Group.

B. Redefinition/assignment of site training responsibilities.

C. Establishment of a Quality Analysis Group.

D. Separation of the Quality Assurance Installation Review Group (QAIRG) from QA Engineering and increased staff levels.

E. Development of specific records review forms for individual contractors.

F. Stricter controls on the system turnover process.

5. A Task Force was developed, established and staffed separately by the Corporate Management of LP&L to perform Quality Records Review and physical verification by walkdowns of selected activities, of contractors and subcontractors who performed safety-related work prior to June 1, 1982, to assure compliance with the QA program.

The LP&L Task Force was comprised of personnel from LP&L QA and the LP&L Nuclear Project Support Engineering Group. The action plan for the Task Force was approved by the LP&L Vice-President-Nuclear Operations. LP&L procedure QP19.1, "Task Force Installation Verification" was approved and issued on January 11, 1983, under the direction of the QA Manager. The procedure provided direction for the implementation methods and reporting mechanisms necessary to ensure adequacy of contractor work prior to June 1, 1982.

Specifically, for 15 contractors, walkdowns were performed using checklists to verify that the installed condition was in accordance with related documentation. Where system walkdowns were impractical, analytical means were employed to confirm the adequacy of the installation. Where applicable, dimensional checks of mechanical components, inline equipment, cable tray and pipe supports, component locations, welds, and terminations (separation) were verified to ensure agreement with engineered/as-built drawings. Checklists were sufficiently detailed to ensure necessary discipline items were verified. Record reviews were performed on the supporting documentation for the physical activities verified during walkdowns. Checklists were used to document these record reviews Verification of the as-built drawings to the physical configuration as installed was the prime concern of the record reviews.

In April, 1983 the LP&L Task Force review was completed. The Task Force findings were transmitted to Ebasco as LP&L Audit W3S-83-QP19.1/W3S-83-3 in accordance with the LP&L Quality Assurance Program. In September, 1983, following corrective action, LP&L Audit W3S-83-QP19.1/W3S-83-3 was closed. The Task Force review identified some record and system installation deficiencies requiring further reinspection and corrective actions as documented in W3I83-0115 (4-8-83) and W3K83-1808 (11-21-83).

The NRC (in Inspection Report 50-382/84-34) reviewed the LP&L Task Force implementation and results. An open item was identified by the NRC concerning physical verifications of Chicago Bridge and Iron installations. As noted by the LP&L Task Force, the Hot Functional Testing during the period of their review prevented a walkdown of the physical installations, however, a review of radiographic documentation was conducted. The open item notwithstanding, the NRC indicated that "[t]he Task Force verification effort and findings did contribute to the overall LP&L and NRC assessment of the acceptability of the contractor work and effectiveness of LP&L's QA program."

6. The LP&L QA organization was enlarged and supplemented with contract personnel in order to provide broader QA coverage of safety-related site activities. Attachment 3E details the LP&L QA staffing history demonstrating the dramatic increase in QA personnel over the last half of 1982.

7. The LP&L QA organization developed procedures and conducted audits to verify system configuration and documentation prior to turnover to LP&L Start-up. Procedure QASP 17.5, "Quality Records Review" assures verification of system configuration and documentation prior to system turnover to LP&L.

8. Plant staff, in conjunction with start-up engineers performed system walkdowns and verified status of the configurations of the systems prior to transfer to the plant staff. Thirty days prior to any scheduled system transfer the cognizant Plant Staff engineer along with the Startup and Ebasco engineers perform a system walkdown to generate deficiency lists and review the system configuration to determine that it is constructed as depicted in system drawings. A walkdown by the same personnel and other Plant Staff personnel is then conducted fourteen days prior to scheduled system transfer to verify, among other things, acceptable progress in addressing system deficiencies. The pre-transfer walkdown process is identified in Startup procedure SAP-40, "System Transfer from Startup to Plant Staff", and Plant Operating Manual Procedure UNT-TEM-003 (previously, UNT-1-008), "Review and Approval of System Transfer".

9. The responsibility for Significant Construction Deficiencies, Inspection Reports and other required reporting was transferred from LP&L QA to LP&L Licensing: This change allowed more time for direct involvement by LP&L QA in construction activities.

10. A review of the Mercury Historical Nonconformance Report files indicated a significant increase in the generation/resolution of nonconformance reports after the 6/23/82 Stop Work Order. A total of approximately 436 NCRs had been generated by Mercury prior to the SWO and a total of approximately 3323 NCRs were generated subsequent to the SWO. During the entire program a total of approximately 1632 Mercury Nonconformance Reports were upgraded to Ebasco NCRs. This increase in NCRs can be correlated to the corrective action walkdowns conducted during 1982/83 as shown in Attachment 3F.

The increase is indicative of corrective actions taken particularly in management/supervision attention and the retraining of QC inspection personnel together with a better definition of inspection criteria. It is also indicative of the methodology employed whereby the inspection activities instituted to assure acceptance of all Mercury safety-related work was completed on a system by system basis rather than trying to address all Mercury systems at once. This approach resulted in the identification and closure of deficiencies over a longer period of time. For additional analysis of the Mercury NCRs please see Attachment 2.

11. As effective as the corrective actions were in resolving hardware related concerns and upgrading the Waterford III QA program, problems with Mercury still occurred, but with much less frequency. Examples of these concerns include the reopening of SCD 61 (Sandvik tubing defect) and SCD 84 (tube track welding) cited in NRC Issue #6. Many of the documentation and hardware problems identified after the SWO can be attributed to ineffectual programs in existence prior to the SWO. Nonetheless, the SWO corrective actions were effective in not allowing the partial QA breakdown to continue. The overall impact of the Mercury issues will be addressed in "collective significance".

ATTACHMENT 3A

Notice of Violation Commitments		Location in Issue #23 Where Addressed
1.	An extensive training/retraining program was implemented by Mercury for their records review, QC inspector, craft and engineering personnel. This program will continue in order to maintain the proficiency of these personnel.	Attachment #3, Item 1
2.	Joint system walkdowns with Mercury and Ebasco have been initiated for the purpose of problem identification and resolution prior to system release and turnover.	Attachment #5, Item 1 Attachment #3, Item 10
3.	Mercury has increased their documention review and QC inspection staffs.	Attachment #1
4.	Ebasco formed a QA Surveillance Group to perform random physical inspections to assure contractor compliance to established requirements.	Attachment #3, Item 3
5.	Ebasco has increased its document review, QC and supervisory staffs and has retrained personnel involved in review of documentation.	Attachment #3, Item 2
6.	The LP&L QA organization has been enlarged and supplemented with contract personnel in order to provide broader QA coverage of safety-related site activities.	Attachment #3, Item 6
7.	LP&L QA has developed procedures and will conduct audits to verify system configuration and documentation prior to turnover to LP&L Start-up.	Attachment #3, Item 7
8.	Plant staff, in conjunction with Start-up engineers, will perform system walkdowns and will verify the status of the current as-built configuration of the system prior to transfer to plant staff.	Attachment #3, Item 8
9.	Responsibility for Significant Construction Deficiencies, Inspection Reports, and other required reporting has been transferred from QA to Licensing.	Attachment #3, Item 9

Notice of Violation Commitments		Location in Issue #23 Where Addressed
10.	LP&L has developed an aggressive plan to establish methods for quality record reviews and applicable physical verification for selected activities performed by 15 contractors who performed safety related activities prior to June 1, 1982. The plan will be implemented by LP&L QA and Engineering personnel.	Attachment #3, Item 5
11.	LP&L and its contractors have reviewed for adequacy those procedures related to the turnover process and have revised them as necessary to assure that review requirements are clearly stated.	Attachment #3, Item 4

Ebasco Surveillance Group
Surveillances of Mercury

8/18/82	W3-NY-15	NB1	Surveillance - Walkdown
8/18/82	W3-NY-15	NB2	Procedure Revision Form 276-1
8/25/82	W3-NY-15	NB3	Review OCR Package 607
8/23-24/82	W3-NY-15	NB4	Review OCR Package 607 SP-660
8/26-27/82	W3-NY-15	NB5	Review OCR Package 1312
9/1/82	W3-NY-15	NB6	Piping & Tubing - Code Stamping
9/7/82	W3-NY-15	NB7	Walkdown - Welding
9/8-12/82	W3-NY-15	NB8	Walkdown & Review Instr. Packages
9/15/82	W3-NY-15	NB9	Weld Machine Calibration
9/18/82	W3-NY-15	NB10	Measuring & Test Equipment
9/23/82	W3-NY-15	NB11	Walkdown
9/27/82	W3-NY-15	NB12	Visual Exam Proc. QCP-3110/R3
9/30/82	W3-NY-15	NB13	Mercury Removal of Items
10/1/82	W3-NY-15	NB14	Walkdown of Sys RCP Support 1B
10/4/82	W3-NY-15	NB15	FCR-AS-2066
10/5/82	W3-NY-15	NB16	Instrument/Support
10/11/82	W3-NY-15	NB17	Welder Qualifications
10/14/82	W3-NY-15	NB18	Audit of QA/QC Personnel - Cert
10/14/82	W3-NY-15	NB19	In process support
10/14/82	W3-NY-15	NB20	Storage SS Tubing
10/19/82	W3-NY-15	NB21	NCRs Assoc Sus 46
10/21/82	W3-NY-15	NB22	DN USE
11/12/82	W3-NY-15	NB23	Walkdown OCR 670
11/12/82	W3-NY-15	NB24	Removal of Items
11/12/82	W3-NY-15	NB25	Walkdown OCR-388/758
11/18/82	W3-NY-15	NB26	Removal of Items
11/19/82	W3-NY-15	NB27	Walkdown OCR 1756
11/19/82	W3-NY-15	NB28	Thermowell Installation Procedure
11/20/82	W3-NY-15	NB29	NCR-W3-4504 SUS 47
11/23/82	W3-NY-15	NB30	OCR 1687
11/29/82	W3-NY-15	NB31	Mercury QA Training
12/3/82	W3-NY-15	NB32	NCR Admin. Closure
12/3/82	W3-NY-15	NB33	Instrument TE-MS-83455
1/6/82	W3-NY-15	NB34	Use of Form 211 to Doc. NCR Condition Program
12/21/82	W3-NY-15	SH1	Walkdown SUS 43A-9
12/27-31/82	W3-NY-15	TM1	Walkdown Instr. Lines
12/28/82	W3-NY-15	TM2	Walkdown Surveillance
12/29/82	W3-NY-15	TM3	CAR #129 Review
1/4/83	W3-NY-15	TM4	Pneu Test Witness
1/6/83	W3-NY-15	TP1	Walkdown Inst. Lines
1/17-18/83	W3-NY-15	TP2	Training
1/26/83	W3-NY-15	NB35	ISO Revision
2/15/83	W3-NY-15	SH2	QCP-3110.5
2/18/83	W3-NY-15	TM5	Use of Correspondence
4/18/83	W3-NY-15	TM6	Inst. Cabinets & Racks
4/25/83	W3-NY-15	TP3	SP-663 (R-2)
5/20/83	W3-NY-15	TM7	Hydro/Pneu Testing
5/27/83	W3-NY-15	GM1	SP-664

ATTACHMENT 3C

Ebasco Procedural Revisions
May 1982 - June 1984

Procedure No.	Procedure Title	Revision/Dates	
QAI-1	QA Records Management Instructions	11	2/8/84
		10	8/5/82
		9	8/3/82
QAI-2	QA Review of Site Gen. Procedure of Activities Affecting Quality	3	7/2/82
QAI-6	Processing of Safety Related PR/PO	7	6/4/84
		6	5/9/84
		5	10/28/82
		4	7/1/82
QAI-7	QA Instruction for Surveillance & Corrective Action	2	2/21/84
		1	7/2/82
QAI-9	Review & Handling of Construction Installation Records	2	4/20/83
QAI-14	Training & Qualification Requirements for QA Records Personnel	4	6/5/83
		3	9/24/82
		2	8/24/82
		1	8/10/82
		0	7/26/82
QAI-15	Surveillance of Site Contractors	4	6/5/83
		3	9/24/82
		2	8/24/82
		1	8/10/82
		0	7/26/82
QAI-16	Qualification of Quality Surveillance Personnel	2	3/13/84
		1	9/28/82
		0	7/30/82
QAI-18	Data Report Processing Quality Assurance Engineering Department	3	10/3/83
		2	8/30/83
		1	8/3/83
		0	6/1/83
QAI-19	Processing of Discrepancy Notices (DNs) and Engineering Discrepancy (EDNs)	2	2/10/84
		1	7/15/83
		0	6/15/83
QAI-20	Walkdown Reverification of Hangers	1	7/11/83
		0	6/27/83

Ebasco Procedural Revisions

May 1982 - June 1984

Procedure No.	Procedure Title	Revision	Dates
QAI-22	Preparation of Response to NRC Inspection Reports	1	8/30/83
		0	8/2/83
QAI-23	Review of Ebasco Construction Quality Records	4	2/4/84
		3	11/30/83
		2	11/8/83
		1	10/18/83
		0	8/29/83
QAI-25	QA Instruction for Auditing at Waterford 3	0	8/22/83
QAI-26	Initiation/Preparation of PRI/SCD Reports	0	2/10/84
QAI-29	Review & Recurrence Control of Adverse Trends Reported by the Ebasco Trend Analysis	0	1/30/84
QAI-30	Documentation Statusing Review Instruction	0	2/1/84
QAI-31	Processing of Nonconformance Reports	0	2/9/84
WQC-167	Review/Trans. of Quality Related Records	1	5/24/82
WQC-168	Inspection of Instrumentation Installation	3A1	6/22/82
WQC-169	General QC Inspections	1	6/22/82
WQC-200	Inspection & Test Status ASME QC	VOIDED	
WQC-201	Control of Weld Filler Metals ASME QC	VOIDED	
WQC-202	Inspection of Piping Hangers/Supports Including Rupture & Whip Restraints	2A3	10/18/82
WQC-204	ASME Piping/Tubing Installation Inspection	1	10/20/82
WQC-205	Inspection of In-Place Storage & Maintenance of Mech. Piping; Permanent Plant Items	0	10/26/82
WQC-208	Piping System Cleanliness Inspection Procedure	3A1	9/9/82
WQC-209	Inspection & Surveillance of Ebasco Installed Conditional Acceptance Items	0	10/26/82
WQC-212	Ebasco QC Requirements of NDE Services ASME	2	10/20/82
WQC-213	Quality Control Review of ASME Section III Piping/Tubing Travelers	0	10/25/82

Mercury Procedural Revisions

May 1982 - June 1984

Procedure No.	Procedure Title	Revisions	Dates
MCP-2100	Welding Control	13	3/3/83
		12	1/13/83
		11	9/27/82
MCP-2101	Welding Repair	4	1/25/83
		3	10/13/83
MCP-2170	Pressure Testing	8	4/19/83
		7	2/20/83
		6	6/22/82
		5	5/3/82
PCP-2010	Document Control	10	5/17/83
		9	10/4/82
		8	6/4/82
		7	6/2/82
		6	3/11/82
PCP-2030	Material & Equipment Control	5	10/11/82
QCP-3010	QA Records Control	4	10/16/82
QCP-3020	QA Program Auditing	4	9/13/82
		3	7/26/82
QCP-3050	Qualification of Inspection & Test Personnel	4	10/17/82
QCP-3110	Visual Examination	4	9/30/82
QCP-3110.4	Pipe & Tubing Inspection	10	2/18/83
		9	9/29/82
QCP-3110.5	Welding Inspection	8	2/21/83
		7	1/19/83
		6	8/6/82
		5	4/5/82
SP-650	Preparation, Review & Approval of Special Procedures	4	3/15/82
SP-652	Installation of Process Pipe Hanger Supports	10	1/14/83
		9	10/17/82
		8	6/29/82
		7	6/12/82

Mercury Procedural Revisions

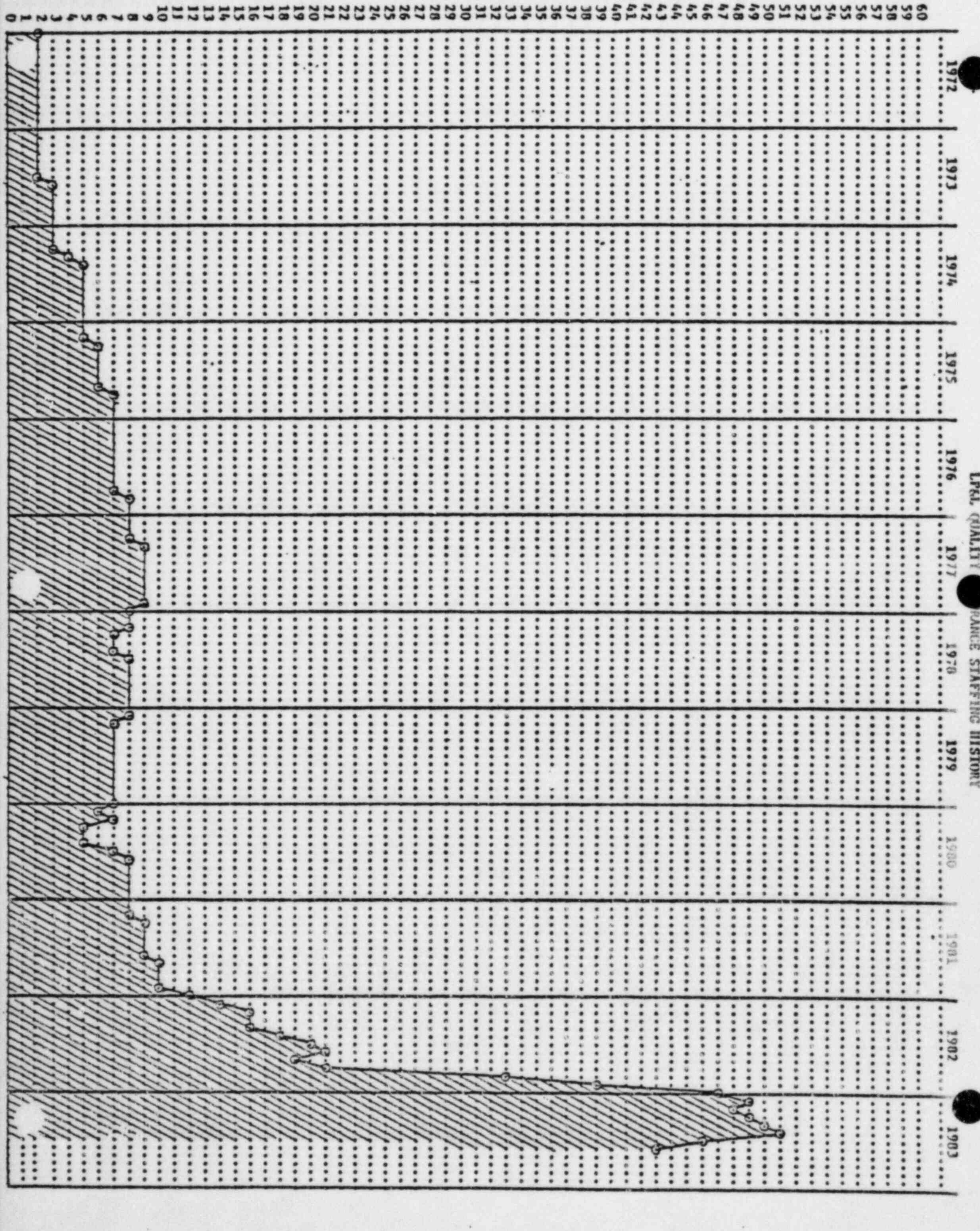
May 1982 - June 1984

Procedure No.	Procedure Title	Revision/Dates	
SP-653	Fabrication & Installation of Safety Class 2 & 3 Process Pipe	6	1/13/83
		5	10/12/82
SP-654	Tube Tray Hanger Fabrication & Installation	9	1/14/83
		8	12/20/82
		7	9/28/82
		6	7/21/82
SP-655	Construction Procedure for Assembly Fabrication & Installation of Seismic Class 1 Local Instrument Assemblies	5	1/12/83
SP-656	Fabrication of Local Instrument Piping & Tubing Assemblies	5	1/13/83
		4	10/12/82
SP-657	Installation of Impulse Lines	6	3/2/83
		5	1/13/83
		4	10/12/82
SP-658	Installation of Seismic 1 Tube Tray for ASME Class 2 & 3 Tubing	4	3/15/83
SP-659	Procedure for Receiving Interface	4	2/8/82
SP-660	Procedure for Preparation & Control of the Process Control Traveler	7	12/17/82
		6	10/21/82
		5	9/27/82
		4	6/7/82
SP-661	Welding NDE Interface	4	4/4/83
SP-664	Handling of Noncomformances & Corrective Action	4	6/20/83
		3	5/10/83
		2	3/8/83
		1	9/27/82
SP-666	Drilled-In Expansion Type Anchors In Concrete for Category I Structures Seismic Class I	8	2/24/83
		7	9/28/82
		6	8/16/82
		5	5/18/82
SP-667	Control of As-Built Information	5	9/30/82
		4	5/14/82

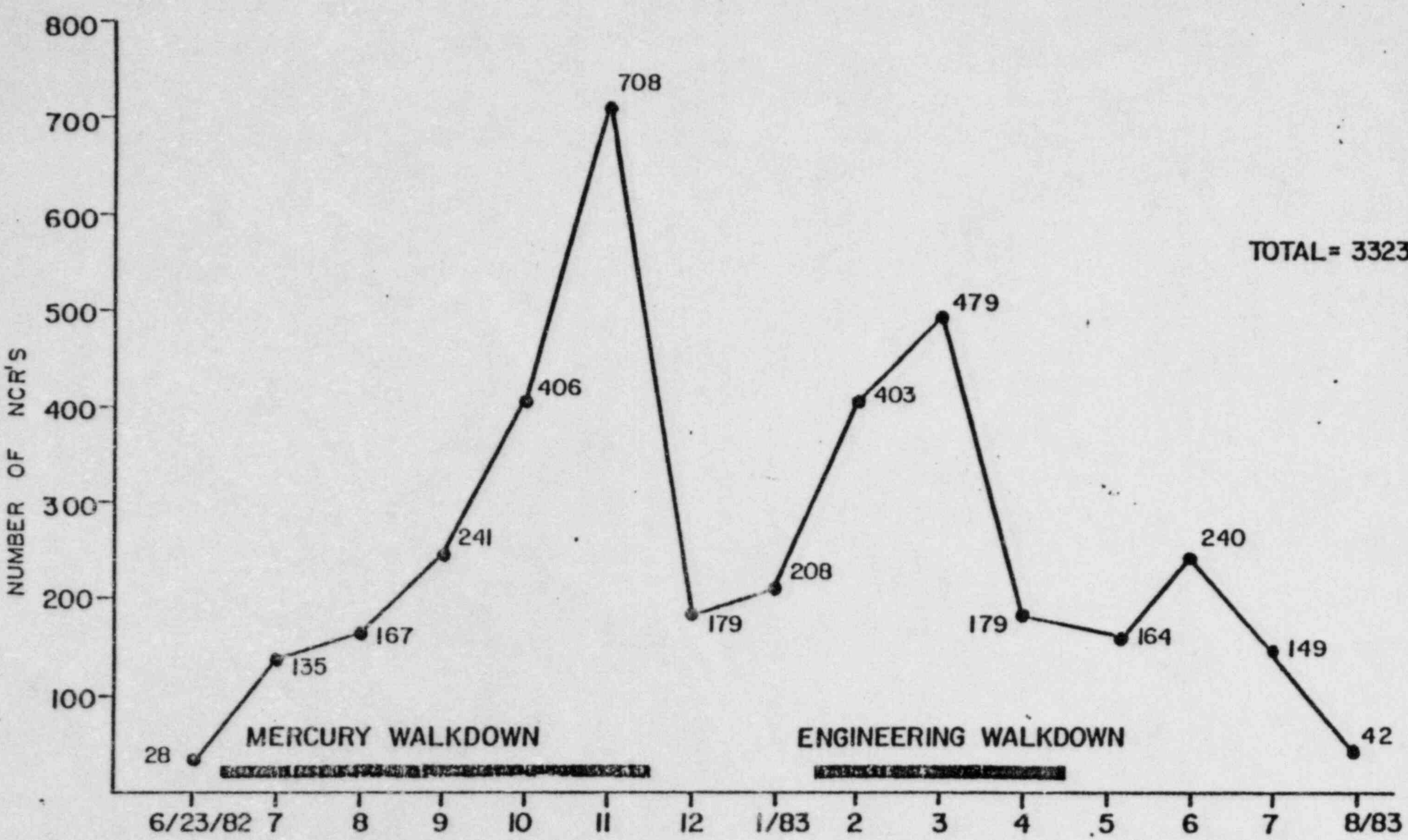
Mercury Procedural Revisions

May 1982 - June 1984

Procedure No.	Procedure Title	Revision	Dates
SP-671	Release and Turnover from Mercury to Ebasco Construction	1	2/14/83
SP-672	Welding Parameter Card Procedure	0	8/13/82
WPS-B	Welding Procedure "B"	12	11/2/82
		11	8/12/82
WPS-D	Welding Procedure "D"	13	11/2/82
		12	8/12/82
WPS-E	Welding Procedure "E"	11	11/2/82
WPS-G	Welding Procedure "G"	11	11/2/82
		10	8/12/82
WPS-Y	Manual Gas Tungsten Arc/Shield Metal Arc Welding ASME Section IX Group Metal Thickness Range	10	8/13/82


LP&L QUALITY ASSURANCE STAFFING HISTORY
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

MERCURY NCR'S WRITTEN BETWEEN 6/23/82 & 8/83



ATTACHMENT 3F

23-35

ATTACHMENT 4

Audit of Mercury Installations

The established Quality Programs of LP&L, Ebasco and Mercury were approved and accepted by all required organizations. They meet the requirements of 10 CFR 50 Appendix B Criterion XVIII and ANSI N45.2 standards invoked on the Waterford III project. With respect to the NRC concern regarding the apparent failure to audit the entire QA Program the following is provided.

I. LP&L QA Audit Program

As documented in the Waterford 3 PSAR, during the construction phase LP&L Quality Assurance was committed to function primarily as a Quality Surveillance group. Ebasco was responsible for assuring contractor compliance with their respective QA program requirements. In fulfillment of its role, LP&L QA conducted audits of contractor activities as deemed necessary. LP&L QA maintained a monthly audit schedule and revised it based upon available resources and criticality of activities to be monitored. In the case of Mercury, a total of 28 audits were scheduled. Attachment 4A is a summary of the completed LP&L QA audits of Mercury. Additionally, 13 unscheduled surveillances of Mercury were conducted by LP&L as shown in Attachment 4B.

II. Ebasco QA Audit Program

The Ebasco QA audit program was structured to audit contractors yearly for compliance with the applicable 10CFR50 Appendix B criteria. In the case of Mercury, Mercury compliance to criterion IV was not audited by Ebasco since permanent installation material procurement was handled by Ebasco. Attachment 4C provides a matrix of Ebasco audits of Mercury with respect to the Appendix B criteria. This attachment demonstrates that the required audits were conducted.

III. Mercury QA Audit Program

The Mercury Quality Assurance Program required a minimum of one internal audit be conducted annually on each auditable QA Manual Section. The Mercury audit schedule was reviewed and shown to be deficient in not completing audits of all QA Manual sections as required during 1981, prior to the SWO. Following the SWO, Mercury met their commitment requirements to the end of their contract. Information on the Mercury internal audits is available for NRC review.

ATTACHMENT 4A

LP&L AUDITS
OF
MERCURY COMPANY
(1979 - 1983)

1979	W3S79-6	1/15/79	EEI Checklist
	W3S79-18	3/19/79	EEI Checklist
	W3S-79-36	5/29/79	Criteria V - Mercury Procedures
	W3S-79-37	6/7/79	Criteria VI - Mercury Procedures
	W3S-79-41	6/25/79	Criteria X - Mercury Procedures
	W3S-79-42	12/5/79	Criteria IX - Mercury Procedures
1980	W3S-80-35	9/12/80	Criteria II, X - Mercury Procedures
	W3S-80-39	7/2-10/2/80	QA Program Review
1981	W3S-81-8	1/12-2/23/81	SP 654, 666
	W3S-81-15	3/25/81	SP-655, MCP 2140
	W3S-81-32	8/27/81	Mercury QA Program
	W3S-81-36	8/21-9/2/81	Criteria XIII - Mercury Procedures
	W3S-81-39	10/8/81	Criteria V - SP-660
	W3S-81-41	10/16/81	Criteria II - Mercury Procedures
	W3S-81-51	12/7/81	Criteria III - SP-667
1982	W3S-82-13	1/20/82	Criteria XI - Mercury Procedures
	W3S-82-14	2/4/82	Criteria XII - Met. Lab
	W3S-82-62	7/22/82	Criteria V, X, III
	W3S-82-62	7/22/82	Criteria III, V, X
	W3S-82-64	7/30/82	Ceiteria XV, XVI
	W3S-82-77	10/5/82	Criteria II, X, QCP-3050
	W3S-82-84	11/8/82	Criteria VI
	W3S-82-85	10/25-11/8/82	10CFR50/ANSI N45.2
1983	W3S-83-10	7/8/83	Criteria V - Mercury Procedures

ATTACHMENT 4B

LP&L SURVEILLANCES

OF

MERCURY COMPANY

(1979-1983)

1979	No Surveillance Performed		
1980	W3S-80-8s	2/21/80	Mercury Walkdown RAB
	W3S-80-36s	9/22/80	Mercury Criteria V
	W3S80-40s	10/17/80	Protection of SR Instrument Impulse Line
1981	W3S-81-31s	8/7/81	Mercury Mechanical Separation
1982	W3S-82-56s	7/6/82	Mercury 10CFR50/ANSI N45.2
	W3S-82-57s	7/11/82	Mercury 10CFR50/ANSI N45.2
	W3S-82-54s	6/28/82	Mercury 10CFR50/ANSI N45.2
	W3S-82-55s	6/24/82	Mercury 10CFR50/ANSI N45.2
	W3S-82-59s	7/23/82	Mercury SP-665
	W3S-82-61s	7/21/82	Mercury ANSI N45.2.2
	W3S-82-73s	9/23/82	Seismic/Tube Track
	W3S-82-79s	10/18/82	Mercury Criteria V
	W3S-82-81s	10/28/82	SP-667, QCP-3110.4
1983	W3S-83-19s	8/19/83	Hydro-Pneumatic Testing

ATTACHMENT 4C

18 CRITERIA - 10 CFR50 APPENDIX B

Ebasco Audits of Mercury	I	II	III	IV	V	VI	VII	VIII	IX	
1979	Note 2	79-11-1 79-10-3 79-3-8 79-2-5 79-3-1	79-12-4	N/A	79-2-1 79-2-3	79-10-2 79-4-4 79-1-5	79-11-2 79-1-8	79-2-3	79-11-3 79-1-1 79-2-3 79-3-3 79-3-2 79-4-3 79-4-3 79-5-3 79-6-2	79-7- 79-6- 79-7- 79-8- 79-8- 79-8- 79-8- 79-10
1980	80-12-1	80-2-3 80-4-7 80-8-4	80-9-1	N/A	80-9-2	80-4-6	Note 5	80-2-8 80-6-1	80-7-2 80-2-1 80-4-2	80-6- 80-7-
1981	81-9-1	81-1-4 81-3-2 81-12-1	1-9-3	N/A	81-4-1	81-2-2	Note 5	81-1-3 81-5-2	81-2-3	
1982	82-2-1	82-11-1 82-6-1 82-7-11 82-11-1	82-7-6	N/A	82-2-1 82-2-2	82-5-1	Note 5	82-11-2	82-1-2 82-2-1 82-7-1	82-10 82-10
1983	83-2-3	83-2-3	83-1-2	N/A	83-5-1	83-3-1	Note 5	83-6-2	83-6-1	

NOTES:

1. Pertinent Chronological Events

   1978 - Fall Mercury Mobilization
   1980 - Mercury Audit for code stamping (80-3-7)
   1981 - Mercury Audit for seismic support (81-11-1) attachment
   1983 - Mercury demobilized August 1983

2. Mercury Organization was reviewed by Ebasco as part of the QA Program Manual Review conducted in 1978 and 1979. Ref. file folder F NY-15 Ebasco QA Records Vault

3. ASME hydro testing commenced in late 1981

4. Audits not performed due to Contract Closure

5. Ebasco audits of services used by Mercury would be conducted as part of Ebasco audits performed relative to other Criterion (e.g. Criterion XII)

ATTACHMENT 6 (CONT'D)

18 CRITERIA - 10CFR50 APPENDIX B

Ebasco Audits of Mercury	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
1979	79-11-4 79-6-2 79-6-3 79-4-6 79-3-7 79-3-3 79-2-1 79-2-3	79-3-3 79-2-1 79-2-3 79-3-7	79-8-6 79-8-2 79-3-6	79-4-5 79-3-1	79-12-4	79-10-4 79-4-2	79-10-4	79-11-2 79-4-7 79-4-2 79-2-1 79-2-2 78-12-2	79-9-4
1980	80-3-2 80-1-1 80-1-2 80-3-1 80-5-1 80-7-3 80-7-4	Note 3	80-4-8	80-7-2	80-10-5	80-1-3 80-3-8	80-1-3 80-3-8	80-6-4	80-8-3 Program Audit
1981	81-2-1 81-3-4 81-12-3	Note 3	81-3-1	81-9-4	81-9-2	81-1-1	81-1-1	81-4-2	81-5-1
1982	82-7-4 82-7-5	82-5-3	82-7-9	82-11-3	82-12-2	82-4-2	82-4-2	82-6-5	82-6-1
1983	83-5-2	83-6-1	83-2-2	Note 4	Note 4	83-6-2	83-6-2	Note 4	83-5-2

ATTACHMENT 5

Verification of the Acceptability of Mercury Installations

Since the Stop Work Order on Mercury safety related activities in June 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.

In consideration of these activities and corrective action taken, LP&L now has a high degree of confidence in the adequacy of the Mercury 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 consisted of a walkdown of supports which commenced in January 1983. The walkdowns resulted in the generation of a large number of NCRs and rework. Attachments 2, 3 and 3F 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 percent 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, 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. 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 re-verify 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 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.

5. The adequacy of Mercury installations is being further confirmed by reinspections in progress in response to NRC issue #1.

ATTACHMENT 5A

Summary of the Ebasco QA Records Review

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 1 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. QC reinspections were initiated in order to resolve documentation deficiencies identified in the review process. A summary of re-inspections 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)

B. Supports/tube track and other miscellaneous Seismic Category 1 installations

Reinspections were initiated to verify the following:

Attribute	Quantity
Support configuration, location and welds	2058
Tube track	514
Instrument Stands	211
Torque verification of anchor bolts including proper imbedment 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 re-inspections 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.

APPENDIX A

PRE-LICENSING ISSUES ASSESSMENT TASK FORCE RECOMMENDATIONS

An assessment of the resolutions and determination of safety significance for each of the 23 Issues and the Assessment of Collective Significance has been provided by the Pre-Licensing Issues Assessment Task Force (Task Force). The Task Force reported directly to the CEO of LP&L and provided its final report on December 7, 1984. The Task Force consisted of officials of UNC Nuclear Industries, Inc., Richland, Washington, and NUS Corporation, Gaithersburg, Maryland, who were assisted by UNC and NUS staff members, as required. The Task Force assessed LP&L's resolution of the issues, including the cause, generic implications and collective significance of the issues. The Task Force also provided an assessment of the safety significance of the issues with respect to fuel loading and low power testing, and operation above 5% power. It assessed the adequacy of LP&L QA/QC program in light of the NRC's issues, and provided recommendations, as appropriate.

The Task Force charter, identification of principals and in tial functions were formalized in Reference 3. The Task Force initially consisted of three members. On October 18, 1984, one of the Task Force Members passed away and it was decided not to designate a replacement.

In some instances Task Force recommendations simply reiterated actions or commitments embodied in the LP&L responses. Since such reiterated Task Force recommendations are already discussed in Chapter IV of this Report, they are not discussed in this Appendix. In other instances, Task Force recommendations were resolved prior to the departure of the Task Force, as noted in the Task Force Final Report. Such recommendations are not discussed herein.

Specific recommendations in the Task Force Report and LP&L responses thereto are as follows:

ISSUE 2

Recommendation 2.1

On page 3.2-15h of the FSAR under Containment Vacuum Relief Actuation System requirements, it is stated that signal processing for alarms is to be Safety Class IE. This would require a piping code of P3. To remove this technical discrepancy between the installation class and the requirements of FSAR Table 3.2-1, it is recommended that page 3.2-15h be amended. This amendment would be a note to the line item concerning alarm that would exempt the low actuation air pressure alarms from IE status since this alarm does not perform an actuation or safety function.

LP&L Response 2.1

FUSAR Change Request No. L-IC-84-10 (Rev. 1) has been issued to amend FSAR Table 3.2-1 for instruments PS-HV-5222 AS & BS. The change will be implemented per 10CFR50.71(e) requirements.

Recommendation 2.2

Eight instruments were identified as having incomplete documentation in the form of missing material verification reports or improperly closed nonconformance reports. These deficiencies should be addressed.

PRE-LICENSING ISSUES ASSESSMENT TASK FORCE RECOMMENDATIONS

LP&L Response 2.2

The subject concerns were resolved via disposition of CIWA-11394. A reinspection of the eight instruments was performed and it was determined that sufficient material traceability did exist to assure the adequacy of the installations.

ISSUE 3

Recommendation 3.1

The separation criteria violations identified in NCR-W3-7702 were dispositioned by removal of the expansion loops. The Task Force validation of the removal of the expansion loops revealed that the tube clamps were not reworked as shown on the Attachment 2 sketch to the NCR. It is recommended that the tube clamps be reworked according to the NCR.

LP&L Response 3.1

Three tube clamps were reworked in order that the tube clamp installations would be consistent with the removed expansion loops.

ISSUE 11

Recommendation 11.1

The Task Force reviewed the "Report on Review and Analysis of Cadwelds in response to NRC Concern 11" and the supporting documents prepared by LP&L. Minor discrepancies were found between the LP&L response and the computer printout. The computer printout data provided six items corresponding to the computer printout key codes. One of the codes (Code C) of the cadweld printout key was replaced by a document, "Verification of Test Frequency." This document did not list cadwelder qualification and requalification with dates of the tests and, as such, did not satisfy the statement in the LP&L response to the NRC that the computer data will provide this information. It is recommended that this be done.

LP&L Response 11.1

The "Report of Cadwelds" has been updated to include cadwelder qualification and requalification with dates of the tests.

ISSUE 16

Recommendation 16.1

Prior to initial criticality, complete the analyses of the concerns identified in the initial interview program discussed in Issue 16 and resolve any concerns which have safety significance for critical operations.

APPENDIX A

PRE-LICENSING ISSUES ASSESSMENT TASK FORCE RECOMMENDATIONS

LP&L Response 16.1

All original concerns have been evaluated and resolved. There are no concerns with safety significance.

Recommendation 16.2

Prior to initial criticality, complete the safety reviews of plant system required for criticality, low power testing, and full power operation against each of the 23 NRC issues.

LP&L Response 16.2

The plant system safety reviews required for initial criticality, low power testing, and full power operation are complete. No safety impact was found as a result of that review.

Recommendation 16.3

Prior to exceeding 5 percent power, schedule an audit by an outside qualified organization of the new interview program discussed in the LP&L response to Issue 16.

LP&L Response 16.3

The Quality Team Interview Program was recently audited by a Middle South Services QA Auditor which is independent of all QT activities and therefore, an audit by an outside organization has been conducted. Another audit has been scheduled for February, 1985. The audit will be conducted by MSS QA.

ISSUE 17

Recommendation 17.1

Make modifications to assumptions of calculations for embedded plate as stated in the Record of Analysis Verification, (Appendix XVII, page 13 of 17).

LP&L Response 17.1

The analysis assumptions for calculations on the worst case adjacent embed plates, which was performed to establish pull-out capacity of Hilti bolts has been modified in accordance with the Task Force recommendation. That is, the shear cone surface area was calculated by using ten times the hole diameter as the diameter of the cone, and actual embedment depth was used as the height of the cone. In addition, the reference to Ebasco Specification No. LOU-1564.461 has been provided. These modifications are documented by letter ES-1500-84 dated December 19, 1984.

APPENDIX A

PRE-LICENSING ISSUES ASSESSMENT TASK FORCE RECOMMENDATIONS

ISSUE 19

Recommendation 19.1

The Task Force has reviewed the Ebasco specifications for power and control cables, Class IE equipment and vendor's qualification documentation and concluded that the cables are qualified for direct burial in dry or wet conditions, but it could not be substantiated that the degradation of these cables would not occur over the life of the plant under the continual submergence condition. See Appendix XIX, Section C. The Task Force recommends that LP&L take appropriate action to obtain environmental testing data on the submerged cables or institute a surveillance program which will check for cable degradation so that appropriate action can be taken, if necessary, to replace cables during convenient scheduled maintenance periods.

LP&L Response 19.1

Although it could not be immediately substantiated that degradation of cables would not occur over the life of the plant under continual submerged conditions, no immediate problem exists. The insulation of cables involved has been qualified by extensive type testing under water immersion for up to 2 years with water at 90°C and 600V applied potential. These tests have shown excellent water stability of these insulations, with no recorded failures over the duration of the tests. This fact, coupled with the knowledge that the actual operating conditions of the cables will be substantially less severe, confirm that no immediate problem exists.

In addition, a walkdown of all basemat conduits identified a total of 28 conduits with evidence of water incursion. Of those, only 18 contain cables, 7 of which are safety related cables. A review of the 7 safety related cables revealed only 1 cable may be required for safe shutdown during a LOCA. This cable operates a valve in the safety injection system which may be manually operated in the event of loss of cable function. Therefore it can be concluded that loss of function of any of these cables due to submergence in water will not prevent safe shutdown of the plant.

It should be noted that the issue of submerged cables remains under evaluation with completion expected by shutdown for the first refueling.

ISSUE 23

Recommendation 23.1

The overall content of the Operational QA Program is judged adequate to support plant operation, but the definition of interfaces between various units of the organization does not seem to be completely clear. This lack of clarity results from the fact that a number of documents of different levels (the QA Manual, Executive Directives, Administrative Procedures, Implementing Procedures) together define and describe the QA program. The Task Force concluded that a summary document should be compiled to identify the sources, to index such source documents to the requirements of ANSI N18.7-1976/ANSI N3.2, and to provide a consolidated base for description of the program. The Task Force does not consider that completion of this recommendation should limit power operation.

LP&L Response 23.1

A "Plan for Development of a Summary QA and Organization/Programmatic Overview Document" has been developed and approved by LP&L Nuclear Operations Management. The summary QA document is scheduled to be completed by March 18, 1985.

Recommendation 23.2

The overall content of Plant Staff training related to QA was judged to be adequate, with the single exception that no part of the training program specifically addresses the QA deficiencies experienced during the construction phase or an assessment of how the lessons learned should be applied in plant operation. While some of the lessons learned have been considered in development of the program, the Task Force believes that specific discussion of these lessons is important.

The Task Force further concludes that part of the reason for this deficiency in the training area is that much of the plant staff does not yet fully understand that some of the lessons learned during construction can be equally applicable to plant activities even though such activities are technically quite different from those carried out during construction. The Task Force audit provided a number of indications that lessons learned are applied to activities, such as maintenance or modifications, which are similar to construction activities, but are often considered not applicable to dissimilar activities such as surveillance tests.

The Task Force believes that aggressive upper-management involvement is essential to assuring that lessons learned during the construction phases are fully considered in the operational phase and to ensure that the plant staff fully comprehends the importance and applicability of the Operational QA Programs. The Task Force does not require the training to be accomplished prior to initial criticality.

LP&L Response 23.2

Establishment of a special QA Training Module for all Waterford 3 personnel covering lessons learned during construction is in the formulation stage. The Training Department is developing lesson plans utilizing upper management visibility as an integral part of the message delivery. This training is targeted for completion by May 15, 1985.

Additionally, LP&L Quality Assurance is now publishing and distributing a newsletter to Waterford 3 Nuclear Operations personnel. This newsletter contains a section which discusses "lessons learned" during the construction phase of Waterford.

Recommendation 23.3

While many improvements have been made in the Operational QA Program since the Task Force was established, and more are currently underway, the Task Force believes that an additional audit by a qualified outside organization would be advisable to assure that needed improvements are incorporated promptly. This audit should address the concerns identified in the TFSG Limited Scope Audit

Recommendation 23.3 (cont'd)

Report and will assure LP&L management that the Operational QA Program addresses the lessons learned in responding to the 23 issues raised by the NRC. Additionally, continued management commitment and involvement in QA at all levels of the organization is essential to a successful quality program. The Task Force does not consider 'hat completion of this additional audit should be a condition for fuel load or power operation, but does believe that the audit should be done as soon as is reasonable after completely of a summary QA document and prior to commercial operation at the latest.

LP&L Response 23.3

An audit of the LP&L Operations QA Program has been scheduled for early April, 1985. This audit will be conducted as a joint effort by INPO and Middle South Services QA.

Recommendation 23.4

Address spe:ific concerns and suggestions identified in TFSG Limited Scope Audit Report of LP&L Operational Quality Assurance Program.

LP&L Response 23.4

The concerns and suggestions identified in the TFSG Limited Scope Audit have been addressed and a corrective action plan has been developed.