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TECHNICAL REPORT TR-5633-3

EXECUTIVE SUMMARY OF FINAL REPORT

INDEPENDENT DESIGN REVIEW FOR THE SHOREHAM NUCLEAR POWER STATION

JUNE 30, 1983

TELEDYNE ENGINEERING SERVICES

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1.0 INTRODUCTION

This report presents the results of an Independent Design Review (IDR) performed by Teledyne Engineering Services (TES) at the request of Long Island Lighting Company (LILCO). The IDR was performed on a portion of the Low Pressure Core Spray (LPCS) System at the Shoreham Nuclear Power Station.

The IDR was structured to verify that the Design and Quality Assurance process imposed by documentation was successfully implemented and that the as-built configuration was in compliance with the commitment of the Final Safety Analysis Report (FSAR).

2.0 APPROACH

The IDR looked at a specific time frame in the design and construction process which was ongoing at Shoreham. In fact as TES was reviewing design, analysis and construction documentation, Stone & Webster (SWEC) was in the process of revising some of these. TES was unaware of the revisions that were underway or planned. Because of this, we opened items which, at the point in time we froze the process, appeared to be deficiencies. In some cases after issuance of these items as preliminary Findings, the LILCO response indicated that the process in place at Shoreham had already found the same deficiency and had resolved it or, resolution was underway. This enabled TES to review the Shoreham process which uncovered the deficiency, the subsequent design changes, the reconciliation process with other disciplines and the final construction. This provided the review team with the opportunity to review the results of the total process as well as to review the ongoing design and construction activities over approximately thirteen months. A

review of this type involves significantly more man-hours than a review dealing only with final documentation because:

(1) Items found by the normal design process are found by the Reviewer. For example, discrepancies which were found by the SWEC reconciliation process were also found by the Reviewer.

(2) All preliminary Findings and Observations were responded to in detail by LILCO and SWEC; even those that were already resolved by the SWEC reconciliation process.

(3) A complete re-review of the process was performed by TES after receiving responses to preliminary Findings. In some cases the normal SWEC process resulted in a completely new analysis being performed while TES was reviewing that revision in existence at the time of the IDR initiation. This required TES to review the new analysis in detail as well as the process which generated the need. Approximately 12,000 man-hours were expended in the performance of this IDR.

It is our opinion that reviews of this nature are more meaningful than those which review only the final documentation.

A Project Review Team was formed to conduct the review and members of the team were assigned specific areas of responsibility. Each Reviewer reported directly to the Project and/or Assistant Project Manager. A Project Review Internal Committee was formed whose sole function was to review all Potential Findings and Observations prior to their final classification and submittal to LILCO. Items classified as Findings and Observations by the Internal Committee were submitted in preliminary form to LILCO and the Nuclear Regulatory Commission (NRC). LILCO and SWEC responded to these preliminary submittals, and a final review of Findings was performed by the individual TES Reviewer having

responsibility and by the Project Manager and chairman of the Internal Committee. A final disposition of each Finding was made based on that review and required agreement of the Reviewer, the Project Manager and Committee Chairman. Responses to Observations were not reviewed by TES since they do not impact the adequacy of the QA or Design Process.

The IDR was performed under the requirements of the TES Quality Assurance Manual and was subject to audits by the assigned Project Quality Assurance Engineer (PQAE). An additional assignment of the PQAE was to perform that portion of the IDR related to review of the LILCO QA and SWEC QA/QC/EA process and documentation. In both roles the PQAE reported through the Manager, Quality Assurance.

3.0 DEFINITIONS

In any review process the definitions of terms used for reporting items by the individuals involved is important to understand since they form the basis of conclusions reached by all parties. The following definitions are used in this IDR.

3.1 Open Item (TES Internal)

An item requiring further review or more information before a decision can be reached. An Open Item can become a Finding, an Observation or a Closed Item but cannot remain an Open Item in the TES Final Report.

3.2 Closed Item

An Open Item which after further review is found to be in compliance and can be Closed.

3.3 Potential Finding (TES Internal)

An item which the Reviewer and Project Manager feel could have an impact on the adequacy of the Design or QA process. All Potential Findings have been submitted to the Project Review Internal Committee for disposition. A Potential Finding can become a Finding, an Observation or can be Closed but cannot remain a Potential Finding in the TES Final Report.

3.4 Finding

An item which impacts the adequacy of the Design or QA process.

3.5 Observation

An item that does not impact the adequacy of the Design or QA process but has significance relative to conservatism, design practice or applicable procedures.

4.0 SCOPE OF THE REVIEW

The IDR was performed on one loop of the safety-related, seismic Category 1, Low Pressure Core Spray System (1E21). The review program was separated into six tasks.

4.1 Task 1 - Design Process and Procedures

This task was designed to determine if LILCO and SWEC had design control procedures that provided an acceptable process for taking design requirements and developing construction drawings that complied with FSAR commitments. Interfaces between internal organizations were determined in following the process of:

(1) specification of design requirements,
(2) development of design,
(3) piping analysis,
(4) support location and selection,
(5) support analysis,
(6) effect on building structure,
(7) equipment loading requirements,
(8) development of construction drawings, and
(9) revisions to design and construction.

Procedures, instructions and methods associated with the design process were made available to TES for review.

The major portion of this task review was performed early in the IDR to familiarize Reviewers with the design process. However, this only provides evidence that a documented process exists. A major result of the IDR is to provide assurance that the established process is followed. Therefore, as items were opened by Reviewers, the design process was continually reviewed to determine whether or not procedures, instructions, and/or methods were available in the area of concern. The final review effort in this area was not completed until resolution of the last outstanding item at TES.

4.2 Task 2 - Review Design Requirements

This task involved a review of the adequacy of the design requirements as they applied to piping, supports and floor mounted equipment. The major effort was to determine whether established specifications, standards and procedures c[redacted] with the FSAR, including applicable Codes, Standards and NRC [redacted]equirements. The proper application of these requirements is th[redacted] for the licensing process, therefore it is critical to assure [redacted]e specification, standards and procedures utilized are in compliance. The engineer

responsible for a design activity, rather than using the FSAR, relies on documents (i.e., specifications, etc.) which provide specific design input, criteria and details of implementation which are addressed more generally in the FSAR.

4.3 Task 3 - Review As-Built Design Documents

An extensive review of design documents was performed. The types of documents reviewed included drawings, analyses, test procedures and results, and design guides. The review, as a minimum, verified the following attributes.

(1) the mathematical and/or computer model used,
(2) the loading and load combinations (Normal and Upset Conditions),
(3) the use of applicable Codes, Standards, Regulatory Guides,
(4) conformance with acceptance criteria,
(5) resolution of interface requirements (allowable nozzle loads, accelerations, etc.),
(6) resolution of design change and field change requests, and
(7) the final reports and drawings.

The initial scope of the review included 7 piping analyses, 70 support designs and analyses, and 12 items of mechanical or electrical equipment. Four of the 12 equipment items were subjected to a full design review (pressure switch, loop level pump, motor operated valve and a relief valve) and 8 items were reviewed for satisfaction of interface requirements. Any item which resulted in generic concern was not limited by this scope and was pursued to a conclusion.

In the completion of this task a number of calculations or analyses were performed by review team members in order to reach conclusions as to the adequacy of the submitted design documents. These

calculations or analyses were not intended to be used as independent verification analyses. They were performed to provide assurance to the Reviewer, to verify assumptions and to determine the adequacy of design guide[illegible] All calculations or analyses which form the basis for conc[illegible]s reached by the IDR were subjected to the requirements of the TES [illegible]nual and are on file in TES Document Control.

4.4 Task 4 - Determine As-Built Plant Configuration

A detailed field walkdown of the portion of the LPCS system subject to the IDR was performed. This walkdown developed the geometry of the as-built piping and supports for all accessible locations. Clearances at penetrations, pipe whip restraints and other structures or components were determined. Location, type of support, available movement on snubbers and springs, and nameplate information on equipment was obtained. A significant number of photographs were taken for use by the project team in the review process.

4.5 Task 5 - Compare As-Built Documentation to Plant Configuration

The plant configuration data gathered in Task 4 was compared with the as-built documentation reviewed in Task 3 to determine if discrepancies existed. As indicated, TES froze a specific time frame in the design process; because of this discrepancies between documentation and plant existed. In some cases TES was then able to obtain later as-built design documentation and instructions to the field from SWEC which indicated that the process being utilized by SWEC had already uncovered these discrepancies and action to resolve them was underway.

TES project team members made three visits to the site to verify that the current documentation and plant configuration were compatible.

4.6 Task 6 - Review LILCO QA and SWEC QA/QC/EA Process and Documentation

This task was divided into three subtasks which involved a review of QA, Engineering Assurance (EA), and Quality Control (QC) activities associated with construction of the Shoreham facility.

(1) LILCO QA audit findings, schedules, implementation and follow-up on corrective actions related to activities at SWEC was reviewed.

(2) SWEC QA and EA audit findings, schedules, implementation and follow-up on corrective actions related to activities associated with the LPCS at Shoreham was reviewed.

(3) SWEC construction activities related to LPCS pipe field welds were subjected to a QA sampling review. Documentation and records for the following items were reviewed:

a. training and qualification records of personnel,
b. identification and control of material, parts and components,
c. control of special processes,
d. nonconformance and dispositioning report process,
e. receiving inspection records,
f. material certification records, and
g. NDE records.

5.0 REPORTING PROCESS

The following reporting process was utilized in the performance of this IDR.

5.1 Items developed by individual Reviewers were submitted to the Project Manager (PM) in writing using the Reviewer Report Form (RRF).

5.2 The PM reviewed each RRF with the individual responsible for its generation. This process required the PM to review the documents which formed the basis for generation of the RRF. A Project Manager Resolution Form (PMR) was generated and required signature of both the PM and the Reviewer to indicate agreement on item classification. Items classified as Closed were forwarded to TES Document Control. Items requiring more information were so noted and the Reviewer was instructed to obtain the same. This required the Reviewer to search documentation available at TES for the required data or to prepare a Request For Information (RFI) form which was forwarded to LILCO/SWEC. Items classified as Potential Findings and Observations and not requiring more review were forwarded to the Project Review Internal Committee for disposition.

All RRF, RFI and PMR forms are maintained in Document Control.

5.3 The Project Review Internal Committee reviewed items forwarded by the Project Manager. The committee reviewed the data which formed the basis for the item and interviewed the responsible Reviewer and Project Manager as required. The committee developed a position on the consequence of an item as it related to the adequacy of the Design or QA Process and completed an Internal Committee Resolution Form (ICR). The position presented in each ICR required a minimum of two signatures of committee members and the PM. Those items classified as Findings or Observations were forwarded to LILCO and the NRC in preliminary form. All ICRs are maintained in Document Control at TES.

5.4 LILCO and SWEC responded to Findings and Observations with additional information, changes to existing documentation, and/or remedial action. TES did not review responses to Observations since

they do not effect Design or QA adequacy. Findings were reviewed by the Chairman of the Internal Committee, the Reviewer responsible for generation of the item and the Project Manager. Final classification of each item was based on this review and required agreement and signature of all three individuals.

5.5 Reports and correspondence resulting from this IDR were submitted concurrently to LILCO and the NRC. The dates and identification of reports and correspondence submitted prior to this Final Report were as follows.

Identification	Date
Initial Status Report, TR-5633-2	July 9, 1982
Transmittal of ICR Forms, ICR Nos. 5633-1 through 5633-6	November 2, 1982
Transmittal of ICR No. 5633-9 through ICR No. 5633-12	November 30, 1982
Transmittal of ICR Nos. 5633-13, -14, -15, -17 and -18	December 8, 1982
Transmittal of ICR No. 5633-19	December 14, 1982
Transmittal of ICR Nos. 5633-20 and -21	January 11, 1983
Transmittal of ICR No. 5633-27	January 21, 1983
Transmittal of ICR No. 5633-28	January 31, 1983
Procedure for Phase 2 of Review	February 11, 1983
Telephone Call Record (2/14/83)	February 17, 1983
Minutes of Meeting (2/15/83)	February 25, 1983
Transmittal of Phase 2 Review of ICR No. 5633-1	March 4, 1983
Transmittal of Phase 2 Review of ICR Nos. 5633-2, -9, -13, -14, -15, -17, -18, -20 and -21	March 11, 1983

Identification	Date
Transmittal of Phase 2 Review of ICR Nos. 5633-10, -19, -27 and -28	March 15, 1983
Minutes of Meeting (3/16/83)	March 28, 1983
Telephone Call Record (3/22/83)	April 7, 1983
Minutes of Meeting (3/30/83)	April 6, 1983
Transmittal of Final Classification of ICR No. 5633-10	April 7, 1983
Minutes of Meeting (4/8/83)	April 21, 1983
Minutes of Meeting (4/21/83)	May 6, 1983
Transmittal of Final Classification of ICR No. 5633-18	May 20, 1983
Transmittal of Final Classification of ICR No. 5633-19	June 6, 1983
Transmittal of Final Classification of ICR Nos. 5633-1, -2, -21, -27 and -28	June 29, 1983

6.0 LILCO/SWEC RESPONSE APPROACH

The responses to preliminary Findings were very detailed and, where required, addressed items on a generic basis. For example, if a TES concern was related to a specific valve, the LILCO/SWEC response addressed the specific valve as well as all other valves in the same category. In many cases this allowed TES to resolve any generic concerns the Reviewer may have had without requesting further data.

7.0 RESULTS

This IDR was performed in three phases. The first phase was a complete review of the Design and QA process which resulted in the generation of items and resolution by the Internal Review Committee. Phase 1 was completed with the issuance of ICR No. 5633-28 by the Internal Review Committee on January 31, 1983.

Phase 2 involved a review of the initial LILCO and SWEC responses to Findings issued by the TES Internal Review Committee in Phase 1. This review resulted in the issuance by TES of detailed comments, which Closed items or resulted in Additional Concerns, on each item classified as a Finding in Phase 1. Phase 2 was completed with the issuance of TES Additional Concern ICR No. 5633-28 on March 15, 1983.

Phase 3 involved a final review of each item for which Additional Concern was submitted to LILCO by TES. This review included detailed discussion which occurred at meetings between LILCO, SWEC and TES as well as the review by TES of formal responses submitted by LILCO and SWEC. Minutes of these interface meetings and notes of telephone conference calls were submitted to LILCO and the NRC. Phase 3 is completed with the issuance of this report.

7.1 Phase 1

The Phase 1 review resulted in Reviewers opening 170 items. In accordance with the reporting process, 74 of these items were Closed after review by the Project Manager. In order to obtain more information concerning the remaining items 97 Requests for Information were prepared and submitted. Upon receipt of responses to these RFIs and further review of existing data an additional 68 items were Closed. The remaining items (28) were brought to the Project Review Internal Committee as Potential Findings and Observations. These items were preliminarily classified by the Internal Committee as follows and Findings and Observations were submitted to LILCO and Findings to the NRC:

2 Closed
16 Findings
10 Observations

The intent of this submittal was to outline TES' preliminary concerns and generate response from LILCO. A summary of the Phase 1 review is given in Table 1.

7.2 Phase 2

LILCO and SWEC responded to each of the preliminary Findings and Observations with additional information and/or reference to specific procedures, instructions and calculations currently available to TES. A meeting was held at SWEC offices in Boston on February 15, 1983 to discuss some of the LILCO and SWEC responses to Findings. At that meeting further information was made available to TES and review of proprietary information was accomplished by TES Reviewers. Individual TES project team members reviewed the LILCO and SWEC responses to Findings and met with the TES Project Manager and Internal Committee Chairman to discuss individual items in detail. This review resulted in the closing of some items and the generation of Additional Concern on others. Submittals were made to LILCO and the NRC outlining in detail the results of the TES review of each item. These submittals were completed on March 15, 1983, and a summary of the Phase 2 review is given in Table 2.

7.3 Phase 3

The TES submittals outlining Additional Concerns at the completion of Phase 2 were specific in nature and provided sufficient detail to allow LILCO/SWEC to prepare final responses. In addition, meetings were held to discuss each item so that there was a clear understanding of the issues and concerns of TES. It should be recognized that once an item reaches this Phase of the review process it usually has generic implications. Further, the detailed responses by LILCO/SWEC that are required cover areas well beyond the scope of the initial review. For example, concerns with small piping design criteria have

resulted in the review of most of the small piping at the Shoreham Plant. This is well beyond the approximately 60 small piping systems covered by the original scope. In the following subsections each item that was a Concern in Phase 3 is addressed in detail and a summary is given in Table 3.

7.3.1 ICR No. 5633-1

TES issued ICR No. 5633-1 on November 2, 1982 as a Finding on the use of chart methods to qualify a 2-inch branch line. A disposition response was received from LILCO/SWEC on January 15, 1983. This response including additional information supplied by SWEC and subsequent meetings to discuss the technical issues involved, have resolved the initial concern but raised a generic issue with respect to the adequacy and the application of the SWEC design procedure for small bore piping. The TES concern was in the following three areas:

(1) Failure to consider the full range of seismic anchor displacements as an alternative to thermal expansion plus one-half the range of seismic anchor displacement

(2) Failure to consider two-directional horizontal seismic building displacements

(3) Failure to consider that horizontal building steel vertical displacements are out-of-phase with vertical displacement of the shield wall, reactor vessel and other large structures

As a result of an interface meeting held at TES with LILCO/SWEC personnel and disposition response received on May 18, 1983, the above concerns were answered as follows:

(1) The full range of seismic anchor displacement, if considered as an alternative to thermal expansion

plus one-half the range of seismic anchor displacement, would be accommodated by the portion of allowable stress set aside in the SWEC procedure for thermal expansion.

(2) A SWEC Interoffice Memo (SBM #6) was issued August 1982 to provide a uniform procedure for qualifying small bore piping when using Design Guide EMTG-5-A. SBM #6 is clear in requiring consideration of two directional horizontal seismic displacement (X and Z) in qualifying small bore piping. All small bore qualifications prior to issuance of SBM #6 were reviewed by SWEC and randomly audited by TES to assure compliance with SBM #6. Small bore qualifications after issuance of SMB #6 were also reviewed by SWEC and randomly audited by TES to assure compliance since a qualification package dated after issuance of SBM #6 was found not to be in compliance by TES Reviewers.

(3) The frequencies of horizontal building steel were well above that for the building and therefore phase differences would essentially be negligible. TES determined through analysis that frequencies of the horizontal building steel in the Reactor Building were above 18 Hz. The significant building frequencies supplied by LILCO/SWEC occur in the range of 1.5 to 3.0 Hz. Accepting these building spectra as provided would indicate that phasing of the horizontal steel vertical displacements relative to the shield wall, reactor vessel and other large structures in the reactor building would not occur.

This issue was generic in nature and required significant review of existing designs and analyses by SWEC to validate the acceptability of small bore piping. Essentially all of the small bore piping was reviewed by SWEC to assure compliance with procedures deemed acceptable by TES. Further, significant review and analysis of Reactor Building horizontal steel was performed by TES to determine fundamental frequencies. This was done in order to assure that these frequencies were well above the first building vertical frequencies contained in spectra published in Volume 5 of the FSAR.

Based on the extensive review and modification of calculations performed by SWEC and the sample review and analysis performed by TES, the small bore piping is determined to be in compliance with the requirments of the FSAR and this item was Closed.

7.3.2 ICR No. 5633-2

TES issued ICR No. 5633-2 on November 2, 1982 as a Finding on the selection and use of pads on large bore piping. A Disposition Response was received from LILCO/SWEC on January 15, 1983. At a meeting held at SWEC on February 15, 1983, TES requested, and was supplied with, three additional calculations for review which represented the highest stressed locations of all pads reviewed by SWEC. In reviewing these additional calculations TES still had concerns with respect to adequacy and application of the design procedure for pads on small bore piping. These concerns were in the following areas:

(1) Single axial type supports which are designed and constructed offset from the pipe centerline are not modelled as offsets in the piping analysis.

(2) The attachments of pads and/or trunnions directly to elbows changes the flexibility and stress

distribution in the elbow. SWEC did not account for these effects in their piping analysis.

(3) The allowable stresses in welds attaching pads to the pipe did not satisfy the requirements of ANSI B31.1-1967 which is the governing Code.

(4) The design basis used when a trunnion is welded to a pad assumes zero pressure stress. TES did not understand the basis for this assumption.

In response to the concerns outlined above, LILCO/SWEC submitted further disposition as follows:

(1) All Category I supports were reviewed and additional calculations performed to determine if offsets in supports affected the piping and support analysis.

(2) The analytical technique used by SWEC for pads attached directly to elbows was made available for TES review.

(3) SWEC revised calculations as appropriate to satisfy the reduced allowable stresses required by ANSI B31.1-1967.

(4) The detailed design basis for pads and trunnions and the resulting calculations were made available for TES review.

TES reviewed the disposition response to each item and, where new calculations were required, performed a detailed audit of a sample number. The results of the TES review indicate the following:

(1) SWEC reanalyzed 13 piping stress calculations and reviewed and/or revised 60 support calculations.

The results of the review and reanalysis indicate a change in stress of less than 10%.

(2) The analytical technique used by SWEC for pads welded to elbows is conservative.

(3) SWEC revised 7 calculations to accommodate the requirements of ANSI B31.1-1967. All calculations reduced the allowable stress by 40%, as required, and the designs were acceptable.

(4) TES reviewed the detailed design basis as well as the calculations for any pads whose geometry was outside the limits of the SWEC procedure and found the designs were acceptable.

Based on the data supplied by LILCO/SWEC and the sample review and audit performed by TES personnel this item was Closed.

7.3.3 ICR No. 5633-10

TES issued ICR No. 5633-10 on November 24, 1982 as a Finding on the SWEC procedures establishing review methods of vendor calculations and the implementation of these procedures. A disposition response was received from LILCO/SWEC on February 10, 1983.

The major issue raised by TES was failure by the vendor to consider the cantilever bending mode in determining acceptability of the fundamental frequency design of valves. This concern was raised during review of a specific valve (1E21-MOV-035) design report.

The LILCO/SWEC response indicated that a procedure was in place at SWEC to review valve vendor reports and designs and that the Reviewer could have accepted the specific valve under question without having a vendor analysis for cantilever bending. This acceptance could

be based on engineering judgement and/or calculations performed by the Reviewer.

SWEC computed the cantilever mode for all 27 Category 1 valves supplied by the vendor responsible for supplying the valve in question. All valves had frequencies above 33 Hz.

TES Reviewers went to the SWEC offices on March 22, 1983 to review all procedures and sign-off sheets related to acceptance of valve vendor design documents. Further, valve design documents were reviewed. The purpose of this review was to determine whether a deficiency in the design process existed which could have resulted in failure to demonstrate valve frequency design adequacy. This subsequent review by TES personnel indicated that such a deficiency did not exist and the process in place at SWEC was acceptable and this item was Closed.

7.3.4 ICR No. 5633-18

TES issued ICR No. 5633-18 on December 18, 1983 as a Finding on the failure to include time-history loads in the Upset Operating Condition category for support analysis. A disposition response was received from LILCO/SWEC on February 2, 1983. The LILCO/SWEC response indicated that a conservative "umbrella" load combination was used and resulting stresses compared with the Normal Operating Condition allowable stresses. The initial Finding was based on the analysis package for one particular support. After receiving the LILCO/SWEC response TES initiated a review of the method of load combination for each support analysis package on the LPCS system. The results of this review indicated that more than 50% of the snubbers, rigid supports and anchors did not consider time-history loads in the upset category and in some of these cases the "umbrella" load procedure was not used. Even though the magnitude of the time-history loads are

small and should not effect adequacy of the supports, TES was concerned that a breakdown in the implementation of the SWEC design process was occurring.

Based on this further TES review SWEC revised calculation for the supports in question. All 12 supports were associated with one piping analysis package (AX-10B) and this resulted from failure to follow the established SWEC requirements on transmittal of information for this specific package. In addition to revising the 12 support calculations for this analysis package SWEC reviewed selected supports on each Category I piping model that involved time-history loads. No other calculations were found with inappropriately combined time-history loads.

TES reviewed all 12 support calculations associated with analysis package AX-10B as well as randomly selecting and reviewing supports from approximately 20 of the additional piping models that involved time-history load. All supports reviewed included the time-history loading as required. Based on this it was apparent that the problems associated with analysis package AX-10B were specific and not generic and this item was Closed.

7.3.5 ICR No. 5633-19

TES issued ICR No. 5633-19 on December 9, 1982 as a Finding against the SWEC design process with respect to the omission of fluid transient loads on a portion of the Core Spray test piping. A disposition response was received from LILCO/SWEC on February 17, 1983. As a result of reviewing the LILCO/SWEC response, TES closed a portion of the Finding but raised Additional Concerns on March 15, 1983 with respect to the following:

(1) Consideration of a reflected decompression wave case due to exit of water from the submerged pipe.

(2) Consideration of steady-state conditions.

(3) Documentation not available to permit exclusion of the CS test mode loading from acting in combination with other dynamic loads.

(4) Pump start times used in the analysis are less than in the Design Specification. Although this is conservative, the times used in the two analyses are different (one second for test mode and two seconds for rapid pump start/stop) and TES needed clarification of what time was appropriate.

LILCO/SWEC responded to these Additional Concerns on April 22, 1983 as follows:

(1) A revised waterhammer analysis considering blowdown forces on the last segment of piping was performed and indicates this loading is insignificant. TES agrees with this.

(2) The steady state thrust load has been calculated as 125 lbs. applied to the last segment of pipe and is judged to be an insignificant load. TES agrees with this.

(3) Appendix J-12 of the Design Specification allows for the Core Spray test mode to not be combined with other dynamic loading. Appendix J-20 of the Design Specification, which is applicable to the LPCS system, has been amended to provide the same guidance. The intent was not to require combination of test conditions and other dynamic loads

(as indicated by Appendix J-12) and it was an oversight that this guidance was not included in Appendix J-20.

(4) SWEC obtained confirmation that Core Spray pump start times is 2 to 4 seconds.

TES has reviewed the LILCO/SWEC responses to the original Finding and Additional Concerns and agrees that all items are now acceptable and this item was Closed.

7.3.6 ICR No. 5633-21

TES issued ICR No. 5633-21 on January 6, 1983 as a Finding against the SWEC design process with respect to the comparison of analytically determined accelerations applied to valve motor operators against the allowable values obtained from the dynamic qualification testing.

A disposition response was received on February 17, 1983 from LILCO/SWEC which addressed a number of minor TES concerns but still left the major concern of analytically determined values exceeding allowable values. This concern was based on the fact that SWEC used global coordinate analytical values for comparison with allowable values and TES considered that the use of local coordinates was the appropriate approach. Use of the local coordinate approach by TES indicated that valve 1E41-MOV-031 motor operator had analytically determined accelerations higher than allowable values. Based on this, TES requested that all motor operated valves be reviewed using the local coordinate acceleration values to determine acceptability.

SWEC reviewed approximately 300 previously qualified valves and found 2 that had local coordinate accelerations which

exceeded allowable values. For these 2 valves the piping models were refined using more appropriate representation of the stiffness of the valve in the valve-yoke region for valve 1T48-MOV-040A and also increasing damping to 2% for faulted condition dynamic loading for valve 1E11-MOV-036B. The new analyses resulted in calculated local coordinate accelerations less than allowable values.

Valve 1E41-MOV-031, which was the basis for the original finding, was not qualified at the time of the TES finding and was part of a group of valves in the process of qualification. TES reviewed a reanalysis of the piping system containing this valve and found that the local coordinate accelerations were less than allowable using a mode-by-mode analysis considering actual force value (i.e., + or -) for each mode in the global to local transformation prior to combining modes. This analysis used 1% damping.

LILCO/SWEC have performed an extensive generic reconfirmation program to insure that all motor operated valves meet test qualification levels. TES has conducted a detailed review of the methods and results of this generic reconfirmation program and have determined that our concerns have been satisfied and this item was Closed.

7.3.7 ICR No. 5633-27

TES issued ICR No. 5633-27 on January 21, 1983 as a Finding on the use of stress intensification factors (SIF) for all branch connections within the TES scope. A disposition response was received from LILCO/SWEC on February 25, 1983. This response indicated that 3 SIF were improper and as a preventive action all SIF values will be reviewed. Included in this response was technical justification for the use of SIF values of 1.0.

On March 15, 1983, TES issued Additional Concerns on this item requesting a review of the preventive action proposed by LILCO/SWEC. Also the technical justification presented by LILCO/SWEC was commented on and TES requested that all branch connections using Class 1 indices (SIF = 1.0) must be justified on a dimensional basis.

LILCO/SWEC submitted responses to the Additional Concerns of TES on May 26, 1983. This response indicated that the only dimensional requirement not met was the radii control. The 1980 ASME, BPVC indicates that lack of radii control requires the use of an SIF of 2.1. SWEC performed a review of over 500 branch connections using an SIF of 2.1 and no allowable stresses were exceeded.

TES has reviewed this LILCO/SWEC response and the results of the SWEC stress summary. The fact, that SWEC reviewed over 500 branch connections, which TES audited, using an SIF of 2.1 (which is the largest value imposed by todays Code on this type of intersection and more conservative than the FSAR requirement) and demonstrated that allowable stresses were not exceeded is a major point and demonstrates that the design is in compliance. Based on the above submittals and TES review this item was Closed.

7.3.8 ICR No. 5633-28

TES issued ICR No. 5633-28 on January 21, 1983 as a Finding against the operating values (temperature, coefficients of thermal expansion, etc.) and geometry input for pipe stress calculation package AX-10A).

Additional concerns on this subject were issued by TES on March 15, 1983 related to the following:

(1) Thermal attenuation procedures for tieback supports between the main pipe and branch line required review

(2) Supports PSR-041 and 065 were modeled improperly and the water hammer case for this system should be recalculated

(3) Support load changes resulting from (1) and (2) above should be reconciled with existing support design packages

A disposition response was received from LILCO/SWEC on May 9, 1983. That response included a complete reanalysis of pipe stress calculation package AX-10A including all TES concerns outlined in the original issue of ICR No. 5633-28 and in the Additional Concerns. Further, LILCO/SWEC reviewed the temperature modeling of all branches with tieback supports that are included in large bore piping computer models to assure that thermal attenuation procedures were appropriate and that modeling was acceptable.

TES personnel have determined through review of all large bore computer models available that the modeling errors (operational values and geometry) found in AX-10A were not generic in nature with the exception of the temperature modeling of branch line tieback supports. This generic issue was resolved by the LILCO/SWEC review of 59 branch line tieback supports and subsequent audit by TES personnel. TES personnel also performed a detailed review of the revised submittal of pipe stress calculation package AX-10A and have concluded that the concerns raised in ICR No. 5633-28 and Additional Concerns of March 15, 1983 have been resolved and this item was Closed.

8.0 CONCLUSIONS

The Independent Design Review conducted by TES of the design and QA process at the Shoreham Nuclear Power Station was initiated as a review of a portion of the LPCS System. Based on the Findings and Additional Concerns issued during the implementation of this effort the scope of the review broadened into a generic review in the following areas:

(1) small bore piping,

(2) attachment of supports to pipe,

(3) consideration of time-history dynamic loading in piping and support design,

(4) determination of applied accelerations on valve operators and comparison with allowables,

(5) branch line stress intensification factors,

(6) thermal attenuation modeling of tieback supports, and

(7) adequacy of vibra check baseplates in a radiation environment.

Based on the above list, it is apparent that a significant portion of the design at the Shoreham Plant has been subject to review and that the original scope was expanded greatly as a result of the initial review effort.

Further, since the design and construction process was ongoing at Shoreham at the time TES initiated the IDR, we were able to review the LILCO/SWEC process for discovering deficiencies, subsequent design changes, reconciliation with other disciplines and the final construction. This provided the review team with the opportunity to review the results of the total process as well as to review the ongoing design and construction activities.

The responses by SWEC to a number of the generic items were in the form of Engineering Studies or Evaluations which differ from Calculations in the SWEC Design Process. The term Calculation denotes an engineering/design technical report that provides the basis for an engineered design or conclusion and provides the full and formal documentation of the engineering process. A Study or Evaluation serves to verify the conclusions of previously established calculations rather than replace them. For example, SWEC performed an Evaluation to determine the adequacy of valve operators to meet acceptable acceleration levels. Part of this study involved reanalysis of 3 piping systems using different modeling techniques, damping values and/or acceleration summation. It is the recommendation of TES that these analyses should eventually become part of the formal documentation for Shoreham. That is, they should be modified accordingly to be classified as Calculations. Further, TES recommends that LILCO review all of the Studies and Evaluations performed as a result of this IDR to determine what existing Calculations require modification to bring the formal documentation in line with the conclusions of this IDR. It is recognized that not all of the Calculations impacted by Studies and Evaluations will require modification and that reference to, or attachment of, the appropriate Study or Evaluation in the Calculation may be appropriate. Completion of this effort by LILCO has no impact on the conclusions of this IDR and is recommended only to provide an appropriate set of records that can be utilized in the future for maintenance, replacement, repair and modification work by the utility.

In the area of Quality Assurance the TES Reviewers in their summary Trip Report indicate that the LILCO QA Program as applied to construction activity on the LPCS System at Shoreham demonstrates: management awareness and participation, a high level of proficiency and efficiency in the Quality Assurance organization, and exceeds the minimum in application and performance of the Quality Assurance Program requirements.

Based on the results of our Independent Design Review it is TES' opinion that the commitments of the FSAR with respect to Design and Quality Assurance have been complied with by LILCO and SWEC for the Shoreham Nuclear Power Station.

Table 1

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	RRF REV NO	RRF CATEGORY	PNR NO	PNR REV NO	PNR CATEGORY	RFI NO	REV NO	ICR NO	ICR CATEGORY	FINAL RESOLUTION
1	1 EAS	INEFFECTIVE SNUBBER	1	1	CLOSED	1	1	CLOSED	0	0	0		0
2	1 EAS	MISSING NAME PLATE	2	1	OPEN	2	1	OBSERVATION	0	0	0	5 FINDING	CLOSED 3-4- 83
3	1 EAS	MISSING SNUBBERS	3	1	CLOSED	3	1	CLOSED	0	0	0	0	0
4	1 EAS	WRONG SPRING SIZES	4	1	CLOSED	4	1	CLOSED	0	0	0	0	0
5	2 EAS	LATERAL CLEARANCE	5	2	OPEN	5	2	CLOSED	0	0	0	0	0
6	1 EAS	VALVE VGW 15A2	6	1	POT.FIND	6	1	POT.FIND	0	0	0	15 FINDING	CLOSED 3-11-83
7	1 EAS	CLASS 1 PIPE SUPPORT GRATING	7	1	CLOSED	7	1	CLOSED	0	0	0	0	0
8	2 EAS	SMALL BORE PIPE NOT SHOWN	8	2	CLOSED	8	1	CLOSED	95	0	0	0	0
9	1 EAS	PSSH026 WARPED CHANNEL	9	1	CLOSED	9	1	CLOSED	0	0	0	0	0
10	1 EAS	INCORRECT REF ON DWG	10	1	OPEN	10	1	CLOSED	0	0	0	0	0
11	1 EAS	MISSING SUPPORT IC-7	11	1	CLOSED	11	1	CLOSED	0	0	0	0	0
12	1 EAS	LOOSE LOCKNUT	12	1	OPEN	12	1	OBSERVATION	0	0	0	6 OBSERVATION	0
13	2 EAS	ATTACH'D SUPP NOT SHOWN	13	2	CLOSED	13	1	CLOSED	95	0	0	0	0
14	1 EAS	DIMENSION DIFFERENCE	14	1	CLOSED	14	1	CLOSED	0	0	0	0	0
15	1 EAS	ATTACHED SUPP NOT SHOWN	15	1	OPEN	15	1	CLOSED	0	0	0	0	0
16	1 EAS	DIMENSIONS DIFFERENT	16	1	CLOSED	16	1	CLOSED	0	0	0	0	0
17	1 GSB	SOURCE OF T&P CONDITIONS	17	1	CLOSED	17	0	CLOSED	0	0	0	0	0
18	1 GSB	S&W NUPIPE HPCI X-11A	18	1	CLOSED	18	1	CLOSED	0	0	0	0	0
19	1 MSA	AX-8AA-3 AX10G-1	19	1	CLOSED	19	1	CLOSED	0	0	0	0	0
20	1 MSA	DESIGN SPEC	20	1	CLOSED	20	0	CLOSED	0	0	0	0	0
21	2 MSA	DEADWEIGHT ANALYSIS	21	2	CLOSED	21	1	CLOSED	0	0	0	0	0
22	1 MSA	FORMULA INCORRECT	22	1	CLOSED	22	1	CLOSED	0	0	0	0	0
23	0 MSA	PIPE WEIGHT	23	0	OPEN	23	0	CLOSED	0	0	0	0	0
24	1 MSA	WALL DEFLECTION/ STRESS	24	1	CLOSED	24	1	CLOSED	0	0	0	0	0
25	0 GSB	S&W NUPIPE	25	0	OBSERVATION	25	0	CLOSED	0	0	0	0	0

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	REV NO	RRF CATEGORY	PMR NO	REV NO	PMR CATEGORY	RFI NO	REV NO	ICR NO	ICR CATEGORY	FINAL RESOLUTION
26	1 GSB S&W NUPIPE		26	1	CLOSED	26	1	CLOSED	0	0	0	0	
27	0 JCT S&W SPEC SH1 BR-AD REV 1		27	0	OBSERVATION	27	0	OBSERVATION	0	0	0	10 FINDING	CLOSED 4-6- 83
28	1 LEB 11600.02-AX-10D-2		28	1	CLOSED	28	1	CLOSED	0	0	0	0	
29	0 MSA PEN LOADS		29	0	OPEN	29	0	CLOSED	0	0	0	0	
30	0 MSA RESTRAINT STIFFNESS		30	0	OPEN	30	1	CLOSED	0	0	0	0	
31	1 MSA VALVE MODELING		31	1	CLOSED	31	1	CLOSED	0	0	0	0	
32	0 MSA PEN X 21A		32	0	OPEN	32	0	CLOSED	0	0	0	0	
33	1 GSB R S CURVES		33	1	OBSERVATION	33	0	CLOSED	0	0	0	0	
34	1 LEB 11600.02 AX 10D-2		34	1	CLOSED	34	1	CLOSED	0	0	0	0	
35	1 LEB 11600.02 AX 10D-2		35	1	OPEN	35	1	POT.FIND	0	0	0	20 FINDING	CLOSED 3-11-83
36	1 MSA CALC PACK 11600.02 AX10B-3		36	1	CLOSED	36	1	CLOSED	0	0	0	0	
37	0 GSB SEISMIC RESPONSE CURVES		37	0	OBSERVATION	37	0	CLOSED	7	0	0	0	
38	1 GSB ANALYSIS X-10B		38	1	CLOSED	38	1	CLOSED	0	0	0	0	
39	1 GSB ANALYSIS X-10B		39	1	OBSERVATION	39	1	CLOSED	0	0	0	0	
40	1 GSB S & W PIPE STRESS REPRT		40	1	POT FINDING	40	1	POT.FIND	0	0	0	21 FINDING	CLOSED 6-21-83
41	1 EAS REF DOCUMENT DISCREPCY		41	1	CLOSED	41	1	CLOSED	0	0	0	0	
42	2 EAS SUPPORT STIFFNESS		42	2	OPEN	42	2	CLOSED	0	0	0	0	
43	0 LJD SUPPORT CALCS		43	0	OPEN	43	0	CLOSED	0	0	0	0	
44	1 LJD SUPPORT CALCS		44	1	OPEN	44	1	OBSERVATION	0	0	0	4 OBSERVATION	
45	1 LJD PIPE SUPT&DUCT CRIT		45	1	OPEN	45	1	CLOSED	0	0	0	0	
46	1 JGP PIPE SUPRT&DUCT CRIT		46	1	CLOSED	46	1	CLOSED	0	0	0	0	
47	0 LJD PIPE SUPRT&DUCT CRIT		47	0	OPEN	47	0	CLOSED	0	0	0	0	
48	1 LJD PIPE SUPRT&DUCT CRIT		48	1	OPEN	48	1	CLOSED	0	0	0	0	
49	1 LJD PSSH 005		49	1	OPEN	49	1	OBSERVATION	0	0	0	3 OBSERVATION	
50	1 LJD IE 21 PSSH 003-4		50	1	OPEN	50	1	CLOSED	0	0	0	0	

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	REV NO	RRF CATEGORY	PNR NO	REV NO	PNR CATEGORY	RFI NO	REV NO	ICR NO	ICR CATEGORY	FINAL RESOLUTION
51	1 LJD	PIPE SUPPORT CALC	51	1	OPEN	51	1	POT.FIND	0	0	17	FINDING	CLOSED 3-11-83
52	1 LJD	PIPE SUPPORT CALC	52	1	OPEN	52	1	POT.FIND	0	0	17	FINDING	CLOSED 3-11-83
53	1 LJD	PIPE SUPPORT CALC	53	1	OPEN	53	1	CLOSED	0	0	0		0
54	1 LJD	PIPE SUPRT&DUCT CRIT	54	1	OBSERVATION	54	1	CLOSED	0	0	0		0
55	1 LJD	IE 21 PSR 002-3 CALCS	55	1	CLOSED	55	1	CLOSED	0	0	0		0
56	1 LJD	IE 21 PSR 002-3	56	1	OPEN	56	1	POT.FIND	0	0	17	FINDING	CLOSED 3-11-83
57	1 RRH	IE 21 PSSH 012-5	57	1	OPEN	57	1	CLOSED	0	0	0		0
58	1 EAS	PSR 014-5	58	1	OPEN	58	1	CLOSED	0	0	0		0
59	1 EAS	PSR 014-5 LOADS	59	1	OPEN	59	1	CLOSED	0	0	0		0
60	1 EAS	PSR 014-5 WELD ITEMS 2,3	60	1	OPEN	60	1	CLOSED	0	0	0		0
61	1 EAS	IE21 PSR 001	61	1	OPEN	61	1	CLOSED	0	0	0		0
62	1 EAS	IE 21 PSR 057 FRICTION	62	1	OPEN	62	1	POTEN FIND	0	0	8	CLOSED	0
63	1 EAS	ITEM NOT CHECKED	63	1	OPEN	63	1	OBSERVATION	0	0	7	OBSERVATION	0
64	1 EAS	PSST 058 DIM ON DWG	64	1	OPEN	64	1	CLOSED	0	0	0		0
65	1 LJD	SUPRT&DUCT CRITERIA	65	1	OPEN	65	1	POT.FIND	0	0	18	FINDING	CLOSED 5-20-83
66	1 EAS	SUPRT DIFF	66	1	CLOSED	66	1	CLOSED	0	0	0		0
67	1 EAS	EXTRA SUPRT IN MODEL	67	1	CLOSED	67	1	CLOSED	0	0	0		0
68	1 EAS	LOADS DWG TO BE REVISED	68	1	OPEN	68	1	CLOSED	0	0	0		0
69	1 RRH	WRONG VALUES	69	1	OPEN	69	1	CLOSED	0	0	0		0
70	1 JHH	AUDIT S&W	70	1	CLOSED	70	1	CLOSED	0	0	0		0
71	1 GSB	MODELING METHOD	71	1	OBSERVATION	71	1	CLOSED	0	0	0		0
72	1 GSB	PSR. 070	72	1	CLOSED	72	1	CLOSED	0	0	0		0
73	1 LEB	ANCHOR MOVEMENTS	73	1	CLOSED	73	1	CLOSED	0	0	0		0
74	1 LEB	X SECTION PROPERTIES	74	1	CLOSED	74	1	CLOSED	0	0	0		0
75	1 RRH	CLAMP NOT WELDED PER 29.3-1	75	1	OPEN	75	1	CLOSED	0	0	0		0

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	RRF REV NO	RRF CATEGORY	PMR NO	PMR REV NO	PMR CATEGORY	RFI NO	RFI REV NO	ICR NO	ICR REV NO	ICR CATEGORY	FINAL RESOLUTION
76	1 LJD	PSR 018-3 P29	76	1	OPEN	76	1	CLOSED	0	0	0	0		0
77	0 SS	LOCATION PSST 013-5	77	0	OPEN	77	0	CLOSED	0	0	0	0		0
78	1 JGP	PSSH 021	78	1	OPEN	78	1	CLOSED	0	0	0	0		0
79	0 JGP	PSSH 021 SUPP. CRITERIA SYS	79	0	OPEN	79	0	POT FIND	0	0	0	2	FINDING	CLOSED 6-27-83
80	1 JGP	DISPLACEMENTS PSSH 021 PS10A	80	1	CLOSED	80	1	CLOSED	0	0	0	0		0
81	1 JGP	PSSH 021 REVISIONS	81	1	CLOSED	81	1	CLOSED	0	0	0	0		0
82	1 EAS	CALC VS DWG	82	1	OPEN	82	1	OBSERVATION	0	0	0	22	OBSERVATION	0
83	1 WJM	STANDARD SUPPORTS	83	1	CLOSED	83	1	CLOSED	0	0	0	0		0
84	1 RRH	PSR 050	84	1	CLOSED	84	1	CLOSED	0	0	0	0		0
85	0 KTS	PSST 066	85	0	OPEN	85	1	CLOSED	0	0	0	0		0
86	1 KTS	PSST 066 P5	86	1	OPEN	86	1	CLOSED	0	0	0	0		0
87	1 KTS	PSST 066 PAGE 10	87	1	OPEN	87	1	CLOSED	0	0	0	0		0
88	0 KTS	PSST 066 PAGE 7	88	0	OPEN	88	0	CLOSED	0	0	0	0		0
89	1 KTS	PSR 025 PAGE 6	89	1	CLOSED	89	1	CLOSED	0	0	0	0		0
90	1 KTS	PSR 025 PAGE 10	90	1	OPEN	90	1	CLOSED	0	0	0	0		0
91	1 KTS	PSR 025 EMBEDDED PLATE	91	1	OPEN	91	1	CLOSED	0	0	0	0		0
92	1 KTS	PSR 025 PAGE 12	92	1	OPEN	92	1	CLOSED	0	0	0	0		0
93	1 KTS	PSR-025 PAGE 7	93	1	OPEN	93	1	CLOSED	0	0	0	0		0
94	1 WJM	SNPS PROJ. PROCEDURE 19	94	1	CLOSED	94	1	CLOSED	0	0	0	0		0
95	1 KTS	PG 2 ASSUMPTION CONFIRMED	95	1	CLOSED	95	1	CLOSED	0	0	0	0		0
96	1 GSR	EXCLUDED LINES IN TIME HISY.	96	1	OBSERVATION	96	1	POT.FIND	0	0	0	23	CLOSED	0
97	1 GSR	ANALYSIS FOR 70 DEGREES	97	1	CLOSED	97	1	CLOSED	0	0	0	0		0
98	2 GSR	MODELED TEMP CHANGE POINTS	98	2	CLOSED	98	0	CLOSED	0	0	0	0		0
99	0 KTS	USE OF PITRIFE	99	0	OPEN	99	1	CLOSED	0	0	0	0		0
100	1 KTS	DWG CALC PACK REVS DISAGREE	100	1	CLOSED	100	1	CLOSED	0	0	0	0		0

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	RRF REV NO	RRF CATEGORY	PMR NO	PMR REV NO	PMR CATEGORY	RFI NO	REV NO	ICR NO	ICR NO	ICR CATEGORY	FINAL RESOLUTION
101	2 KTS	WK SKETCH DOES NOT MATCH DWG	101	2	OPEN	101	1	CLOSED	0	0	0	0		0
102	1 KTS	PSR 001-6 RE* DWG	102	1	OPEN	102	1	CLOSED	0	0	0	0		0
103	0 KTS	CALC PACK NOT SIGNED	103	0	OPEN	103	0	CLOSED	0	0	0	0		0
104	0 KTS	NO CHECK FOR BASE PLATE	104	0	OPEN	104	0	CLOSED	0	0	0	0		0
105	0 LJD	RRF & PMR 48	105	0	OPEN	105	0	CLOSED	0	0	0	0		0
106	1 KTS	CALC PACK PSSH 045-7	106	1	CLOSED	106	1	CLOSED	0	0	0	0		0
107	1 KTS	CALC PACK PSSH 045-7	107	1	CLOSED	107	1	CLOSED	0	0	0	0		0
108	2 LEB	PACKAGE AX 10-D-2	108	2	OBSERVATION	108	2	OBSERVATION	0	0	0	27	FINDING	CLOSED 6-27-83
109	1 LEB	PACKAGE AX 10-D-2	109	1	CLOSED	109	1	CLOSED	0	0	0	0		0
110	0 LEB	PACKAGE AX 10D 2	110	0	OBSERVATION	110	0	CLOSED	0	0	0	0		0
111	1 LEB	INADEQUATE SRV ENVELOPE	111	1	CLOSED	111	0	CLOSED	0	0	0	0		0
112	1 JCT	PENN X-10B	112	1	OPEN	112	1	OBSERVATION	0	0	0	24	OBSERVATION	0
113	1 KTS	PACK REFLECT DWG CHANGE	113	1	CLOSED	113	1	CLOSED	0	0	0	0		0
114	1 KTS	PG 5 ASSUMPTIONS CONFIRMED	114	1	CLOSED	114	1	CLOSED	0	0	0	0		0
115	1 KTS	PSSA SIZE 8 STRUTS	115	1	OPEN	115	1	CLOSED	0	0	0	0		0
116	1 KTS	DWG 8 CALC PACK 3	116	1	CLOSED	116	1	CLOSED	0	0	0	0		0
117	1 KTS	PSR 044 ASSUMPTIONS	117	1	OPEN	117	1	CLOSED	75	0	0	0		0
118	1 SDW	ANALYSIS 1* PIPING	118	1	CLOSED	118	1	CLOSED	0	0	0	0		0
119	0 SDW	DELTA T'S FOR SOCKOLETS	119	0	OPEN	119	1	OBSERVATION	0	0	0	11	OBSERVATION	0
120	1 SDW	TESTING COND. CORE SPRAY	120	1	CLOSED	120	1	CLOSED	0	0	0	0		0
121	1 SDW	TRANSIENT EVENT 2.4	121	1	OPEN	121	1	CLOSED	0	0	0	0		0
122	1 SDW	DERIVATION OF DELTA TS	122	1	CLOSED	122	1	CLOSED	0	0	0	0		0
123	1 SDW	RPV NOZZLE MATERIAL	123	1	POT.FIND	123	1	POT.FIND	0	0	0	14	FINDING	CLOSED 3-11-83
124	1 SDW	BRANCH FILM COEFF.	124	1	CLOSED	124	1	CLOSED	0	0	0	0		0
125	0 SDW	FREE FILM COEFFS.	125	0	OPEN	125	0	CLOSED	0	0	0	0		0

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	REV NO	RRF CATEGORY	PMR NO	REV NO	PMR CATEGORY	RFI NO	REV NO	ICR NO	ICR CATEGORY	FINAL RESOLUTION
126	1 SDW	RPV NOZZLE DISPLACEMENTS	126	1	POT.FIND	126	1	OBSERVATION	0	0	0 16	OBSERVATION	0
127	1 SDW	SOURCE OF DELTA TS	127	1	OPEN	127	1	CLOSED	0	0	0 0		0
128	1 SDW	LOG EVALUATION	128	1	CLOSED	128	1	CLOSED	0	0	0 0		0
129	1 SDW	CLASS 1 CERTIFICATION	129	1	CLOSED	129	1	CLOSED	0	0	0 0		0
130	1 SDW	BRANCH PROPERTIES	130	1	CLOSED	130	1	CLOSED	0	0	0 0		0
131	1 SDW	MISSING CALC. PAGES	131	1	CLOSED	131	1	CLOSED	0	0	0 0		0
132	1 SDW	EQ. 10 MOMENTS	132	1	OPEN	132	1	OBSERVATION	0	0	0 24	OBSERVATION	0
133	1 EAS	RADIATION LEVEL @ LPCS	133	1	POT.FIND	133	1	POT.FIND	0	0	0 12	FINDING	CLOSED 3-11-83
134	1 LEB	DATA SHEET DISCREPANCIES	134	1	CLOSED	134	1	CLOSED	0	0	0 0		0
135	1 LEB	DYNAMIC DISPLACEMENT	135	1	OPEN	135	1	CLOSED	0	0	0 0		0
136	1 LEB	SUPPR. POOL CURVES	136	1	CLOSED	136	1	CLOSED	0	0	0 0		0
137	1 LEB	SKEWED SUPPORT	137	1	OPEN	137	1	CLOSED	0	0	0 0		0
138	0 LEB	BR. LINE ANALYSIS	138	0	OPEN	138	0	POT. FIND	0	0	0 1	FINDING	CLOSED 6-27-83
139	0 LEB	BRANCH SIF	139	0	OPEN	139	0	CLOSED	0	0	0 0		0
140	1 LEB	NO SIF INPUT	140	1	CLOSED	140	1	CLOSED	0	0	0 0		0
141	1 LEB	DISCREPANCIES DATA TABLE	141	1	CLOSED	141	1	CLOSED	0	0	0 0		0
142	1 LEB	PIPE AND TIEBACK PROPS.	142	1	CLOSED	142	1	CLOSED	0	0	0 0		0
143	0 LEB	VALVE OPERATOR STIFFNESS	143	0	OPEN	143	0	CLOSED	0	0	0 0		0
144	1 LEB	BRANCH LINE ANALYSIS	144	1	CLOSED	144	1	CLOSED	0	0	0 0		0
145	1 LEB	BRANCH LINE TEMP.	145	1	OPEN	145	1	POT. FIND	0	0	0 28	FINDING	CLOSED 6-27-83
146	1 LEB	BRANCH LINE DISCREP.	146	1	CLOSED	146	1	CLOSED	0	0	0 0		0
147	1 LEB	MASS POINTS NODES	147	1	CLOSED	147	1	CLOSED	0	0	0 0		0
148	1 LEB	BRANCH LINE SEISMIC	148	1	CLOSED	148	1	CLOSED	0	0	0 0		0
149	0 HSA	FUNCTIONAL CAPABILITY	149	0	OPEN	149	0	CLOSED	0	0	0 0		0
150	1 RRH	MISSING PAGE	150	1	OPEN	150	1	CLOSED	0	0	0 0		0

SHOREHAM NUCLEAR POWER STATION UNIT 1 LPCS SYSTEM
REVIEW LOG

ITEM -REV	REVIEWER INITIAL	DESCRIPTION	RRF NO	RRF REV NO	RRF CATEGORY	PHR NO	PHR REV NO	PHR CATEGORY	RFI NO	RFI REV NO	ICR NO	ICR REV NO	ICR CATEGORY	FINAL RESOLUTION
151	2 KTS	WELD SIZE	151	2	OPEN	151	1	CLOSED	0	0	0	0		
152	1 GSB	PILUG OUTPUT MISSING	152	1	CLOSED	152	1	CLOSED	0	0	0	0		
153	1 KTS	ATTACHMENT PT. NO.	153	1	CLOSED	153	1	CLOSED	0	0	0	0		
154	1 KTS	P(TRIFE RUN MISSING	154	1	CLOSED	154	1	CLOSED	0	0	0	0		
155	1 KTS	PIPE ELEVATION	155	1	OPEN	155	1	CLOSED	0	0	0	0		
156	1 KTS	ADDED BENDING STRESS	156	1	CLOSED	156	1	CLOSED	0	0	0	0		
157	1 KTS	CONFIRM ASSUMPTION	157	1	OPEN	157	1	CLOSED	0	0	0	0		
158	0 GSB	DYNAMIC MODELING	158	1	OPEN	158	0	CLOSED	0	0	0	0		
159	1 LEB	SUPPORT STIFFNESS	159	1	CLOSED	159	1	CLOSED	0	0	0	0		
160	1 LEB	MODELING OF SUPPORT	160	1	OPEN	160	1	CLOSED	0	0	0	0		
161	1 LEB	VALVE ACCELERATIONS	161	1	CLOSED	161	1	CLOSED	0	0	0	0		
162	0 EAS	SHIELD WALL ATTACHMENTS	162	0	OPEN	162	0	POT.FIND	0	0	0	13	FINDING	CLOSED 3-11-83
163	0 MSA	STRESS CALC. PACKAGE REVS.	163	0	OPEN	163	0	CLOSED	0	0	0	0		
164	0 EAS	SUPPORT FRICTION CRITERIA	164	0	OPEN	164	0	POT.FIND	0	0	0	9	FINDING	CLOSED 3-11-83
165	0 SDW	SUPERCEDED PAGES	165	0	OPEN	165	0	CLOSED	0	0	0	0		
166	1 SDW	AREA REINF.CALCS	166	1	OPEN	166	1	CLOSED	0	0	0	0		
167	0 SDW	DELTA T LISTING	167	0	OPEN	167	0	CLOSED	0	0	0	0		
168	1 KTS	SUPPORT PSR 052	168	1	OPEN	168	1	CLOSED	0	0	0	0		
169	0 GSB	WATER HAMMER LOADS	169	0	POT.FIND	169	0	POT.FIND	0	0	0	19	FINDING	CLOSED 6-6-83
170	0 KTS	LUG CALCULATIONS	170	0	OPEN	170	0	OBSERVATION	0	0	0	25	OBSERVATION	
0	0		0	0		0	0		0	0	0	0		

Table 2

Summary of Items

Phase 2

Findings Only

ICR No.	Status after Review of LILCO/SWEC Response		Generic Response		Modification Required	
	Closed	Additional Concern	Yes	No	Documentation	Plant
1		Additional Concern		X	No	No
2		Additional Concern	X		Yes	No
5	Closed			X	No	No
9	Closed			X	No	No
10		Additional Concern	X		No	No
12	Closed		X		Yes	No
13	Closed			X	No	No
14	Closed			X	No	No
15	Closed			X	Yes	No
17	Closed			X	No	No
18		Additional Concern		X	No	No
19		Additional Concern		X	Yes	No
20	Closed			X	No	No
21		Additional Concern		X	As part of SWEC Reconciliation	No
27		Additional Concern	X		Yes	No
28		Additional Concern	X		As part of SWEC Reconciliation	No

Table 3

Summary of Items

Phase 3

Additional Concerns Only

ICR No.	Status after Review of LILCO/SWEC Response		Generic Response		Modification Required	
	Closed	Finding	Yes	No	Documentation	Plant
1	Closed		X		Yes	No
2	Closed		X		Yes	No
10	Closed			X	No	No
18	Closed		X		No	No
19	Closed			X	Yes	No
21	Closed		X		Yes	No
27	Closed		X		Yes	No
28	Closed		X		Yes	No