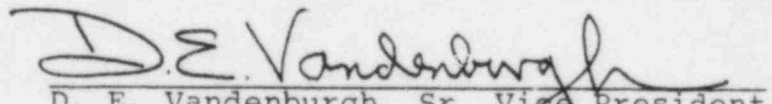


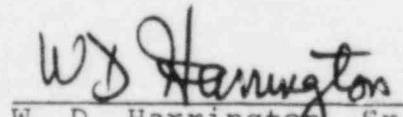
FINAL REPORT


CONNECTICUT YANKEE

PLANT DESIGN CHANGE EXTERNAL REVIEW GROUP

SEPTEMBER 6, 1985

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SUMMARY

Connecticut Yankee Atomic Power Company's response to the NRC's order for modification of their license is contained in a Program Plan, dated January 1985. Included in the plan was the creation of a three-member Plant Design Change External Review Group, the charter of which was included in the plan as Enclosure III. As indicated in the charter, this group is responsible to provide a Final Report to the Vice President, Nuclear and Environmental Engineering, at Northeast Utilities Service Company and to the NRC - Region I.

The External Review Group (ERG) was charged with the responsibility to provide an independent oversight of the Plant Design Change Task Group (Task Group). In carrying out these responsibilities, the ERG was charged with the tasks of determining the adequacy of the reviews, the effectiveness and sufficiency of the Task Group's activities and recommendations, and the completeness of the corrective actions to improve the design change process.

The oversight by the ERG took several forms as follows:

1. Development of the Charter and Procedures for ERG activities.
2. Review and approval of working procedures for the Task Group.
3. Four day-long meetings with the Task Group.
4. Independent review by the staffs of ERG members of various documents and reports produced by the Task Group.

Based on the ERG's oversight of the Task Group's activities during the last six months, the ERG concludes that an effective multi-disciplined approach was taken to the review of all design changes at the Connecticut Yankee plant covering the period January 1979 through December 1984. The ERG was very much impressed with the thoroughness of the review conducted. During the six-year period in question, 355 Plant Design Change Requests (PDCR) were processed for Connecticut Yankee. About 10% of these were found by the screening process to require detailed evaluation. In addition, the Impell Corporation was retained by the Task Group to review 20,294 Work Permits/Orders to determine if any involved design changes of potential safety significance. The subsequent detailed evaluation determined that the implementation of only one PDCR raised an immediate safety concern. The prompt notification of Northeast Utilities Service Company management resulted in a thorough review and a filing with the Nuclear Regulatory Commission of a Justification for Continued Operation. A detailed listing of the other deficiencies has been provided to the Northeast Utilities Service Company Senior Vice President who will provide an action plan to the NRC which will address the resolution of the deficiencies.

It is gratifying to verify that design changes for Connecticut Yankee were handled in an appropriate manner in the past, but it is even more gratifying to determine that an improved process has evolved since the fuel pool seal failure incident. Recommendations to improve further the plant design change process have been made by the Task Group, and the addition of these process modifications should provide a standard of excellence for the industry.

EVALUATION OF TASK GROUPS

SCREENING OF PLANT DESIGN CHANGES

The Plant Design Change Task Group performed a preliminary evaluation of all plant design changes approved during the period January 1, 1979 through December 31, 1984, to determine if any public safety concerns had been introduced with implementation of the changes. This preliminary evaluation was termed "screening."

Plant design changes had been initiated in one of three ways:

- . through the use of Plant Design Change Requests
- . through the use of jumpers, lifted leads and bypasses, and
- . through the use of Work Permits and Automated Work Orders without approval under a PDCR.

The screening process was carried out by the six member Task Group working under the guidance provided in their Procedure 1.02 - Plant Design Change Screening. The Task Group used three screening criteria to evaluate the design changes as follows: 1) Potential loss of a boundary designed to contain radioactivity, 2) Thoroughness of the change package for safety related changes, and 3) Adequacy of the safety evaluation. Documentation of reviews was provided by completion of a form which included reviewer's evaluations, independent review questions and comments, a summary of the Task Group's discussion and the basis for the final determination. For those design changes requiring additional review, the appropriate concerns which arose during the screening process were documented on the screening form to ensure their resolution during detailed evaluation.

The Task Group's screening of 355 design changes resulted in 35 being selected for detailed evaluation. The ERG's examination of six screening packages (4 which had been dispositioned "yes" - indicating further review was required due to potential safety significance and 2 which had been dispositioned "no" - but which had been considered borderline as to whether further evaluation should be conducted) resulted in the Group's concurrence that the assessments made by the Task Group had been made correctly.

The ERG also audited the screening packages for 2 of 12 design changes involving jumpers, lifted leads or bypasses which were still in effect as of April 15, 1985. The ERG agreed with the Task Group's assessment.

The Impell Corporation's review of 9101 work permits and 11,193 automated work orders revealed that safety evaluations had to be done for 65 work permits/orders which were safety significant. The ERG verified that the Task Group worked in close cooperation with the contractor throughout the task, thereby auditing their work from time to time. During the course of ERG's meeting with Impell representatives, the methodology used, the detailed findings, suggested generic guidelines and their observations and recommendations were all reviewed to the Group's satisfaction. It is obvious the task was a formidable one yet it was performed in a thorough, probing and unbiased manner. Based on ERG's discussions with the Task Group and discussions with Impell, we believe their work was complete and good judgement was exercised. Although several work permits/orders have been identified for further evaluation, none have resulted in a change which is known to adversely affect plant safety.

Based on ERG's review of selected design change screening packages and Impell's evaluations, ERG members have concluded that the screening process has been executed in an objective, complete and thorough manner. This is based on the premise that in those design change packages audited it was found that a broad spectrum of concerns had been considered, concerns such as testing requirements, failure modes, specification adequacy, impact on other systems, adequacy of operation, adequacy of safety evaluations, seismic requirements, safety analysis, accident consequences, faulty operation of equipment and adequacy of procedures were all assessed in the Task Group's review. The ERG believes that the Task Group has conducted a very complete and thorough screening review.

EVALUATION OF TASK GROUP'S

REVIEW OF PLANT DESIGN CHANGES

Working under the guidance provided in their Procedure 1.03 - Plant Design Change Evaluation, the Task Group undertook detailed evaluations of the 35 PDCR's which were found to have potential safety significance. Detailed evaluations of 11 of the 35 resulted in no identified deficiencies. The remaining 24 resulted in 39 deficiencies requiring further evaluation or corrective action.

A scope review was first conducted to outline the areas requiring detailed evaluation. The review considered three primary

phases for evaluation:

- . Impact on the plant design basis
- . Confirmation of proper implementation
- . Provisions for continued safe operation.

The detailed evaluations were then performed based on the concerns identified in the screening, scoping reviews, and on-site inspections and walkdowns. Documentation of the evaluations was provided by completion of a Summary Evaluation form which provided each member of the Task Group an opportunity to review the findings for completeness and accuracy. Questions and resolutions were also documented. All six members of the Task Group had to concur with evaluation results before approval could be reached.

The Task Group findings on the 39 deficiencies showed 3 which needed to be addressed; one of immediate concern (PDCR "380") which was addressed in a notification to the Vice President of Nuclear and Environmental Engineering and two major areas which could require extensive evaluation and corrective action. These involved 1) an evaluation necessary to clearly identify components and system boundaries necessary to allow cold shutdown following a design basis earthquake, and 2) an evaluation of the containment isolation system. Further, deficiencies were categorized into five classifications; seismic, procedural, design, testing and safety analysis. This revealed that 66% of the deficiencies were in the engineering and design areas and in particular, seismic qualification of components. Eleven of the 39 deficiencies had been identified through other programs in process at Northeast Utilities and therefore only 28 deficiencies could require new studies or projects.

Based on ERG's audit of 10 evaluation packages, ERG members have concluded that the evaluation process has been conducted in a most thorough and professional manner. The audits have indicated a genuine concern for addressing all possible issues even though remotely applicable. The methodical manner in which the Task Group has conducted their evaluations gives the ERG a high level of confidence that the task was executed in a most competent and complete manner.

EVALUATION OF THE PLANT DESIGN CHANGE PROCESS

Throughout the screening and detailed evaluation phases of the design review effort, the Task Group identified potential design change process deficiencies. The ERG provided additional process improvement suggestions. At the meeting of the ERG with the Task Group on August 8, 1985, eighteen recommendations for process corrections and improvements were discussed.

The ERG, on the basis of their oversight, concludes that there has been a concern for safety and quality at Connecticut Yankee throughout the six-year period, 1979-1984. As expected, the process was not perfect and improvements have been continually made. In fact, a number of process improvements were initiated by the Northeast Utilities Service Company independent of the Task Group's work.

The ERG believes that the recommendations made by the Task Group will further improve the process. They include a more integrated review, enhanced identification of and control over design basis information, and improved ongoing training for engineering personnel responsible for the design changes. The Northeast Utilities Service Company would do a service to the nuclear utility industry by sharing the lessons learned as a result of this review.

CONCLUSIONS

Based on ERG's audit of the Task Group's conduct of investigations, data produced, findings and follow-up actions, the ERG concludes that the task has been conducted and completed in a very thorough and effective manner. These conclusions are supported by the detailed information presented in the Connecticut Yankee Plant Design Change Task Group's Final Report, a copy of which is enclosed, and by the record of ERG's communication and involvement with the Task Group as found in the Appendix to this report.

We further believe that the Northeast Utilities Service Company has made available all the necessary resources to allow completion of this task in a most competent and professional manner, as evidenced by the fact that approximately 11,700 man-hours of highly experienced engineering professionals were assigned and carried the project to completion.

APPENDIX

CHRONOLOGY OF THE ERG/CYPDCTG INTERFACE

<u>Date</u>	<u>Form</u>	<u>Subject</u>
Feb. 1	Letter from W.G. Counsil to D.E. Vandenburg WGC-85-CY-11	Program background information
Feb. 13	Telecon between R.J. Schmidt & D.E. Vandenburg	Method for procedure development
Feb. 15	Letter from C.F. Sears to D.E. Vandenburg, CFS 85-050	Draft ERG Procedures
Feb. 20	Telecon between R.J. Schmidt and D.E. Vandenburg	Procedures, Audit/Review
Feb. 21	Letter from R.J. Schmidt to D.E. Vandenburg, CYPDCTG-012	CYAPCO letter to NRC of Feb. 6, 1985.
Feb. 21	Letter from R.J. Schmidt to D.E. Vandenburg, CYPDCTG-011	Transmit CYPDCTG Procedures 1.01, 1.02, 1.03, 1.04
March 1	Telecon between R.J. Schmidt and D.E. Vandenburg	Comment on CYPDCTG procedures
March 1	Letter from D.E. Vandenburg to R.J. Schmidt	Comments on CYPDCTG procedures
March 5	Telecon between R.J. Schmidt and D.E. Vandenburg	Comments on CYPDCTG procedures
March 6	Memo from R.J. Schmidt to C.F. Sears (CYPDCTG-017), with copies to ERG	February Monthly Report
March 7	Letter from R.J. Schmidt to CYPDCTG Procedures Manual Copy Holders, CYPDCTG-021	Procedure 1.01, 1.02
March 7	Letter from R.J. Schmidt to D.E. Vandenburg, CYPDCTG-022	Procedures 1.03, 1.04, 1.05
March 12	Meeting ERG and CYPDCTG	Status/Audit
March 21	Letter from C.H. Poindexter to D.E. Vandenburg	Comments on Procedures
March 27	Letter from D.E. Vandenburg to R.J. Schmidt	Approval of 1.01, 1.02, 1.03, 1.04, 1.05

<u>Date</u>	<u>Form</u>	<u>Subject</u>
April 4	Memo from R.J. Schmidt to C.F. Sears (CYPDCTG-037) with copies to ERG	March Monthly Report
April 8	Letter from R.J. Schmidt to CYPDCTG Procedures Manual Copy Holders, CYPDCTG-046	Procedures 1.01, 1.03, 1.04, 1.05, 2.01, 2.02
April 11	Letter from D.E. Vandenburg to T.E. Murley	ERG first status report
April 25	Meeting - ERG and CYPDCTG	Status/Audit
May 7	Memo from R.J. Schmidt to C.F. Sears (CYPDCTG-064), with copies to ERG	April Monthly Report
May 8	Letter from R.J. Schmidt to C.F. Sears, CYPDCTG-069	Screening Milestone Report
May 20	Letter from W.D. Harrington to D.E. Vandenburg	Review Design Change
May 21	Letter from R.J. Schmidt to D.E. Vandenburg, CYPDCTG-074	Procedure 1.04, Rev. 1
May 31	Meeting - CYPDCTG and ERG	Status/Audit
May 31	Letter from D.E. Vandenburg to R.J. Schmidt	Approval of Procedure 1.04, Rev. 1
June 7	Memo from R.J. Schmidt to C.F. Sears (CYPDCTG-078), with copies to ERG	May Monthly Report
June 13	Letter from R.J. Schmidt to CYPDCTG Procedure Manual Copy Holders, CYPDCTG-083	Procedures 1.04, Rev. 1, 2.01, 2.03
June 21	Letter from D.E. Vandenburg to C.F. Sears	ERG 2nd status report
July 2	Letter from R.J. Schmidt to D.E. Vandenburg, CYPDCTG-091	Evaluation of ERG comments on screening and process improvement
July 3	Memo from R.J. Schmidt to C.F. Sears (CYPDCTG-090), with copies to ERG.	June Monthly Report

<u>Date</u>	<u>Form</u>	<u>Subject</u>
July 24	Letter from R.J. Schmidt to D.E. Vandenburg	Milestone reports: Plant Design Change Evaluations, Review of the Design Change Process
July 26	Letter from R.J. Schmidt to D.E. Vandenburg	Draft Final Report
Aug. 5	Memo from R.J. Schmidt to to C.F. Sears (CYPDCTG-106), with copies to ERG	July Monthly Report