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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454-OL
	)	50-455-OL
(Byron Nuclear Power Station,	)	
Units 1 & 2)	)	

SUMMARY OF THE TESTIMONY OF
LOUIS D. JOHNSON
ON CONTENTION 1

I. Louis D. Johnson is the Manager of Projects for Torrey Pines Technology.

II. Torrey Pines has performed a third party review of the components supplied to Byron by Systems Control Corporation. This review encompassed Systems Control main control boards, DC fuse panels, local instrument panels, cable trays, and cable tray hangers.

III. Torrey Pines' review was performed in accordance with a program plan which encompassed a number of different review tasks.

IV. Mr. Johnson first describes the Torrey Pines review of the Systems Control-supplied main control boards. Data pertaining to this component was gathered and reviewed by Torrey Pines personnel, and Torrey Pines performed a partial inspection of one of the main control boards supplied to Byron. Based on his evaluation of all the data reviewed by Torrey Pines, Mr. Johnson concludes that the safety-related main control boards are adequate for design use. This conclusion is based on the seismic qualification and analysis of the boards, the non-significant nature of the weld discrepancies identified on the main control boards, the existence of redundant load paths in the structures, and the design margin which characterizes the construction of the main control boards.

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V. Mr. Johnson then describes the Systems Control-supplied DC fuse panels. Data pertaining to this component was gathered and reviewed by Torrey Pines personnel, and Torrey Pines performed a partial inspection of one of the DC fuse panels. Based on his evaluation of all the data reviewed by Torrey Pines, Mr. Johnson concludes that the DC fuse panels are adequate for design use. This conclusion is based on the seismic qualification of the panels, the equivalency of the panels for seismic qualification purposes that can be derived from the nature of the weld discrepancies identified by Torrey Pines, the existence of redundant load paths in the structures, and the design margin which characterizes the construction of the DC fuse panels.

VI. Mr. Johnson's testimony then addresses the local instrument panels supplied by Systems Control. As with the other components, data pertaining to this component was gathered and reviewed by Torrey Pines personnel, and seven panels were partially inspected by Torrey Pines. Based on his evaluation of all the data reviewed by Torrey Pines, Mr. Johnson concludes that the safety-related local instrument panels are adequate for design use. This conclusion is based on the seismic qualification of the panels, the equivalency of the panels for seismic qualification purposes which was evident through a review of the weld discrepancies identified by Torrey Pines, the existence of redundant load paths in the structures, and the design margin which characterizes the construction of the local instrument panels.

VII. Mr. Johnson's testimony then addresses the Systems Control-supplied cable tray hangers. Data pertaining to the cable tray hangers was gathered and reviewed by Torrey Pines personnel, and Torrey Pines selected 11 hangers for inspection. Based on his evaluation of all the data pertaining to the Systems Control hangers, Mr. Johnson concludes that these components are adequate for design use. This conclusion is based on the results of Sargent & Lundy's evaluation of the connections inspected in the sample of 80 hangers, the results of Torrey Pines' own inspection of hangers, the results of inspections performed over the years by Industrial Contract Services, Peabody Testing Service, and Pittsburgh Testing Laboratory, the existence of redundant load paths in the structures, the design margin which characterizes the construction of the hangers, and the utilization of standardized design criteria (in the form of enveloping seismic spectra) in the design of cable tray hangers.

VIII. The final portion of Mr. Johnson's testimony discusses the Systems Control-supplied cable trays. Data pertaining to the cable trays was gathered and reviewed by Torrey Pines personnel, and Torrey Pines inspected six cable trays. Based on his evaluation of all the data pertaining to the Systems Control cable trays, Mr. Johnson concludes that the cable trays are adequate for design use. This conclusion is based on the results of Sargent & Lundy's evaluation of cable tray stiffener welds, the results of Torrey Pines' own inspection of cable trays, the results of the inspections performed over the years by Industrial Contract Services and Pittsburgh Testing Laboratory, the existence of redundant load paths in the structures, the design margin which characterizes the construction of the cable trays, and the standardized design criteria (representing worst case loading conditions) utilized in the design of cable trays.

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(Byron Station, Units 1 and 2)	)	

TESTIMONY OF LOUIS D. JOHNSON

Q1. Please state your name.

A1. My name is Louis D. Johnson.

Q2. By whom are you employed?

A2. I am employed by Torrey Pines Technology, a division of GA Technologies located in San Diego, California.

Q3. Please describe Torrey Pines Technology.

A3. Torrey Pines Technology ("TPT") is the Division of GA Technologies Inc. through which GA's extensive engineering and scientific resources are offered to industry. The scope of these services is individually tailored to meet each customer's special needs which may vary from individual consulting with one of our technical experts to large service contracts for complete engineering or R&D programs.

GA Technologies Inc. has been actively engaged in the nuclear power industry since 1965 and is one of the largest privately owned centers for diversified energy research, development, and engineering in the world. Our activities have centered around the creation of advanced systems of power generation and energy conversion. Our facilities encompass nearly one million square feet of office space and include engineering, sophisticated test facilities, precision manufacturing installations, and advanced technology laboratories.

GA Technologies employs approximately 1,725 people of which 859 are degreed professionals, including 435 with advanced degrees. Many of the technical staff are recognized leaders and experts in their field. They have authored numerous technical books, hundreds of papers and filed more than 400 patents. The staff is highly experienced in the nuclear field and has extensive background in water cooled nuclear power plant work. Attachment 1 to my testimony lists Torrey Pines Technology's resources for application to engineering services projects. Attachment 2 presents TPT services provided to utilities.

Torrey Pines Technology has successfully performed independent review contracts with Southern California Edison Company for the San Onofre Nuclear Generating Stations Unit 2 and 3, Long Island Lighting Company for the Shoreham Nuclear Power Station, Arizona Public Service Company for Palo Verde Nuclear Generating Station Units 1, 2 and 3, Louisiana Power & Light for the Waterford Steam Electric Station Unit 3, and Public Service Company of Indiana for the Marble Hill Nuclear Generating Stations Unit Nos. 1 and 2. In addition, TPT has completed an independent management review for Cincinnati Gas and Electric Company on the W. H. Zimmer Nuclear Power Station. An independent design review of Limerick Generating Station Unit 1 is in process for Philadelphia Electric Company.

Q4. What is your position at Torrey Pines?

A4. I am Manager of Projects for Torrey Pines Technology.

Q5. Please describe your educational and employment background.

A5. I have a bachelor's degree in mechanical engineering and am a registered professional nuclear engineer in the State of California. I have been working in the nuclear industry for 22 years and have worked on nuclear power plants for the past 10 years. (My resume is appended to my testimony as attachment 3.) The last five years have been with Torrey Pines Technology providing engineering services to over 35 nuclear power plants. Among other efforts, we have conducted seven independent reviews of nuclear power plant activities. In 1982 and 1983 I was project manager on the independent construction review of the Shoreham Nuclear Power Station. The Shoreham review was structured to provide a basis for judging the adequacy of the safety-related construction of the plant. This was accomplished by reviewing the programs used to control construction for the plant (including the quality assurance program), by reviewing the implementation of those programs in the actual construction, and by inspecting the constructed items in the field to determine if they complied with the design documents. Review items were selected to be representative of various levels of complexity, types of hardware, interface relationships, and features important to the safety of the plant. Items selected for review included safety-related mechanical and electrical components, controls, piping, cabling, and structures. The installed hardware was inspected in varying degrees of detail to confirm that the actual hardware met the requirements specified in the various construction control documents. Complete auditability was maintained in the review process, and independence protocols were utilized.

As a company, GA Technologies is completely familiar with nuclear plant quality assurance requirements both from its role as a nuclear plant vendor and from TPT's services to nuclear utilities. I have been involved in application of quality assurance disciplines throughout my nuclear industry experience, first in aerospace and then in nuclear plants. The use of statistical analyses as one of the quality assurance tools has been part of this experience, along with the use of engineering judgment in the implementation and evaluation of statistical methods and as a basis for reaching conclusions where statistical methods do not completely apply. This use of engineering judgment was applied in the Shoreham construction review and has been applied in the current Systems Controls Corporation hardware review effort.

Q6. What is the scope of your testimony?

A6. My testimony will describe the third party review effort by TPT relating to the adequacy of Systems Control Corporation safety-related hardware provided to the Byron Station. This review encompassed Systems Control main control boards, DC fuse panels, local instrument panels, cable trays, and cable tray hangers. My testimony both describes the work performed by Torrey Pines and sets forth the professional judgments I reached as a result of our review.

Q7. How did Torrey Pines become involved with the work performed by Systems Control Corporation at the Byron Station?

A7. TPT was contacted by Mr. Michael Miller of Isham, Lincoln & Beale and representatives of Commonwealth Edison during early May 1984. My understanding is that Edison and its counsel desired that an outside entity with a broad background in nuclear power station design and construction examine the work performed for Byron by Edison's vendor Systems Control Corporation ("SCC") and provide testimony as an expert witness in this proceeding. A program plan for the third party review effort subsequently was prepared for and approved by Mr. Miller.

Q8. Did Torrey Pines perform any work in connection with the Byron Station prior to its involvement with Systems Control?

A8. Yes. As a consultant to Isham, Lincoln & Beale, I was personally involved, along with Mr. R. Leary, in providing third party review comments on the draft report relating to the Byron reinspection program, primarily with respect to presentation of statistical results. Neither of us were involved in the reinspection effort or the final published report.

Q9. What is the purpose of Torrey Pines' examination of the work performed by Systems Control at Byron?

A9. The purpose of the TPT examination is to provide a third party opinion on the adequacy of the safety-related SCC hardware at Byron. "Adequacy" in this context refers to the capability of SCC safety-related hardware to accept design loads (stresses) without exceeding code-allowable stresses. A number of discrepancies had been identified with Systems Control-supplied components during the course of construction at Byron. Consequently, various reinspections were performed and both Sargent & Lundy and Westinghouse performed engineering evaluations to determine the adequacy of the Systems Control hardware at the site. Review by Torrey Pines of the records and analyses pertaining to the SCC components, supplemented by appropriate additional inspections and evaluations, was designed to provide an additional expert judgment on the adequacy of Systems Control work.

Q10. What equipment has Systems Control supplied to Byron?

A10. SCC supplied safety-related main control boards, DC fuse panels, local instrument panels, cable tray hangers, and cable trays for the Byron plant.

Q11. What are the design specifications for the Systems Control equipment?

A11. Sargent and Lundy design specification F/L 2788 provides requirements for main control boards and DC fuse panels, specification F/L 2809 provides requirements for local instrument panels, and specification F/L 2815 provides requirements for cable tray hangers and cable trays.

Q12. What are the functions of the various components supplied to Byron by Systems Control?

A12. SCC main control boards provide a supporting structure for plant equipment in the main control room (instruments, gauges, alarms, switches, status indicators, etc.). The DC fuse panels are cabinet-type structures located in the Auxiliary Building battery rooms which contain fuses and relays which protect the DC system.

Local instrument panels provide in-plant supporting structures for instrumentation transducers and other control-related equipment. Cable tray hangers provide supporting structures for cable trays, which are used to route and protect electrical cables within the plant.

Q13. Please describe the program undertaken at Byron by Torrey Pines to review the work performed by Systems Control.

A13. Torrey Pines prepared a program plan which delineated the scope and nature of the work that TPT was to perform. The following is an excerpt from the summary paragraph of the TPT program plan:

> This program plan has been developed to provide the basis for an objective assessment of the adequacy of all safety-related hardware supplied by Systems Control Corp. (SCC) for the Byron station. This program will be performed by Torrey Pines Technology, a division of GA Technologies Inc., for Isham, Lincoln & Beale. The program is organized into six tasks, as follows:
>
> Task A Data Collection
> Task B Records Review
> Task C Engineering Evaluation
> Task D Inspection
> Task E Discrepancy Documentation
> Task F Evaluation and Report
>
> . . .

> CECo has implemented a program of inspections, tests and analyses, to demonstrate that the SCC hardware is acceptable. Torrey Pines Technology will review that work and will perform additional inspections and analyses, as deemed necessary, to enable TPT to draw defensible conclusions regarding the adequacy of SCC hardware.

The complete program plan is appended to my testimony as Attachment 4. A summary of efforts in each task is presented below (each task was performed for each type of component reviewed):

Task A - Data Collection

This task was designed to identify and assemble all available records such as purchase specifications, drawings, procurement documents, material receiving reports, nonconformance reports, inspection records, letters and memos, which provide information on acceptability of System Control Corporation items. Records generated by System Control Corporation were not reviewed.

Task B - Records Review

This task was designed to review available records on SCC items and evaluate the degree to which those records provide objective evidence of acceptability of SCC hardware at Byron.

Task C - Engineering Evaluation

This task evaluated the technical basis used to substantiate acceptability of SCC items supplied for Byron Units 1 and 2. Where required, independent analyses were performed to confirm validity of the engineering approaches.

Task D - Inspection

This task identified SCC-supplied hardware items for reinspection to verify accuracy of inspections. Samples of hangers, cable trays, main control boards, DC fuse panels, and local instrument panels were identified for reinspection.

Task E - Discrepancy Documentation

When a difference between an observed condition (document or installed hardware) and a required condition was perceived by an inspection team or document investigator, that difference was recorded on a TPT Discrepancy Report (DR) to document the fact that a difference was observed. Each DR was reviewed by a supervisor for accuracy and clarity of criteria and observed condition. In addition, the supervisor coordinated his review with a review by the cognizant CECo or S&L engineer to ensure the accuracy of the DR.

Torrey Pines Technology personnel arrived at the Byron site May 22 to start record identification efforts and at the Sargent and Lundy offices in Chicago to start review of engineering analyses on May 29. Peak effort involved 16 men, leading to completion of site inspection efforts on June 22. A total of 17 man-months' effort was expended on the project through June 1984.

Personnel used for the third party review effort were either qualified inspectors or degreed engineers with experience in the fields of structural analysis, nuclear system design, quality assurance, statistics, mechanical systems, and project management. Lead personnel on the project had previous experience in independent review projects for Torrey Pines Technology. While this effort was a third party review rather than a review meeting NRC criteria for an independent review, the independence of the project personnel was verified in that no one on the TPT team or any of their relatives had previously worked for Commonwealth Edison Company or on the Byron plant, and no one had financial interest in Commonwealth Edison Company.

Q14. Please describe the Systems Control-supplied main control boards at Byron.

A14. The 12 main control boards supplied by SCC are located in the Byron main control room. They are closed cabinet-type structures that are used to mount various types of instrumentation (gauges, status indicators, alarms, switches, etc.) on the front face with access to the instruments and electrical terminations from the back of the control board. The cabinet-type structures involve a number of structural steel connections to form the structure and utilize two to six welds on each connection.

Q15. Please describe Torrey Pines' review of the Byron main control boards.

A15. Safety-related main control boards for the Byron plant were identified from Material Receiving Reports and the S&L Master Document List. S&L design specification F/L-2788 and the related purchase order 207534 were obtained. Requirements relating to configuration, testing, seismic loading, and welding were derived from drawings, procedures, and the specification document. Documentation of main control board inspections by Pittsburgh Testing Laboratory, Westinghouse, and CECo, including related memos and letters, NRC inspection reports, etc., were obtained. Seismic test reports from Wyle Laboratories and seismic analysis reports from Westinghouse were also obtained.

Procurement and receiving records were reviewed for adequacy.

Inspection documentation was reviewed to determine the extent and precision of the inspection records. Nonconformance reports and associated documentation also were reviewed.

The seismic qualification test results of Wyle Laboratories (required by the procurement specifications) also were reviewed. The seismic qualification test is conducted to demonstrate that a component is capable of accepting design seismic inputs. No structural damage was observed after the test at Wyle Laboratories. Torrey Pines also reviewed the seismic analysis of the main control boards performed by Westinghouse to verify the boards' structural adequacy (in response to Edison Byron NCR 544 on main control board welds).

Torrey Pines selected one main control board that had been previously inspected for reinspection of 68 welds. The inspection showed discrepancies that were comparable to discrepancies identified in previous weld inspections on main control boards. Discrepancy report 007 was prepared to document the discrepant welds.

Q16. What is your professional judgment of the adequacy of the main control boards supplied to Byron by Systems Control?

A16. Based on evaluation of all data reviewed by TPT, it is my judgment that the safety-related main control boards are adequate for design use.

Q17. What are the bases for your opinion?

A17. First, Torrey Pines reviewed the tests and analyses performed on the main control boards by Wyle Laboratories and Westinghouse. Four of the 12 boards were tested by Wyle to cover all main control board configurations. The boards were mounted on a shaker table and subjected to a sine sweep to establish resonant frequencies, and then subjected to operating basis earthquake (OBE) and safe shutdown earthquake (SSE) seismic inputs as specified. The tests demonstrated that the boards were capable of carrying seismic loads without structural damage.

After weld discrepancies on main control boards were identified Westinghouse performed a seismic analysis of the as-built conditions of the main control boards, in order to determine the ability of the entire population of boards installed at Byron to meet seismic load requirements. Westinghouse utilized its WECAN computer code to determine forces and moments in control board joints under the SSE seismic input loading. These forces and moments were then converted to stresses in as-built welds at the joints to confirm adequate design margin in the as-built main control boards.

In reviewing the work performed by Wyle and Westinghouse TPT examined the seismic excitation spectra used in both the seismic qualification testing and the seismic analyses. The bases for validity of the Westinghouse computer model for application to the Byron main control boards was reviewed and determined to be sufficient. Location of peak stresses from the analysis was determined, and the evaluation of design margin in the as-built welds was verified to be proper and conservative.

After reviewing the tests and analyses of Wyle and Westinghouse Torrey Pines has concluded that the work was properly done. Having concluded that the tests and analyses were performed in appropriate fashion, TPT has concluded that the test and analysis results indicating the capability of the main control boards to carry design seismic loads are valid.

Second, the welds on the main control boards, even though AWS D1.1 discrepancies have been identified, are structurally adequate. Inspections performed by Pittsburgh Testing Laboratory in 1980 and 1982, and Westinghouse inspections performed in 1983, found weld surface quality discrepancies which have been demonstrated by Westinghouse's seismic analysis to not have design significance. In addition, Torrey Pines' inspection of a main control board to AWS D1.1 criteria (except for length, because the length criteria could not be identified in the pertinent specifications), confirmed that the weld discrepancies were non-significant. TPT inspected 68 welds on main control board 2PM01J, and found 20 to have discrepancies. The discrepancies included underfill, craters, and boxing. These discrepancies were similar to those identified in the earlier PTL and Westinghouse inspections of the boards.

Third, our review of the main control boards led us to conclude that the structures have redundant load paths available and do not depend on single welds or single weld connections for structural integrity. Typical connections in main control board construction involve two to six welds, and loads are shared between multiple connections within the structure.

Fourth, a generic factor which exists for each of the components supplied to Byron by Systems Control is the design margin which characterizes the components. Significant design margin is an expected condition on sheet metal weldments, such as those on the main control boards, since standard material sizes and configurations are used which result in such a margin. This general condition was confirmed by TPT with regard to the main control boards through our review of the Westinghouse seismic analysis, which shows minimum design margins of approximately 1.25 even after discrepant welds are taken into account.

Q18. Please describe the Systems Control-supplied DC fuse panels at Byron.

A18. The four DC fuse panels supplied by SCC are located in the Auxiliary Building battery rooms, near the control room. They are closed cabinet-type structures that are used to mount fuses and relays related to protection of the DC system. The cabinet-type structures involve a number of structural steel connections to form the structure and utilize two to six welds on each connection.

Q.19 Please describe Torrey Pines' review of the Byron DC fuse panels.

A.19 The DC fuse panels for the Byron plant were identified from material receiving Reports and the S&L Master Document List. S&L design specification F/L - 2788 and the related purchase order 207534 were obtained. Requirements relating to configuration, testing, seismic loading, and welding were derived from drawings, procedures, and the specification document. No weld inspection records were identified. The Wyle Laboratories seismic qualification test results (required by the procurement specifications) were reviewed. No structural damage was observed after the test at Wyle Laboratories.

TPT selected welds on one DC panel for inspection. A small number of discrepancies were identified (documented on Discrepancy Report 007) that were similar to weld discrepancies identified on other SCC-supplied hardware.

Q.20 What is your professional judgment of the adequacy of the DC fuse panels supplied to Byron by Systems Control?

A.20 Based on evaluation of all data reviewed by TPT, it is my judgment that the DC fuse panels are adequate for design use.

Q.21 What are the bases for your opinion?

A.21 First, Torrey Pines reviewed the seismic qualification testing performed by Wyle Laboratories on the DC fuse panels. An as-built panel was subjected to a sine sweep to establish resonant frequencies, and then subjected to OBE and SSE seismic inputs as specified. The testing was properly performed, and no damage to the panel resulted. Therefore, we have concluded that the DC panels have been demonstrated by appropriate testing to be able to carry design seismic loads.

Second, we have concluded that the population of the four DC fuse panels can be deemed to be seismically qualified through the equivalency of the non-tested panels to the tested panel. This conclusion derives from the results of our inspection of a non-tested DC panel, panel 2DC10J. We inspected 47 welds on the panel, identifying three discrepancies. These discrepancies were relatively minor, consisting of two underfill discrepancies and one instance of a crater. Based on the non-significant nature of these discrepancies we have concluded that the non-tested DC panels at the site can be deemed to be equivalent to the tested panel for the purposes of seismic qualification.

Third, we concluded from our review of the DC fuse panels that the structures have redundant load paths available and do not depend on single welds or single weld connections for structural integrity. Typical connections on DC panels involve two to six welds, and loads are shared between multiple connections within the structure.

Fourth, a generic factor in the construction of the DC panels is the design margin which characterizes the construction of the panels. Significant design margin is an expected condition on sheet metal weldments, such as those on the DC fuse panels, since standard material sizes and configurations are used in the construction of the panels.

Q.22 Does your answer to Question 21 encompass the recent evaluation of DC fuse panels performed by Sargent & Lundy?

A.22 No, it does not. Sargent & Lundy has recently performed a seismic qualification equivalency review of the DC fuse panels by evaluating inspections of welds on each of the panels. Torrey Pines is reviewing the results of the inspections of the panels and Sargent & Lundy's evaluation. If our analysis of the evaluation of the DC panels leads me to modify my conclusion on the panels, I will appropriately supplement my testimony.

Q23. Please describe the System Control-supplied local instrument panels at Byron.

A23. The 76 local instrument panels supplied by SCC are located throughout the plant. They are open structures of welded steel channel construction, four feet or eight feet in width, that provide a mounting location to properly support instrumentation (transducers, etc.) used to monitor and control equipment located near the panels. The structures involve a number of connections to form the structural framework and utilize two to six welds on each connection. The total number of panels is divided almost equally between the four foot and eight foot panels.

Q24. Please describe the Torrey Pines review of the Byron local instrument panels.

A24. Safety-related local instrument panels for the Byron plant were identified by material receiving reports and the S&L Master Document List. S&L specification F/L 2809 and related purchase order 219596 were obtained. Requirements, inspections, and tests were derived from F/L 2809, the SCC QA manual, and SCC drawings. Documentation of local instrument panel inspections by PTL was obtained. CECo inspection records and associated NCRs were obtained. Seismic test reports by Wyle Laboratories were also obtained.

Procurement and receiving records were reviewed for adequacy. Inspection documentation was reviewed to determine the extent and precision of the inspection records. Inspection records were available on all 76 local instrument panels. Nonconformance reports and associated documentation were reviewed. The Wyle seismic qualification test results (required by the procurement specifications) were reviewed. No structural damage was observed after the testing at Wyle Laboratories.

Torrey Pines selected welds on seven local instrument panels for reinspection of the as-built condition. Four of the panels had weld discrepancies similar to the discrepancies identified on other SCC-supplied hardware. Discrepancy reports 004 and 006 were prepared to document the discrepant welds. Total weld length on one of the four-foot panels inspected was found to be approximately 353 inches, even though the pertinent design drawing only required approximately 250 inches of weld, and even though the PTL inspector who had inspected the panel documented a weld length much below the amount found by TPT. Discrepancy report 001 was issued to document this weld length discrepancy.

Q25. What is your professional judgment of the adequacy of the local instrument panels supplied to Byron by Systems Control?

A25. Based on evaluation of all data reviewed by TPT, it is my judgment that the safety-related local instrument panels are adequate for design use.

Q26. What are the bases for your opinion?

A26. First, Torrey Pines reviewed the seismic testing performed on the local instrument panels by Wyle Laboratories. A four foot and an eight foot panel were selected for testing. The panels were subjected to a sine sweep to establish resonant frequencies. Both panels exhibited minimum resonant frequencies in excess of the 33 Hz cutoff frequency for significant dynamic amplification. The 8 foot panel was then conservatively selected for a seismic qualification test using the SSE seismic inputs. Seismic qualification testing of the panel demonstrated that the panel is capable of carrying design seismic loads.

Torrey Pines concluded that the Wyle tests were properly performed. Therefore, we also have concluded that the local instrument panels have been demonstrated by appropriate testing to be able to carry design seismic loading.

Second, based on our inspection of local instrument panels we have concluded that the Byron population of panels is seismically qualified through the population's equivalency to the panel tested by Wyle. We inspected portions of seven local instrument panels, including the eight foot panel seismically qualified by Wyle (panel 1PL54J). The panels selected for inspection represented a cross-section of the panels at the site, encompassing the variables of time of fabrication, type of panel (4 foot or 8 foot), inspection location (site or Systems Control), and plant location. Each of these panels, as well as all of the other panels supplied to the site, previously had been accepted by Pittsburgh Testing Laboratory to the requirements of AWS D1.1

The Torrey Pines inspection identified 17 weld discrepancies in the 205 welds inspected. Eight of the discrepancies were located on one of the panels (the Wyle-tested panel), with the rest of the discrepancies distributed on three of the other six panels. Discrepancies identified were generally non-significant and included weld surface discrepancies such as porosity, craters, and overlap.

Because of the similarity of the weld discrepancies identified during our inspection of the local instrument panels with the discrepancies identified on other Systems Control components, discrepancies which have been analyzed to be structurally non-significant, we concluded that the discrepancies on the local instrument panels also are not structurally significant.

Therefore we believe that, notwithstanding the weld discrepancies which exist, the population of local instrument panels at Byron is sufficiently equivalent to the panel seismically qualified by Wyle Laboratories to justify applying the results of the Wyle testing to the overall population. Moreover, the greatest number of discrepancies found during the TPT inspection of the local instrument panels was on the eight foot panel that had been tested by Wyle; this fact further adds to my confidence that the non-tested local instrument panels at Byron can be deemed to be equivalent to the tested panel for the purposes of assessing seismic load capability.

Third, we determined through our overall review of the local instrument panels that the components have redundant load paths available and do not depend on single weld connections for structural integrity. Typical connections involve two to six welds, and the loads are shared between connections within the structure.

Fourth, a generic factor which exists for the local instrument panels supplied to Byron by Systems Control, as well as for the other components supplied by

SCC, is the design margin which characterizes the construction of the panels. Significant design margin is an expected condition on sheet metal weldments, such as those on the local instrument panels, since standard material sizes and configurations are used in the construction of the panels.

Q27. Does your answer to Question 26 encompass the recent evaluation of performed local instrument panels by Sargent & Lundy?

A27. No, it does not. Recent inspections have been performed on 17 local instrument panels by Sargent & Lundy inspectors on loan to Commonwealth Edison. Four panels were completely weld mapped, and ten weld connections were inspected on each of 13 panels. These inspections are an outgrowth of the Torrey Pines inspection, and were undertaken in order to confirm the equivalency, for seismic qualification purposes, of the overall population of local instrument panels with the Wyle-tested panel. The inspections were undertaken because the presence of discrepancies in the panels inspected by TPT raised the possibility that the as-built conditions of the non-tested panels might be sufficiently different from the condition of the tested panel that the seismic qualification test results for it cannot be extrapolated to the panel population as a whole. Torrey Pines is reviewing the inspection results. If our evaluation of this recent review leads us to modify our conclusion on local instrument panels, I will appropriately supplement my testimony.

Q28. Please describe the Systems Control-supplied cable tray hangers at Byron.

A28. Cable tray hangers are used in the plant to provide structural support for cable trays. They are welded structures of steel and unistrut elements. Detailed hanger configurations are usually prepared by combining standardized steel and unistrut elements with standardized connection details to form the specific hanger design.

Q29. Please describe the Torrey Pines review of the Byron cable tray hangers.

A29. Material Receiving Records and a Hatfield Electric Company computer listing were used to identify the roughly 5500 safety-related cable tray hangers supplied by SCC. S&L specification F/L 2815 and purchase order 2C0038 were obtained. SCC weld procedures and hanger drawings were identified. Inspection records prepared by Industrial Contract Services, Peabody Testing Service, Pittsburgh Testing Laboratory, and CECo were obtained for review, along with associated NCRs, NRC inspection reports, applicable memos, letters, and engineering analyses of discrepant conditions.

Procurement and reviewing records were reviewed for adequacy. Inspection documentation was reviewed to determine the extent and precision of the inspection records. Nonconformance reports and associated documentation were reviewed. This review included NCR's 813, 772, 893, and 407 relating to specific DV connections in hanger assemblies. The S&L analyses of discrepant hanger welds identified through inspection of a sample of 80 hangers were reviewed and independent calculations were made to confirm the accuracy of the results.

Torrey Pines selected welds on eleven hangers for inspection of as-built weld conditions. A weld discrepancy was noted on one hanger. Discrepancy report 009 was generated to document the discrepant weld (undersize). Discrepancy report 002 was prepared to document a non-specified weld on cable tray hanger "fingers".

Q30. What is your professional judgment of the adequacy of the cable tray hangers supplied to Byron by Systems Control?

A30. Based on evaluation of all data reviewed by TPT, it is my judgment that the safety-related cable tray hangers supplied by SCC are adequate for design use.

Q31. What are the bases for your opinion?

A31. First, Torrey Pines concluded that the results of Sargent & Lundy's evaluation of the sample of 80 hangers, encompassing 358 connections, provide valid demonstration of the adequacy of the Systems Control cable tray hangers. S&L randomly selected from the plant's hanger population the 80 hangers that were inspected, and all AWS D1.1 weld discrepancies were subjected to engineering evaluation by S&L. The 358 total connections inspected included 44 connections that were deemed by S&L to be highly stressed according to plant design. 106 connections were identified to have weld discrepancies, and each was evaluated by Sargent & Lundy and found to be adequate to carry design loads.

Torrey Pines concluded that Sargent & Lundy's evaluation was performed in proper fashion. The sample of hangers and connections was sufficiently large to support the conclusions reached with regard to hanger adequacy, both in terms of engineering judgment and in terms of a statistically-based judgment (the sample of 358 connections establishes with 95% confidence that there is at least 99.4% reliability that all Systems Control hangers are adequate). Independent calculations of hanger load capacity by Torrey Pines, which focused on the highly stressed connections, confirmed the S&L results. In Torrey Pines judgment, therefore, the hanger evaluation performed by Sargent & Lundy indicates the adequacy of the hangers.

Second, our conclusion of the validity of the Sargent & Lundy evaluation is further supported by the results of our inspection of Systems Control hangers. TPT inspected 11 hangers selected to encompass variables of (1) hangers in the sample of 80 analyzed by Sargent & Lundy to be adequate with reduced margins, (2) hangers with weld detail DV-162, as addressed in Edison Byron NCR 893, and (3) hangers judged to be sensitive to inadequate or missing weldments based on a qualitative failure modes and effects analysis by TPT that identified hanger geometries that would be most sensitive to weld discrepancies. Six of the 11 hangers had been inspected, found to have weld discrepancies, and evaluated as part of the sample of 80. We found only one discrepancy on the 11 hangers inspected, an instance of undersize under the criteria of AWS D1.1. This discrepancy was identified on one of the five hangers that had not been within the sample of 80. We have investigated the differences between our inspection results and those of the S&L inspectors (on loan to Commonwealth Edison) who had identified the discrepancies, and our conclusion is that the discrepancies themselves are sufficiently minor that the differences in inspection results are attributable to both the subjective nature of visual weld inspection and the apparent conservatism which was exercised by the S&L inspectors. The results of our inspections of hangers confirmed our judgment that the discrepancies that exist on Systems Control cable tray hangers are not structurally significant, and they do not compromise the ability of the hangers to meet design load requirements.

Third, this conclusion finds further support in the results of the hanger inspections performed over the years by Industrial Contract Services, Peabody Testing Service, and PTL. Although these inspection results do not provide a complete inspection history of Byron cable tray hangers, their significance in terms of our conclusions regarding hangers is that the weld discrepancies identified by each of these agencies generally involved weld surface quality, and such discrepancies were subsequently determined by Sargent & Lundy to not have design significance. Likewise, the types of discrepancies identified on the nonconformance reports which pertained to specific types of connection details (for example, DV-2, DV-162) were determined by S&L to be non-significant.

Fourth, we determined through our overall review of the cable tray hangers that the components have redundant load paths available and do not depend on single welds for structural integrity. As with the other Systems Control components supplied to Byron, typical connections in hanger assemblies involve two or more welds, and loads are generally shared between multiple connections within the structure.

Fifth, just as in the case of the other Systems Control components supplied to the site, the design margin which characterizes the basic construction of the hangers provides further illustration of the adequacy of these components. Significant design margin is an expected condition on sheet metal weldments, such as those on the cable tray hangers, since standard material sizes and configurations are used to construct the hanger assembly.

Sixth, standardized design criteria, in the form of enveloping seismic spectra, are applied in the design of cable tray hangers. These criteria represent worst case loading conditions for a given elevation within the plant. The existence of such design criteria, which result in significant design margins, has been confirmed by the various evaluations of the Systems Control hangers which have demonstrated adequate design margins even after weld discrepancies are taken into account.

Q32. Please describe the System Control-supplied cable trays at Byron.

A32. Cable trays are used to support and protect electrical cables in the plant. The majority of the cable trays are constructed of sheet metal steel with a channel cross section that is 1-2 feet wide with 4-6 inch high side panels. V-shaped sheet metal sections ("stiffeners") are welded to the bottom of the trays to provide additional stiffness. A small percentage of cable trays are open on the bottom, utilizing pipe sections to form the cable support members (these trays are commonly called "ladder" trays). Straight and angled sections (called "fittings") of solid-bottom cable trays and ladder trays are joined together to form a continuous cable tray system that is supported by cable tray hangers.

Q33. Please describe Torrey Pines' review of the Byron cable trays.

A33. Safety-related cable trays for the Byron plant were identified from S&L specification F/L 2815 and purchase order 200038. SCC weld procedures and drawings for cable trays were obtained for review along with available inspection records from CECo, Hatfield Electric Company, Industrial Contract Services, and PTL. Associated NCRs, NRC inspection reports, applicable letters and memos, and engineering analyses of discrepant conditions were obtained for review.

Procurement and receiving records were reviewed for adequacy. Inspection documentation was reviewed to determine the extent and precision of the inspection records. Discrepancy report 003 was prepared to document the lack of inspection records on most cable trays. Nonconformance reports and associated documentation were reviewed. S&L analyses of discrepant cable tray welds were also reviewed.

Torrey Pines selected welds on six cable trays for inspection of the as-built condition. The weld discrepancies that were identified were similar to previously identified, non-significant discrepancies. Discrepancy report 008 was prepared to document the discrepancies.

Q34. What is your professional judgment of the adequacy of the cable trays supplied to Byron by Systems Control?

A34. Based on evaluation of all data reviewed by TPT, it is my judgment that the safety-related cable trays supplied by SCC are adequate for design use.

Q35. What are the bases for your opinion?

A35. First, Torrey Pines concluded that the results of Sargent & Lundy's evaluation of cable tray stiffener welds provide valid demonstration of the adequacy of Systems Control cable trays. In response to Edison

Byron NCR 529 an inspection of 123 cable trays, encompassing 227 stiffeners, for weld length and spacing was performed. S&L evaluated the discrepancies identified during this inspection, and concluded that each of the stiffeners had weld in excess of minimum design requirements. Sargent & Lundy also reviewed these same stiffeners for weld quality, as documented in Edison Byron NCR 707. Although each stiffener had a weld discrepancy of some kind, S&L found that the discrepancies were minor and that each stiffener weld was capable of carrying design loads. Torrey Pines reviewed the evaluations performed by Sargent & Lundy and concluded that the approach taken by S&L to show structural integrity of the cable tray hangers was conservative and was accurately performed.

Second, our conclusion of the validity of the S&L evaluation is further supported by the results of our inspection of System Control cable trays. Because of the similarity of cable tray configurations TPT selected only six cable trays for inspection, five of which had been determined to have reduced weld margins in S&L evaluations related to Edison Byron NCRs 529 and 707, and one of which had no previous inspection record. 50 of the 104 stiffener welds inspected by

Torrey Pines had minor discrepancies per AWS D1.1 criteria. 45 of these discrepancies related to length of the stiffener welds. Two weld cracks (one longitudinal crack and one transverse crack on stiffener end welds) were identified on separate stiffeners. Based on the S&L analyses of the cable trays we determined that the discrepancies were not significant. The results of our inspection of cable trays thus confirmed our judgment that the discrepancies that exist on System Control cable trays are not structurally significant and they do not compromise the ability of the trays to meet design load requirements.

Third, this conclusion finds further support in the results of the cable tray inspections performed over the years by Industrial Contract Services and PTL. Although these inspection results do not provide a complete inspection history of Byron cable trays, their significance in terms of our conclusions regarding hangers is that the weld discrepancies identified by each of these agencies generally involved weld surface quality, and such discrepancies subsequently were determined by Sargent & Lundy to not have design significance.

Fourth, we determined through our overall review of the cable trays that the components have redundant load paths available and do not depend on single welds for structural integrity. As with the other Systems Control components supplied to Byron, typical connections in cable tray assemblies involve two or more welds, and loads are generally shared between multiple connections within the structure.

Fifth, just as in the case of the other Systems Control components supplied to the site, the design margin which characterizes the basic construction of the cable trays provides further indication of the adequacy of these components. Significant design margin is an expected condition on sheet metal weldments, such as those on cable trays, since standard material sizes and configurations are used to construct the tray assembly.

Sixth, standardized design criteria are applied in the design of cable trays that represent worst case loading conditions. The existence of such design criteria, which result in significant design margins, has been confirmed by the various evaluations of the Systems Control cable trays which have demonstrated adequate design margins even after weld discrepancies are taken into account.

Q.36 Does your answer to Question 35 encompass the recent evaluation performed on cable ladder trays by Sargent & Lundy?

A.36 No, it does not. Recent inspections have been performed on 17 ladder cable trays and 10 ladder fittings. Torrey Pines is reviewing the inspection results and S&L's evaluation of the results. If our evaluation of this recent review leads us to modify our conclusion on cable trays, I will appropriately supplement my testimony.

ATTACHMENT 1

The technical resources of GA Technologies Inc. are available through its Torrey Pines Technology engineering services division. General areas of expertise are as shown in the following listing:

STRUCTURAL ENGINEERING

- Building, Structure, Concrete Design
- Seismic Design

PIPING AND HANGER DESIGN

- Code Stress Analysis

STRESS ANALYSIS

- Static and Dynamic
- System, Component, Part
- Simple to 3D Finite Element

SAFETY ANALYSIS

- Accident Evaluations
- Probabilistic Analyses
- System Functional Evaluations
- Reliability Evaluations

EQUIPMENT QUALIFICATION

- Environmental and Seismic
- Identification (Q-List)
- Procurement (Spares)

THERMODYNAMICS

System Design and Performance Evaluations

Productivity Evaluations

ELECTRICAL

System Design

INSTRUMENT AND CONTROL

Control System Design, Modeling, Evaluation

Data System Design through Operation

Instrument Design

NUCLEAR

Core Physics/Fuel Cycle

Shielding

Release Circulations

MATERIALS

Corrosion/Erosion

Welding/Mechanical Properties

Friction and Wear

CHEMICAL

- Water Chemistry
- Radiochemistry

RADIOACTIVE WASTE MANAGEMENT

- Shipping
- Storage
- Disposal

QUALITY ASSURANCE

- NRC-Approved QA Program
- Design, Construction and Manufacturing Audit
- Training
- Quality System Evaluations
- Implementation Audits

LICENSING

- SAR Preparation
- Responses to NRC Requests
- Emergency Response Planning

PROJECT MANAGEMENT

- Organization Data Management and Control
- Activity and Cost Control

ATTACHMENT 2

TPT SERVICES PROVIDED TO UTILITIES

UTILITY	PLANT NAME	TPT ROLE*	SERVICE PROVIDED
American Electric Power		Primary	Dissimilar metal weld analysis
Arizona Public Service	Palo Verde 1, 2, & 3	Primary Secondary	Independent design review Plans and schedules Human factors-control room Piping stress Equipment qualification Structural design Design report preparacion
Boston Edison	Pilgrim	Primary	QA training Control room design review
Cincinnati Gas & Electric	Zimmer	Primary	Independent project management review
Cleveland Electric Illuminating	Perry 1 & 2	Primary	Safety related equipment identification and spares procurement system Licensing-FSAR review Limited life parts evaluation QA training
Commonwealth Edison	Various	Primary	Q-List software development
	Byron-Braidwood	Primary	Auxiliary feedwater reliability evaluation Reinspection program consulting
	La Salle	Secondary	Probabilistic risk assessment
	Quad Cities	Primary	Control rod removal and disposal

UTILITY	PLANT NAME	TPT ROLE*	SERVICE PROVIDED
Consolidated Edison	Indian Point 2	Secondary	Probabilistic risk assessment
		Primary	Control room design review
Consumers Power Co.	Palisades	Primary	Licensing support Technical specification review Shield cooling pipe sealing program
	Big Rock Point	Primary	Licensing support Technical specification review
	Campbell 3	Primary	Boiler assessment and repair consulting
Electric Power Research Institute	Various	Primary	Value impact analysis Fuel test data analysis Steam generator program technology transfer Bimetallic weld program
Florida Power & Light	St. Lucie	Primary	Electrical penetration consulting
General Public Utilities	Oyster Creek	Primary	Control rod removal and disposal Motor operated valve analyses Radionuclide activation analyses
Houston Lighting & Power	South Texas Project	Primary	Safety-related spare parts Q-List Equipment qualification Control room design review
Illinois Power		Primary	QA training

UTILITY	PLANT NAME	TPT ROLE*	SERVICE PROVIDED
Korea Electric Co.	Korea Nuclear 5, 6, 7 & 8	Secondary	Control room review (NUREG-0578) Piping stress analysis Preparation of design reports Seismic equipment qualification review Structural design I&C review and revision
Long Island Lighting Co.	Shoreham	Primary	Independent construction review Laboratory services
Louisiana Power & Light	Waterford 3	Primary	Independent design review
Metropolitan Edison Co.	TMI	Secondary	Damage claim analysis
Montana Power & Light		Primary	Reheater scrubber vibration analysis
New York Power Authority	Various	Primary	Motor operated valve analyses
Niagara Mohawk Power Corp.	Nine Mile Point 1	Primary	Control rod radiation measurement Radionuclide activation analyses
Northeast Utilities	Millstone 1 & 2	Primary	Reload fuel design evaluation Fire Protection Risk Assessment
Northern States Power	Monticello	Primary	Control rod removal and disposal
Pacific Gas & Electric Co.	Diablo Canyon 1 & 2	Primary	Equipment qualification package review Radiochemical analyses

UTILITY	PLANT NAME	TPT ROLE*	SERVICE PROVIDED
Pennsylvania Power & Light	Susquehanna 1 & 2	Primary	Equipment qualification Engineering support
Philadelphia Electric Co.	Peach Bottom 2 & 3	Primary	Remote decontamination machine design Control rod removal and disposal Control rod activation analysis
Public Service of Colorado	Fort St. Vrain	Primary	Quality assurance audit Facility review committee
Public Service Indiana	Marble Hill 1 & 2	Primary	Independent construction review Auxiliary feedwater reliability evaluation
Sacramento Municipal Utility District	Rancho Seco	Secondary	High energy piping Control room design Electric room design Radwaste filter modification Seismic qualification review
		Primary	Control room design review
Southern California Edison	San Onofre 1, 2, & 3	Primary	Analytical chemistry Radiochemistry Laboratory services Hot cell services Hot debris removal planning Safety-related spare parts categorization and procurement Radiation monitor system assessment and instrument calibration Independent Review of Seismic Design Independent problem analysis ASME Code consulting Emergency Preparedness Licensing QA training

UTILITY	PLANT NAME	TPT ROLE*	SERVICE PROVIDED
		Secondary	Seismic qualification review Startup probability Licensing Environmental equipment qualification Plans and schedules Emergency planning
Southern Services	A. Vogtle	Secondary	Piping stress analysis Seismic equipment qualification Shielding/nuclear sampling Response to NRC standards Pressure/temperature containment analysis I&C-effluent radiation monitoring
Tennessee Valley Authority	Various	Primary	Equipment qualification
	Browns Ferry	Secondary	Probabilistic risk assessment
Toledo Edison Co.	Davis Besse	Primary	Limitorque operator reliability Core analysis seminar Piping analysis seminar Electrical system evaluation
Taiwan Power Co.	Maanshan 1 & 2	Secondary	Project engineering coordination High energy piping TMI review Bid evaluation Radiation analysis Process system design Seismic equipment qualification review Pressure/temperature containment analysis
	Kuosheng 1 & 2	Secondary	Seismic qualification review

UTILITY	PLANT NAME	TPT ROLE*	SERVICE PROVIDED
Vermont Yankee Nuclear Power Corp.	Vermont Yankee	Primary	Control rod removal and disposal
Virginia Elec. & Power Co.	Surry	Secondary	Fuel damage claim evaluation
Wisconsin Electric Power Co.	Point Beach	Primary	Radiation monitoring system assembly
Wisconsin Public Service Corp.	Kewaunee	Primary	Control room design review

* LEGEND

Primary = TPT was the primary contractor
Secondary = TPT was a subcontractor

ATTACHMENT 3

LOUIS D. JOHNSON
Manager, TPT Projects

PROFESSIONAL SPECIALTY

Project and functional management, engineering design and development, multi-discipline management.

EDUCATION

B.S., Mechanical Engineering, Wichita State, 1959

EXPERIENCE

Managed the Shoreham nuclear power plant independent construction review and provided expert testimony on the results of the review before the Atomic Safety and Licensing Board.

Responsible for all projects under Torrey Pines Technology, the engineering services division of GA Technologies Inc. Assisted in all phases of the establishment, organization, growth, and profitability of the engineering services business. Projects involved all aspects of nuclear power plant engineering.

Managed all plant engineering effort on the Fort St. Vrain nuclear power plant including mechanical, electrical, control, and systems engineering, analysis, and document control functions. Efforts of 100-150 people were concerned with operation of the plant and support during remote core refueling operations. Directed engineering effort relating to the core outlet temperature fluctuation problem on the plant and plant analyses.

Represented company in federal licensing matters relating to a nuclear reactor. Discerned trends, reviewed and attempted to influence regulatory documents, and estimated licensing risks.

Managed a functional group of 100-150 engineers and draftsmen providing design, drafting, materials engineering and manufacturing engineering service to all site run projects at the Idaho Nuclear Engineering Laboratory. Work involved all elements of a nuclear plant (core, structure, vessel, piping, steam generator, pumps and circulators, valves, irradiation facilities, casks and waste management). Included technical and leadership training, recruiting and staffing, and coordination of efforts with both local and Washington NRC offices.

Managed a group of forty engineers engaged in the design and development of electromechanically driven control valves and piping systems for both high and cryogenic temperature applications in a radiation and space vacuum environment. Technical disciplines included probabilistic design analyses, electrical and mechanical design, and component development planning, test and analysis.

PROFESSIONAL ASSOCIATIONS

Registered Professional Nuclear Engineer, California 1976.
Member of ASME.

ATTACHMENT 4

PROGRAM PLAN

THIRD-PARTY REVIEW OF SYSTEMS CONTROL CORP.

ITEMS AT BYRON STATION

PREPARED FOR ISHAM, LINCOLN AND BEALE

MAY 22, 1984

TORREY PINES TECHNOLOGY

A Division of GA Technologies Inc.

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1. SUMMARY

This program plan has been developed to provide the basis for an objective assessment of the adequacy of all safety-related hardware supplied by Systems Control Corp. (SCC) for the Byron station. This program will be performed by TPT, a division of GA Technologies, Inc., for Isham, Lincoln & Beale. The program is organized into six tasks, as follows:

Task A	Data Collection
Task B	Records Review
Task C	Engineering Evaluation
Task D	Inspection
Task E	Discrepancy Documentation
Task F	Evaluation and Report

Byron Units 1 & 2 are currently in final stages of the licensing process. SCC has supplied cable pans and hangers, main control boards, and local panels, all of which have become suspect because of a breakdown in the SCC QA program. As a result, the SCC work to demonstrate acceptability of their products is in question. CECo has implemented a program of inspections, tests and analyses, to demonstrate that the SCC hardware is acceptable. TPT will review that work and will perform additional inspections and analyses, as deemed necessary, to enable TPT to draw defensible conclusions regarding the adequacy of SCC hardware.

The review will begin on 5/22/84, and will be completed by 7/13/84. The summary schedule for this work is shown in Figure 1.

2. TASK DESCRIPTIONS

The purpose of this review is to evaluate the acceptability of all SCC-produced safety-related items in the Byron station.

The review will be based primarily on available records of inspections, tests, and analyses performed by parties other than SCC, supplemented by inspections and analyses performed by TPT.

The program is structured to permit TPT to make an objective assessment of the adequacy of all Byron items supplied by SCC.

Four categories of items will be considered: main control boards, local instrument panels, cable pans, and cable pan hangers.

TASK A - DATA COLLECTION

Objective

To identify and assemble all available records,* other than those generated by SCC, which provide information on acceptability of SCC items.

Subtasks

A1 Identify, by part name and lot or serial number, all items supplied by SCC at the Byron plant. Prepare a list of these items, by part name.

A2 Identify, and obtain copies, of all specifications and drawings which specify requirements for items supplied by SCC. Prepare a checklist listing each inspection, test, or analysis required for each item.

A3 Identify and list, for each item (or lot of items), each inspection, test, or analysis record associated with that item, and all backup records for disposition of deficiencies (NCRs).

---

*Records include specifications, drawings, procurement documents, material receiving reports, nonconformance reports, engineering analyses, test reports, NRC documents, inspection records, letters, and memos.

TASK B - RECORDS REVIEW

Objective

To review available records on SCC items and evaluate the degree to which those records provide objective evidence of acceptability of SCC hardware at Byron.

Subtasks

A1 Review a representative sample of inspection and test records identified in Task A to determine if they provide objective evidence of the acceptability of the item. Use the checklist developed in Task A for verifying test and inspection requirements.

A2 Record results of the review on master list of items prepared in Task A.

A3 Identify items for reinspection to verify accuracy of inspections by each inspecting agency. Include each category of items for reinspection. Perform inspection per Task D.

A4 Prepare a summary report, listing for each item or lot of items supplied by SCC:

a) Inspections and tests performed for which a credible record exists,

b) Results of TPT review of record content,

c) Result of inspections or test (accept or reject), and disposition of rejectable conditions,

d) Identification of all items for which no credible inspection record exists

e) Identification of all items which have 2 or more independent inspection records which do not have the same results.

TASK C - ENGINEERING EVALUATION

Purpose

To review the technical basis used to substantiate acceptability of SCC items, and to perform independent analyses, if required.

The following items will be reviewed for validity:

C1 Main Control Boards - Review seismic test results, seismic analysis, and similarity justification for those boards not tested. Evaluate lowest margin welds as determined by the seismic analysis.

C2 Local Instrument Panels - Review analysis that confirms sufficient margin in panel welds.

C3 Hangers - Review adequacy of statistical inspection and analysis confirming sufficient margin in hanger welds. Review a representative set of "worst case" hanger welds (load, configuration, weld quality) to confirm adequate margin for use.

C4 Cable Pan Parts - Review adequacy of statistical inspection and analysis confirming sufficient margin in pan welds. Review a representative set of "worst case" pan welds to confirm adequate margin for use.

C5 Prepare a summary report including:

a) Description of TPT work performed above.
b) Results and conclusions based on TPT work and justification for conclusions.
c) List of Discrepancy Reports.

TASK D - INSPECTION

Purpose

To inspect SCC items installed in Byron station.

<u>NOTE:</u> All inspections shall be performed by individuals certified as Level II or III inspectors per ANSI N45.2.6.

D1 Based on results of Tasks B and C, develop list of number of items to be inspected.

D2 Select specific items in the plant. Provide written justification for selection and for Unit 1/Unit 2 selection.

D3 Prepare inspection checklist based on drawing and specification requirements.

D4 Inspect items and record all results on the checklist, sign and date checklist.

D5 Compare inspection results with that of other inspection reports, if available.

D6 Prepare a summary report, including:

a) List of items inspected by TPT, with TPT inspection results and other inspection results, if applicable.
b) Justification for selection of items for inspection.
c) List of Discrepancy Reports.

TASK E - DISCREPANCY DOCUMENTATION

Purpose

To provide detailed documentation of each discrepancy* found in the review.

E1 Reviewers shall document any discrepancy on the attached form (Fig. 1). Include sufficient information to permit an assessment of the discrepancy.

E2 Supervisor shall review the Discrepancy Report (DR) for accuracy and clarity of criteria and observed condition. Supervisor shall coordinate his review with a review by the cognizant CECo and/or S&L engineer, to ensure the accuracy of the DR.

E3 Each DR shall be given unique ID # and a log shall be maintained of all DRs prepared.

---

* Discrepancies include (a) item(s) without a credible inspection record, (b) inspections, tesst or analyses by TPT which are in disagreement with CECo inspection, test or analyses results, or (c) other conditions which may cast doubt on the acceptability of SCC items.

TASK F - EVALUATION AND REPORT

Purpose

To evaluate all reviews, analyses, and inspections by TPT and to draw objective conclusions regarding acceptability of SCC items.

F1 Evaluate all information generated by TPT and prepare report on conclusions regarding acceptability of SCC items; present conclusions for each type of item. The criteria for acceptability is that the indicated as-built hardware must be adequate to withstand design conditions and that there is no observed inadequacy of inspection records.

F2 Provide recommendations to CECo regarding any additional work required to provide full justification for acceptance of SCC items.

F3 Prepare a report with above information and a description of all work performed by TPT, along with records of all TPT inspections, reviews, and analyses.

F4 Prepare testimony on the results of the third party review as required.

TORREY PINES TECHNOLOGY
A Division of GA Technologies Inc.
P.O. Box 85608
San Diego, California 92138

DR#____________

BYRON REVIEW - DISCREPANCY REPORT

ITEM NAME: ____________________

SERIAL/LOT NOS. ____

REQUIREMENT(S):

DESCRIPTION OF DISCREPANCY:

PREPARED BY ________________________ DATE____________

REVIEWED BY ________________________ DATE____________

Proposed Schedule for Review of Systems Control Corp. Items at Byron Station

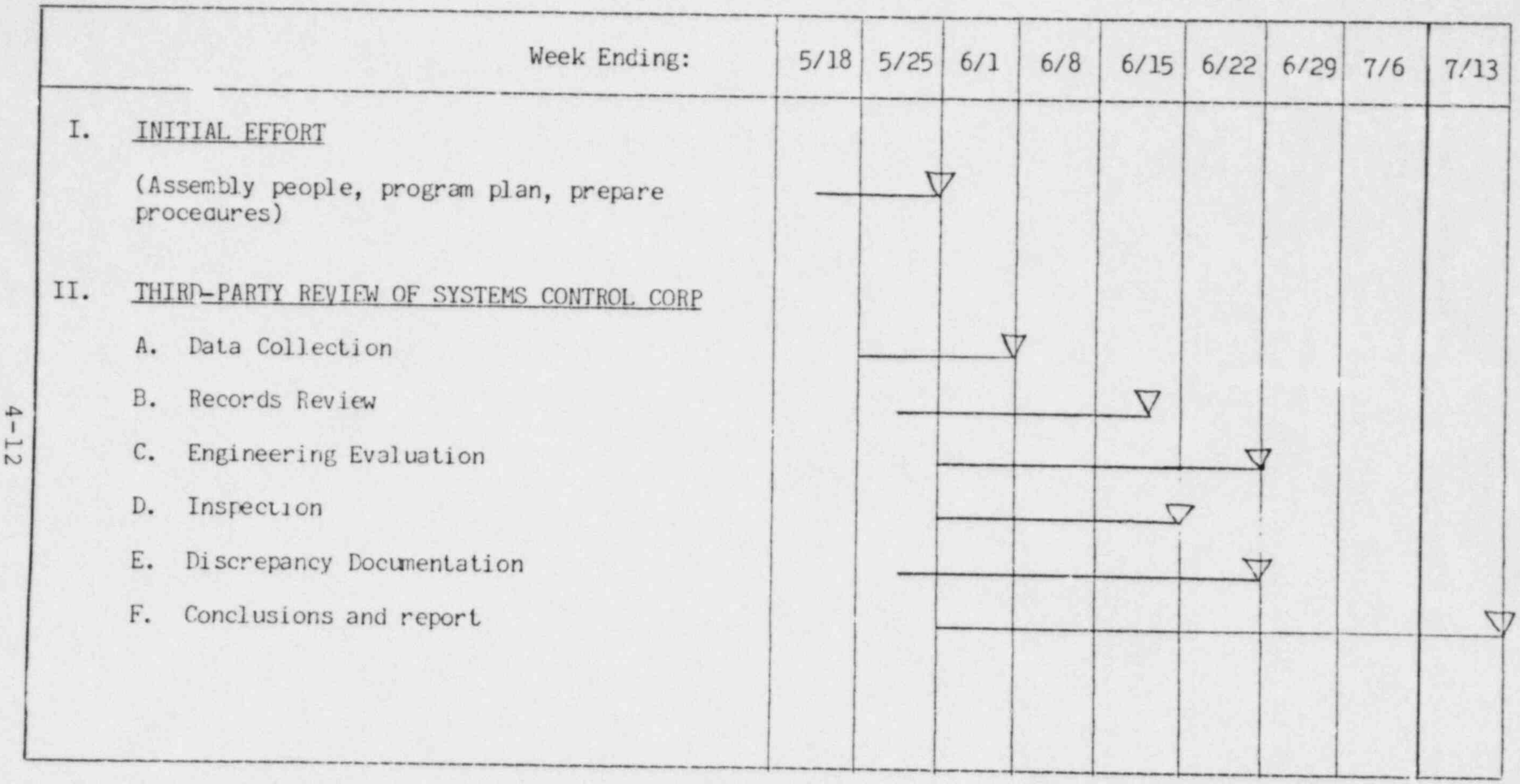

Figure 1