BYRON STATION

INDEPENDENT DESIGN REVIEW
FOR
COMMONWEALTH EDISON COMPANY

INTERIM REPORT

MAY 1984

BECHTEL POWER CORPORATION

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(1097o)

This report is submitted on behalf of the IDR team by the Level-1 - Internal Review Committee.

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EXECUTIVE SUMMARY

Background

This Interim Report, dated May 1984, covers the initial phase of work performed under the Independent Design Review (IDR) for the Byron Generating Station, Units 1 and 2, of Commonwealth Edison Company. The purpose of this review is to provide an additional level of confidence in the adequacy of the design of the Byron Station by Sargent & Lundy Engineers (S&L).

Under the IDR, Bechtel Power Corporation has been engaged to review the design by S&L of three selected safety systems for adherence to design requirements, for technical adequacy, for the design process, and to draw broader conclusions as appropriate.

The systems selected for review are the essential service water (ESW) system, the component cooling water (CCW) system, and the 125 Volt (V) dc distribution system. Included in the review are facilities for supporting and enclosing the systems (e.g., structures), for serving the systems (e.g., electric power supply and control systems), and safeguard requirements for protecting the systems against external effects (e.g., fire protection).

The IDR is being performed by a dedicated team of qualified personnel, in accordance with the Bechtel Program Plan dated April 1984. The Plan includes an approved quality assurance program.

Plans and Activities

The IDR effectively began on April 17, 1984. It is expected that the work will be completed and a final report submitted by July 31, 1984.

A strategy was chosen whereby the selected systems would initially be reviewed on an overall basis to determine which areas should receive greatest attention. These areas will be reviewed in greater depth in the latter stages of the IDR.

Work completed and reflected in this Interim Report covers the initial overall review and some detailed investigations. During this time, the IDR team expended approximately 6000 total manhours and reviewed more than 570 documents.

The remaining work entails completing review work in progress, analysis of unresolved matters, and identification and assessment of the remaining areas for in-depth review.

Results

To date, a total of 13 potential Observations has been identified. These are listed on Table 1 and status identified. Eight of these were ruled valid and forwarded as Observation Reports to S&L for response. Five were determined not valid by the Level-1 Internal Review Committee, based on careful consideration of the scope of the IDR and interpretation of the Byron commitments and design. Of the eight valid Observations, four are considered

essentially resolved on the basis of responses and corrective action proposed by S&L. Four are still under review, awaiting further information from S&L and assessment by the IDR team.

None of the Observations is regarded as safety significant at present. Further, there are no negative trends evident in the Observations.

To develop the eight Observations, 542 points of evaluation were assessed. The overall work was generally found to reflect accepted professional standards as to technical adequacy and the design process.

Conclusions

Until the review is complete, only limited conclusions can be drawn and even these must be regarded as tentative. However, the review work covered by this report tends to confirm the adequacy of the design of the Byron Station. This confidence relates primarily to the three systems reviewed, but the nature of the results suggests that similar conclusions could be drawn for other areas of the S&L design.

TABLE 1

LISTING AND STATUS OF POTENTIAL OBSERVATIONS

Potential Observation Report No.	Subject	Status
8.1	SRV Discharge Path	Response accepted/closed-out
8.2	Column Baseplate Thickness	Under review
8.3	Alarms for Makeup Pump	Response accepted/closed-out
8.4	Burial Depth of ESW Pipes	Response accepted/closed-out
8.5	Seismic Analysis for Screenhouse	Under review
8.6	Valve Disc Requirements	Response accepted/closed out
8.7	Valve Classification	Determined invalid
8.8	Valve Testing	Determined invalid
8.9	Isolation Devices in 125 V dc System	Under review
8.10	Battery Capacity	Under review
8.11	Battery Temperature Environment	Determined invalid
8.12	DC Short Circuit Calculations	Determined invalid
8.13	CCW System Isolation	Determined invalid

Section 1

INTRODUCTION

1.1 PURPOSE

Commonwealth Edison Company (CECo) has requested Bechtel Power Corporation (BPC) to conduct an independent design review (IDR) of the Byron Station, Units 1 and 2. The purpose of this IDR is to provide an additional level of confidence in the design of the Byron Station through a review of selected systems and the design process employed by the architect/engineer, Sargent and Lundy Engineers (S&L).

This Interim Report covers the IDR progress from its beginning on April 17, 1984 through May 31, 1984.

1.2 SCOPE

The scope of the IDR is to review the following three systems: component cooling water (CCW), essential service water (ESW) and Class 1E 125 V dc distribution. The system boundaries are as generally described in the FSAR. The review covers only that design work done by S&L as well as their interfaces with others performing design work, such as Westinghouse (W) and Nuclear Power Services (NPS). Included in the review, as applicable to the three systems, are mechanical process

design; piping design, including stress analysis; electrical design; instrumentation and control systems design; civil/structural design; heating, ventilating and air conditioning (HVAC) design; support design for piping, electrical conduits and trays, and HVAC ducts; equipment and valve qualification; relevant nuclear engineering; and other design considerations, such as fire protection and high and moderate energy line breaks (HELB and MELB). The design of Unit 2 is reviewed to the extent appropriate to assure that common systems are adequate and the quality of design is consistent with that of Unit 1.

The scope of work for the three systems is as follows:

1. Identification/implementation of commitments and criteria;
2. Design adequacy;
3. Adequacy of the S&L design process, including evaluations of engineering judgements and assumptions, use of standard design methods and the adequacy of the documentation of design calculations;
4. S&L design interfaces with Westinghouse and NPS;
5. Design change control; and
6. S&L design reviews.

Construction verification is not included in the scope of the IDR.

The IDR essentially covered S&L design work completed through April 1, 1984, but some S&L work in progress was considered after this date.

1.3 DESCRIPTION OF THE REVIEW AND STATUS

The program was structured to review design requirements, design adequacy and the design process, and then to make overall assessments based on these system reviews. The strategy for the IDR is to perform an initial review consisting of an overview, taken to an appropriate depth to identify those areas that should be reviewed further. Major emphasis is placed on the adequacy of the design of the final product. The IDR work, to date, is described in detail in Appendices A, B, C and D. The basic scope and methodology of program tasks is given in Appendix E (Program Plan) as are the team organization, strategies employed and the quality program.

The status of the areas under review, cross-referenced to the Program Plan, is shown on Table 2. Most of the work should be regarded as still in progress. Where work is shown as not included, it is intended that this be performed prior to completion of the IDR.

To date, the level of effort has been significant. More than 570 documents have been reviewed, and almost 6000 manhours have been expended by the IDR team (most of these in direct-review activities). Results, from a count of items in the Appendices, indicate approximately 542 points of evaluation were completed. In addition, an important number of items is now under review and partially completed.

TABLE 2

CROSS-REFERENCE BETWEEN ACTIVITIES IN
PROGRAM PLAN AND INTERIM REPORT

Key
X - Area included in report
O - Area not included in report
NA - Not applicable

Report Section	Program Plan Task: Design Requirement	Design Adequacy	Design Process	General Assessment
Interim Report (text)				X
Appendix A (CCW System)				
A-1	X			
A-2		X		
A-3			X	
A-4			X	
A-5			X	
A-6			O	
Appendix B (ESW System)				
B-1	X			
B-2		X		
B-3			X	
B-4			X	
B-5			X	
B-6			X	
Appendix C (DC System)				
C-1	X			
C-2		X		
C-3			X	
C-4			X	
C-5			X	
C-6			X	
Appendix D (Common Req.)				
D-1	X			
D-2		X		
D-3			X	
D-4			NA	
D-5			X	
D-6			O	

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1.4 ORGANIZATION AND STAFFING

The personnel comprising the IDR team are qualified engineering personnel, primarily from BPC's San Francisco Power Division. A listing of these team members is included in Appendix E. Additional, short-term assistance is provided by specialists from the San Francisco Power Division and Corporate management.

Staffing of the IDR team is designed to meet the CECo requirements for independence as specified in the letter dated April 12, 1984 from Messrs. B.R. Shelton and R.E. VanDerway to Mr. P. Karpa.

1.5 ACTIVITIES

Initially, the Byron Station FSAR was sent to San Francisco, and the IDR team began reviewing it during the week of April 11, 1984. On April 17, 1984, a kick-off meeting was held in the S&L offices in Chicago attended by representatives from CECo, S&L and Bechtel. The purpose of this meeting was to familiarize the IDR team with S&L's organization, and the S&L personnel responsible for designing the systems being reviewed; to provide an overview of the systems being reviewed, and the job status; and to clarify and reach agreement on the scope of the IDR and how it was to be conducted.

On April 18, 1984 the IDR team members met with their S&L counterparts for further orientation regarding available design information.

Specific design documents were selected for the IDR team to review in Chicago during the week of April 23, 1984. The IDR team spent April 23-27, 1984 in Chicago, and then made subsequent trips to the S&L offices, as necessary, to review documents and meet directly with S&L personnel. Some members of the IDR team visited the Byron jobsite during the weeks of April 23, 1984 and May 7, 1984 to meet with S&L site personnel and to review their design process, their interface with the S&L office in Chicago, and their interface with NPS. A list of general meetings is shown in Appendix F.

Communications and cooperation with the S&L organization are excellent.

1.6 SCHEDULE

The total IDR team effort will span approximately 3-1/2 months. The schedule requires an interim report to be submitted by May 31, 1984 and a final report to be submitted by approximately July 31, 1984.

1.7 DEFINITIONS

Observation - A condition wherein the IDR, Level-1 Committee believes there is a failure to meet licensing commitments or other safety-related design requirements

Potential Observation Report - A preliminary internal report for the documentation of an observation

Observation Report - Level-1 Internal Review Committee documentation of its evaluation of an Observation

Resolution Report - Documentation of the resolution of an Observation

Completion Report - Documentation of action taken (disposition) to complete the review effort associated with an Observation

Level-1 Internal Review Committee - A committee made up of key IDR team members

Level-2 Internal Review Committee - A committee made up of senior members of Bechtel Power Corporation who are not part of the IDR team

Safety Significant Condition - A condition confirmed to exist which results in a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety

Section 2

OBSERVATIONS AND RESOLUTIONS

2.1 OBSERVATION REPORTS

The IDR team has issued Observation Reports (ORs) for items which either uniquely affect the system or other review area, or are of a general nature. Each OR is summarized below, its significance noted, and a status of resolution described. The ORs have been numbered to correspond to the project file system, which begins numbering when a potential Observation is issued. The gaps in the sequence are due to Potential ORs determined invalid but which are listed elsewhere in this report.

2.2 COMPONENT COOLING WATER (CCW) SYSTEM

Observation Report 8.1

Observation:

FSAR Section 9.2.2.4.1 inconsistently describes the CCW surge tank relief valve as discharging to the chemical and volume control system (CVCS) waste recycle holdup tank. In the as-issued design, the relief valve actually and properly discharges to the chromated drains portion of the auxiliary building equipment drain system.

The Observation is not safety significant, based on adequacy of the existing design.

Resolution:

S&L has responded to state that the FSAR is being revised to indicate that the CCW surge tank relief valve discharges to the chromated drain system.

This resolution is acceptable to the IDR team and the item is closed out.

2.3 ESSENTIAL SERVICE WATER (ESW) SYSTEM

Observation Report 8.2

Observation:

A review of the calculations for the river screenhouse structural steel indicated that a column baseplate may be overstressed. There appeared to be a potential that the baseplate in an overstressed condition could affect the structural stability of the column and baseplate connections. S&L was asked to provide calculations to justify the adequacy of the existing base plate and to evaluate the impact of this Observation on all other column base plate designs.

Based on information available, the Observation is regarded as not safety significant, because further calculations will be forthcoming, and these are expected to confirm adequacy.

Resolution:

S&L has reviewed the base plate design for Column A-1 and provided the IDR team with a recent calculation which is based on the final design configuration and confirmed the adequacy of the base plate. S&L has also provided in their calculation the application of the AISC formula for calculating base plate thickness. Prior to completion of the IDR, S&L will also confirm the adequacy of the other base plates in the river screenhouse, and provide their assessment to the IDR team.

Pending completion of review of all calculations by the IDR team, this issue is regarded as still under review.

Observation Report 8.3

Observation:

An auto fail-to-start alarm has not been implemented for the ESW makeup pumps as described in FSAR Section 9.2.5.5. Two alarms identified as engine trouble alarm and start alarm in the control room are believed sufficient for the operator to detect pump failure to start.

The Observation is not safety significant, based on adequacy of the existing design.

Resolution:

S&L has responded to state that the FSAR is being revised to identify the alarms in the control room associated with the ESW makeup pump

diesels. Annunciation is transmitted to the control room indicating engine trouble, auto-start, and auto-trip for each engine.

This response is acceptable to the IDR team and the item is closed out.

Observation Report 8.4

Observation:

There appears to be an inconsistency between a statement in the FSAR (Response to Question 10.8) and an S&L calculation regarding the burial depth of the ESW makeup lines. The FSAR response to Question 10.8 states that these lines are buried a minimum of 25 feet below grade while the S&L calculation indicates a depth of 16.5 feet. If the 25-foot depth of the ESW piping is necessary to maintain piping integrity during a seismic event, burial of the pipe to a lesser depth could affect this integrity. However, it is stated in the response to FSAR Question 10.21 that a seismic event will have no adverse effect upon the ESW buried lines, and it seems likely that there is a discrepancy in the FSAR.

This Observation is not regarded as safety significant, based on the FSAR response to Question 10.21, and the likelihood that it represents acceptable design.

Resolution:

S&L responded that the 25-foot depth indicated in Question 10.8 is not correct. Question 10.21 provides drawings identifying the depth of the ESW piping. S&L reviewed their calculations and determined that the

calculations are consistent with the depth information provided on drawings included in response to Question 10.21. The response to Question 10.8 will be revised to indicate that the question has been answered by the response to Question 10.21. The IDR accepts this resolution.

Observation Report 8.5

Observation:
In 1981, the seismic response analysis of the river screenhouse was revised as the result of NRC FSAR Questions 130.9 and 130.9A dealing with soil modeling. The revised seismic spectra and resulting loads were higher than those of the previous design analysis. Although the structural steel design of the river screenhouse was reviewed for the new loads, there has been no evidence provided that the reinforced concrete portions of this structure were reviewed for the revised building seismic response. Also, the same situation holds true for the piping and equipment components.

Since the revised seismic analysis of the river screenhouse resulted in higher loads, verification of the building structural integrity, and for the components, is appropriate. Otherwise, there is an element of uncertainty in meeting commitments.

This Observation has limited significance, since it pertains only to the river screenhouse. Other Seismic Category I structures are founded on rock, where a combination of responses from both the finite

element and soil spring approaches was not a licensing requirement. And finally, the S&L system provides for routinely making reviews for such analysis.

Resolution:

S&L responded that a comparison of the results of the shearwall analysis from the finite element and soil spring approaches had been made, as evidenced by the response to Question 130.9. Also, as evidenced by the response to Question 130.9a, no modifications to the concrete structure were judged to be required. However, the extent of reviews and related judgements on the concrete structure and equipment components is not clear to the IDR team from examining these question responses and other material provided. To confirm these judgements, S&L has provided additional design calculations which were made to review the original river screenhouse design using the envelope spectra based on the half-space (soil spring) and finite element methods for soil-structure interaction.

Pending completion of the review of the calculations, this item is regarded as still under review but the IDR team tentatively concurs with the S&L statement.

Observation Report 8.6

Observation:

In FSAR Question 110.57, the NRC required that Note 4 of FSAR Table 3.9-9 be expanded to show that valve discs will not fail if subjected to P (max). The response to the FSAR Question states that the table is

intended to cover valve pressure boundary items as defined by ASME Sect. III, B&PV Code which does not include valve discs. This statement is in conflict with NC-2110(b) which states that "the term pressure retaining material as used in this subsection applies to ...valve bodies, bonnets, and discs." Failure of the valve disc in the closed position could be a violation of the pressure boundary.

This Observation is not regarded as safety significant, since the response to Question 110.57 also cites extensive hydrostatic testing at pressures to ensure leak-tightness. Also, experience indicates that the valve disks are not expected to fail.

Resolution:
S&L responded that FSAR Table 3.9-9 is based on ASME Section III, Subsection NC, Table NC-3521-1, which was added in the Winter 1976 Addendum. Note 3 of Table NC-3521-1 states "Design requirements listed in this table are not applicable to valve discs..." Further, this table is not intended to define the pressure boundary components of the valve. The Byron/Braidwood procurement specifications for Category I valves define the pressure boundary components which include the valve disc. S&L proposed that Note 4 of Table 3.9-9 would be revised to agree with the wording in Table NC-3521-1, and the phrase "...or otherwise not part of the pressure boundary..." will be deleted. Also, the response to Question 110.57 was accepted by the NRC and need not be revised.

The procurement specifications include the disc as a pressure boundary part; therefore, this response is acceptable and the item is closed out.

2.4 DC CLASS 1E DISTRIBUTION SYSTEM

Observation Report 8.9

Observation:

The 125 V dc safety-related (SR) control center has two nonsafety-related (NSR) components (undervoltage relay and ground detector recording voltmeter). Circuits to these components are isolated from the SR bus by one interrupting device actuated by fault current. The Byron FSAR commitment (Table 8.1-1 and Appendix A, Reg. Guide 1.75) is to either provide two interrupting devices, actuated by fault current, in series, or one interrupting device actuated by safety injection coincident with a loss of offsite power signal.

Although the design does not strictly satisfy the FSAR commitment, this observation does not have safety significance. The failure of the isolation device coincident with a fault in the associated NSR circuit will only result in the loss of a single train of the 125 V dc system. The redundant train will perform to required safety functions.

Resolution:

S&L responded that their letter to General Electric Company dated April 19, 1978 documents that Sargent & Lundy approved this application; however, the basis for this approval is not documented. An acceptable alternative to the documentation is to provide an analysis that demonstrates that the application of the non-Class 1E components does not degrade the Class 1E circuits below an acceptable

level. Prior to the completion of the IDR, an analysis will be provided to verify that the designed application of the non-Class 1E components does not degrade the Class 1E circuits below an acceptable level.

While awaiting receipt of the forthcoming analysis, this item is regarded as still under review.

Observation Report 8.10

Observation:
The design process associated with the 125 V dc system does not document verification of the actual loads connected to the battery.

The verification of the actual battery loads is necessary to verify the duty cycle used in the battery sizing design calculation. Without this verification, there is an element of uncertainty in the final design.

S&L responded that load tabulations providing verification of all dc system loads (i.e., control valve, auxiliary relay, and indicating light loads) are not available. Also, the Sargent & Lundy design process does include other procedures that verify that the battery has sufficient capacity to energize the dc system loads.

This Observation is not presently considered as safety significant, because of other information forthcoming, and the evidence of procedures and actions to review battery loads.

Resolution:

Load tabulations for various plant operating conditions will be provided by S&L to the IDR team in order to be able to confirm the design.

While awaiting receipt of the forthcoming analysis, this item is regarded as still under evaluation.

2.5 COMMON REQUIREMENTS

2.5.1 High Energy Line Breaks/Moderate Energy Line Breaks (HELB/MELB)

No Observation Reports for items resulting from consideration of HELB/MELB effects on the systems in the IDR scope have been issued.

2.5.2 Fire Protection

No Observation Reports for items resulting from consideration of the adequacy of fire protection for the s/stems in the IDR scope have been issued.

2.5.3 Other

No Observation Reports for items resulting from consideration of the other common requirements, such as design change control and separation requirements, have been issued.

2.6 GENERAL ASSESSMENTS

Due to the incomplete status of the IDR, and the Observation Reports not closed-out, it is premature to draw general Observations or conclusions at this time. However, based on the Observations and the overall review performed thus far, there are no trends or patterns of problems in design adequacy, nor any general breakdowns in the overall design process. The Observations are of relatively minor, random discrepancies and seem mostly to relate to questions of documentation.

All the Observations reported to date have been initially assessed as not significant to safety. Several of the Observations involve inconsistencies between documents, or FSAR commitments that are not literally met. However, the basic elements of the FSAR commitments appear to be met. Also, some Observations require additional information to be provided by S&L. Although the review of some of these is still ongoing, the existing evidence permits the Level-1 Internal Review Committee to tentatively agree that the Observations are not important to safety.

These conclusions are primarily applicable to the three systems within the scope of the IDR. However the nature of the Observations suggests that similar conclusions could be drawn for other areas of the S&L design. The overall work was generally found to reflect accepted professional standards as to technical adequacy and the design process.

Accordingly, the results of the IDR review work covered by this Interim Report tend to confirm the adequacy of the design of the Byron Station.

Section 3

PROGRAM

3.1 REVIEW FOR IDENTIFICATION/IMPLEMENTATION OF COMMITMENTS AND CRITERIA

One of the first tasks of the IDR program was to review the Byron FSAR and other pertinent documents to determine and identify licensing commitments and safety-related design requirements applicable to the systems selected for review. In addition to the FSAR, a review was made of the Byron SER (NUREG-0867, Feb. 1982), the Fire Protection Report, and the Environmental Report. As a result of these initial reviews, a set of commitment lists was developed and are reflected in Appendices A-1, B-1, C-1 and D-1. These lists were used by the various IDR team members to form the basis for determining if the Byron system designs meet the specified licensing commitments and design requirements. Commitment reviews for selected safety requirements common to the three selected systems, such as fire protection and pipe break, were also made and used by the IDR team. From the commitment lists, selected design requirements were evaluated for proper implementation. Requirements considered significant by the reviewer or for which a specific concern had been expressed were verified. In addition, when an individual reviewer determined that there were appropriate commitments in addition to those listed, the implementation of these commitments was pursued as appropriate.

Various design documents were reviewed to verify the implementation of design requirements. These documents included, but were not limited to, drawings, calculations, specifications, Project correspondence, and vendor documents. The methodology used to identify design requirements is given in Task-1 in Appendix E (Program Plan).

3.2 REVIEW OF DESIGN ADEQUACY

Selected design documents for the three systems were reviewed for adequacy in meeting licensing and safety-related design requirements. The total system design was reviewed including mechanical, nuclear, control and instrumentation, electrical and civil/structural aspects. Portions of other systems that service the three selected systems, and other systems or accident effects that can affect the selected systems are also included in the IDR. Accordingly, the scope includes auxiliary steel for support structures, electrical power and controls that uniquely serve a selected system, HVAC that must maintain a required environment for a selected system component, fire protection, and high energy line breaks/medium energy line breaks (HELB/MELB).

Documents reviewed include design criteria, calculations, drawings, procurement specifications, ASME Section III Design Specifications and vendor-furnished information.

The methodology used to review for design adequacy is detailed under Task-2 in Appendix E.

The results of the review for design adequacy are shown in Appendices A-2, B-2, C-2 and D-2.

3.3 REVIEW OF THE DESIGN PROCESS

Selected documents for the three systems are being reviewed for adequacy of the design process used in the final design. Where procedural requirements were not available, the actual process is evaluated to determine the extent to which the design is adequately controlled. The documents reviewed include those related to design criteria, calculations, drawings, specifications and design change control.

The methodology used to review the adequacy of the design process is given in detail under Task-3 in Appendix E.

The results of the review for adequacy of the design process are shown in Appendices A-3, B-3, C-3 and D-3.

3.4 REVIEW OF DESIGN INTERFACES WITH WESTINGHOUSE (W) AND NUCLEAR POWER SERVICES (NPS)

The design interfaces between S&L and Westinghouse and between S&L and NPS, as applicable to the three systems, were reviewed to determine the

adequacy of control by S&L of the flow of design information that passes between them and the other two organizations. Included in this review are the implementation of Westinghouse requirements with the S&L design, and evidence that S&L requirements were incorporated in the NPS designs. The adequacy of the Westinghouse and NPS designs was excluded from this review. In general, the methodology used for this review was similar to that used for the review of adequacy of the design process.

The results of the review of design interfaces with Westinghouse and NPS are shown in Appendices A-4, B-4 and C-4.

3.5 REVIEW OF DESIGN CHANGE CONTROL

The S&L procedures associated with the control of design changes were reviewed to determine the adequacy of control and compliance with Quality Assurance Program requirements. Selected design documents were reviewed to determine the adequacy of revision control.

The methodology used to review design change control is covered under Task-3 in Appendix E, Program Plan.

The results of the review of design change control are shown in Appendix D-3.

3.6 REVIEW OF SARGENT & LUNDY DESIGN REVIEW

S&L internal review reports were examined to assess the effectiveness of the S&L design review for the three systems and the review process in general. The methodology used for this review is similar to that used for the review of adequacy of the design process.

The results of the review of S&L design reviews are shown in Appendices B-6 and C-6.

APPENDIX A

COMPONENT COOLING WATER (CCW) SYSTEM

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Excess letdown heat exchanger CCW side is ASME III Class 2 (FSAR Fig. 9.2-1)	W P&ID 1094E27, Rev. 7	X	
Pressure in CCW headers downstream of pumps is indicated locally and with alarm in control room that actuates at preset limit (FSAR 9.2.2.2.2.6)	P&ID M-66-3, Rev. Z W Precaution, Limitation and Setpoint document, Section 11B, Pg. 93	X	
CCWS is sampled (FSAR 9.2.2.3.1)	P&ID M-66-4, Rev. AE	X	
A corrosion inhibitor is (capable of being) added (FSAR 9.2.2.5)	P&ID M-66-2, Rev. W	X	
Air-operated containment isolation valves are designed to close on loss of either electrical power or air supply (FSAR 6.2.4.1.2)	P&ID M-66-1, Rev. AA W P&ID 1094E27, Rev. 7	X	
Each surge tank is connected to CCWS by two 4" lines through locked open valves (FSAR Section 3.4.C)	P&ID M-66-4, Rev. AE W SD-CAE-291, Rev. 2	X	

Piping Engineering

FSAR/Licensing Commitment	Covered By Design Document/Requirment	Acceptability Yes	Acceptability No
System is safety category/quality group (FSAR 9.2.2.2)	S&L P&ID M-66 Shts 1, 2, 3, 4 Mech. Dept S&L Piping line list 8/30/83 - Page 17 etc.	X	
Design basis max temp-200°F (FSAR 9.2.2.1)	Mech Dept S&L Piping line list 8/30/83	X	
Design pressure-150 psig (FSAR Table 9.2-3)	Mech Dept S&L Piping line list 8/30/83	X	
Piping materials-carbon steel (FSAR 9.2.2.2.1)	S&L piping design, Table 105BB Rev. E, 1.1 & 1.2, 1/28/77	X	
Piping joints-essentially all welded (FSAR 9.2.2.2.1)	S&L piping design, Table 105BB Rev. E, 1/28/77 Type of fabrication Flanged joints	X X	
Relief valves - set pressure equal to or lower than system design pressure or component design pressure	S&L P&ID M-66 Shts 1, 2, 3, 4 Set pressure shown as 150 psig	X	
All valve bodies B/W carbon steel with stellite or stainless steel trim (FSAR 9.2.2.2.2)	S&L piping design Table 105BB Rev. E, 1/28/77 valves - Purchase descriptions	X	

APPENDIX A-1

IDENTIFICATION/IMPLEMENTATION OF COMMITMENTS AND CRITERIA

Civil/Structural

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Seismic Design & Analysis			
Seismic input motion & response spectra (FSAR 2.5.2, 3.7.1.1 & 3.7.1.2 & NRC Reg. Guide 1.60, NRC Q130.5, 130.6, 130.6a)	1. Structural Design Criteria DC-ST-03-BY-BR, Rev. 11 2. Response Spectra Design Criteria DC-ST-04-BB, Rev. 2 3. S&L Calc. #8.11.4.2, Rev. 0 & 1 4. S&L Calc. #4.2.1.1 BY & 4.2.1.2 BY 5. S&L Calc. EMD-033898 (10/21/81) for buried line & tunnels	X	
Damping values used (FSAR 3.7.1.3 & WCAP-7921-AR, May 1974)		X	
Use of constant vertical static factors (FSAR 3.7.3.10)		X	
Torsional effects of eccentric masses (FSAR 3.7.3.11)		X	

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Civil/Structural (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Expansion Anchors			
IE Bulletin 79-02	Standard SDS-E11 Rev. 0	X	
	Standard specification for concrete expansion anchor work form BY/BR/CEA, Rev. 19		
	Report on static, dynamic and relaxation testing of expansion anchors in response to NRC I.E. Bulletin 79-02, July 20, 1981		

Control Systems

FSAR/Licensing Commitment	Covered by Design Document/Requirement	Acceptability Yes	Acceptability No
A temperature detector in the component cooling pump suction line with alarm in the main control room (MCR) (FSAR 9.2.2.2.2.6a)	M-66 Sht. 3, Rev. Z 3/5/84 M-2066 Sht. 1, Rev. M 12/14/83	X	
Temperature detectors in the outlet lines for the component cooling heat exchangers with alarm in the MCR (FSAR 9.2.2.2.2.6b)	M-66 Sht. 3, Rev. Z 3/5/84 M-2066 Sht. 3, Rev. G 2/15/84	X	
Pressure detectors on the lines between the component cooling pumps and the component cooling heat exchangers with alarm in the MCR (FSAR 9.2.2.2.2.6c)	M-66 Sht. 3, Rev. Z 3/5/84 M-2066 Sht. 2, Rev. L 12/14/83	X	
Safety-related flow indication from the reactor coolant (RC) pump motor oil coolers and flow indication from the RC pump thermal barrier with alarm in the MCR (FSAR 9.2.2.2.2.6)	M-66 Sht. 1, Rev. Z 5/17/83 M-2066 Sht. 5, Rev. G 12/14/83 M-2066 Sht. 2, Rev. L 12/14/83 B/B instrument index (yellow) CC Sht. 5, Rev. 24 11/15/83	X	

Control Systems (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Water level indicators on the component cooling surge tank with alarm in the MCR (FSAR 9.2.2.2.2.6)	M-66 Sht. 4, Rev. AE 3/29/84 M-2066 Sht. 3, Rev. G 2/15/84	X	
Radiation monitor on the outlet of each component cooling heat exchanger with alarm in the MCR (FSAR 9.2.2.2.2.6)	M-66 Sht. 4, Rev. AE 3/29/84 B/B Unit 1 instrument index, BOP (White) PR, Sht. 2 & 26, Rev. 26 3/30/84	X	
Flow indicators on the charging and RHR pump seal lines with alarm in the MCR (FSAR 9.2.2.2.2.6)	M-2066 Sht. 1, Rev. M 12/14/83	X	
If a component cooling pump fails during operation, the resulting low pressure starts one of the standby pumps (FSAR 9.2.2.2.2.6)	M-66 Sht. 3, Rev. Z 3/5/84 M-2066 Sht. 2, Rev. L 12/14/83	X	
A local pressure indicator is provided in each component cooling pump suction line (FSAR 9.2.2.2.2.6)	M-66 Sht. 3, Rev. Z 3/5/84	X	

Control Systems (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
The component cooling surge tank water level is indicated locally and in the main control room (FSAR 9.2.2.2.2.6)	M-2066 Sht. 3, Rev. G 2/15/84	X	
Redundant instruments are provided to indicate if the level in one of the two sides of the surge tank falls below the low-level setting (FSAR 9.2.2.2.2.6)	M-66 Sht. 4, Rev. AE 3/29/84 M-2066 Sht. 3, Rev. G 2/15/84	X	
The atmosphere vent on the tank is automatically closed in the event of high radiation level at the component cooling heat exchanger discharge (FSAR 9.2.2.4.2)	M-66 Sht. 4, Rev. AE 3/29/84	X	

Equipment Qualification - Seismic (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	No
Seismic Analysis of Pumps (FSAR 3.9.3.2.1.1)			
Nozzle loads for the applicable plant conditions must be applied	Section 10.5 of Form 350-B, "Standard Specification for Seismic Qualification".	X	
Analysis of interaction between pump and motor is considered	Section 10.6 of Form 350-B, "Standard Specification for Seismic Qualification".	X	
For pumps having a natural frequency greater than 33 Hz, static analysis is acceptable. For pumps with a natural frequency less than 33 Hz, a dynamic hype analysis is performed	Section 10.7 of Form 350-B, "Standard Specification for Seismic Qualification".	X	
Active valve operability (FSAR Question 110.8)	S/L Form 350-B, Active valve operability demonstrated by analysis (no actual testing done)	X	
Valve upper structure assembly stresses (active valves)	Velan Seismic Report 6633, Rev. 1 Item not within IDR scope - evaluation of concern continuing.		X

Equipment Qualification - Seismic

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Seismic qualification of balance of plant safety-related mechanical equipment (testing or analysis) (FSAR 3.9.2.2.2)	Form 350-B "Standard Specification for Seismic Qualification" 9/19/75	X	
Seismic qualification of pumps and motors (BOP), reference IEEE-344-75 (testing or analysis) (FSAR 3.9.3.2.1.1)	Form 350-B "Standard Specification for Seismic Qualification" refers to latest revisions of IEEE standards listed in project purchase specification. IEEE-344 is referenced in purchase specifications. The Component Qualification Division checklist for seismic review indicates whether reports meet requirements of 344-75.	X	
Design loading combination for ASME Code Class 2 and 3 components and supports (FSAR Table 3.9-5)	Form 350-B "Standard Specification for Seismic Qualification". Section 1.2.1 specifies the loading combinations for upset and faulted conditions.	X	
Stress criteria for safety-related ASME Class 2 and Class 3 vessels. (Reference: ASME III, Subsection NC & ND or Code Case 1607) (FSAR Table 3.9-6)	Form 350-B "Standard Specification for Seismic Qualification". Section 10.3 states "The stress limits for nonactive fluid system equipment shall be as stated in the ASME BPVC Section III". (Current revision per Form 350-B.)	X	
Stress criteria for ASME Class 2 and Class 3 inactive pumps and pump supports (FSAR Table 3.9-7) (Reference: ASME III, Subsections NC & ND or Code Case 1607)	Form 350-B "Standard Specification for Seismic Qualification". Section 10.3 states "The stress limits for nonactive fluid system equipment shall be as stated in the ASME BPVC Section III". (Current revision per Form 350-B.)	X	

Equipment Qualification - Seismic (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Design criteria for active pumps and pump supports (FSAR Table 3.9-8) Note: Stress limits specified are more restrictive than the ASME III limits to provide assurance of operability.	Form 350-B, Section 10.3.2, "Stress Limits for Active Fluid System Equipment", lists stress limits for upset and faulted conditions. Upset stress limits reference ASME Section III. Faulted stress limits are held to emergency condition stress levels specified in FSAR.	X	
Stress criteria for safety-related ASME Code Class 2 and Class 3 inactive BOP valves. (Reference ASME III Subsections NC and ND or Code Case 1635.) (FSAR Table 3.9-9)	Form 350-B "Standard Specification for Seismic Qualification" Section 10.3 states "The stress limits for nonactive fluid system equipment shall be as stated in the ASME BPVC Section III." (Current revision per Form 350-B.)	X	
BOP design criteria for active valves. (Reference ASME Section III, Subsections NC3500 and ND3500. (FSAR Table 3.9-10)	Form 350-B, Section 10.3.2, "Stress Limits for Active Fluid System Equipment", lists stress limits for upset and faulted conditions. Upset stress limits reference ASME Section III. Faulted stress limits are held to emergency condition stress levels specified in the FSAR.	X	
Applicant will comply with IEEE-382-1972 "Trial Use Guide for the Type-Test of Class 1 Electric Valve Operators for Nuclear Power Generating Stations" (FSAR A1.73-1 - Reg. Guide 1.73)	Purchase Spec. F/L 2884 Attachment "E" (Limitorque motor operator) references IEEE-382-72.	X	

Mechanical-Pipe Support

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
ASME Sect. III, NF, 1977	F/L 2906 Rev. 2, 5/16/83 Installation and support selection guidelines for process piping, instrument piping, and tubing in Cat. I bldg. (2" and smaller Cat. I, instrumentation piping, 4" and smaller Cat. II piping and tubing)	X	
NRC IE 79-02 Bulletin FSAR 3.8.4.2 3.8.4.5.2 3.9.3	Mechanical Component Support Design Ref. Manual, Rev. 4, 3/30/84 (No designated document number)	X	
FSAR 3.8.4.2 3.8.4.5.2 3.9.2	TTDP-SED-06 Rev. 0, 2/24/84, Mech. component supports	X	

Mechanical - Process

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
RCP thermal barrier cooling water return high flow automatically throttles down the containment isolation valve (FSAR 9.2.2.2.2.2)	P&ID M-66-1, Rev AA	X	
RCP thermal barrier CCW has relief valve with set pressure equal to system design pressure or component design pressure (FSAR 9.2.2.2.2.2)	W Precautions, Limitations and Setpoint document, Section 11, Page 96 P&ID M-66-1, Rev AA	X	
The CCWS may not be shared during cooldown or recirculation phase because CCW temperature will exceed 105°F (FSAR 9.2.2.4.4)	P&ID M-66-3, Rev Z	X	
CCW surge tank relief valves discharge to the CVCS waste recycle holdup tank (FSAR 9.2.2.4.1)	P&ID M-66-4, Rev. AE		X
Single failure analysis of lines penetrating containment states that redundant isolation valves are used to secure flow (FSAR Table 9.2-5)	P&ID M-66-1, Rev. AA		X

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Excess letdown heat exchanger CCW side is ASME III Class 2 (FSAR Fig. 9.2-1)	W P&ID 1094E27, Rev. 7	X	
Pressure in CCW headers downstream of pumps is indicated locally and with alarm in control room that actuates at preset limit (FSAR 9.2.2.2.2.6)	P&ID M-66-3, Rev. Z W Precaution, Limitation and Setpoint document, Section 11B, Pg. 93	X	
CCWS is sampled (FSAR 9.2.2.3.1)	P&ID M-66-4, Rev. AE	X	
A corrosion inhibitor is (capable of being) added (FSAR 9.2.2.5)	P&ID M-66-2, Rev. W	X	
Air-operated containment isolation valves are designed to close on loss of either electrical power or air supply (FSAR 6.2.4.1.2)	P&ID M-66-1, Rev. AA W P&ID 1094E27, Rev. 7	X	
Each surge tank is connected to CCWS by two 4" lines through locked open valves (FSAR Section 3.4.C)	P&ID M-66-4, Rev. AE W SD-CAE-291, Rev. 2	X	

Piping Engineering

FSAR/Licensing Commitment	Covered By Design Document/Requirment	Acceptability Yes	Acceptability No
System is safety category/quality group (FSAR 9.2.2.2)	S&L P&ID M-66 Shts 1, 2, 3, 4 Mech. Dept S&L Piping line list 8/30/83 - Page 17 etc.	X	
Design basis max temp-200°F (FSAR 9.2.2.1)	Mech Dept S&L Piping line list 8/30/83	X	
Design pressure-150 psig (FSAR Table 9.2-3)	Mech Dept S&L Piping line list 8/30/83	X	
Piping materials-carbon steel (FSAR 9.2.2.2.1)	S&L piping design, Table 105BB Rev. E, 1.1 & 1.2, 1/28/77	X	
Piping joints-essentially all welded (FSAR 9.2.2.2.1)	S&L piping design, Table 105BB Rev. E, 1/28/77 Type of fabrication Flanged joints	X X	
Relief valves - set pressure equal to or lower than system design pressure or component design pressure	S&L P&ID M-66 Shts 1, 2, 3, 4 Set pressure shown as 150 psig	X	
All valve bodies B/W carbon steel with stellite or stainless steel trim (FSAR 9.2.2.2.2)	S&L piping design Table 105BB Rev. E, 1/28/77 valves - Purchase descriptions	X	

APPENDIX A-2

DESIGN ADEQUACY

Civil/Structural

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Seismic input motion and ground response spectra	FSAR, relevant sections as stated in Appendices A-1, B-1 and C-1. NRC Reg. Guide 1.60 SER Section 3.7	Review of ground response spectra based on 0.2g for SSE and 0.09g for OBE is in agreement with NRC Reg. Guide 1.60.	X	
Deep wells seismic analysis	FSAR 3.8.4.3	Deep wells are designed to withstand tornado but not seismic loads.	X	
Expansion Anchors				
Base plate flexibility and prying loads	IE Bulletin 79-02	Ref. 1 (11.5.1) and Table 11.5-1 conservatively increase loads calculated by rigid plate theory multiplying them by an amplification factor determined by comparing rigid plate models with finite element models although Ref. 4 states that the Wiss, Janney, Elstner & Assoc. tests showed that at ultimate load the base plates were not in contact with the concrete so there was no prying action.	X	

Ref. 1 Structural Standard Document Standards, SDS-E11, Rev. 0

Ref. 2 Standard Specification for Concrete Expansion Anchor Work For BY/BR/CEA, Rev. 19

Ref. 3 Report on Static, Dynamic and Relaxation Testing of Expansion Anchors in Response to NRC IE Bulletin 79-02, July 20, 1981

Ref. 4 B/B - FSAR Response to NRC Question 110.71

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Civil/Structural (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Expansion Anchors (Cont)				
QC documentation	IE Bulletin 79-02	Ref. 2 (4.0) establishes inspection, testing, frequency of testing and documentation.	X	
Factors of safety (concrete)	IE Bulletin 79-02	Ref. 1, Table 11.1-1, ultimate capacities for wedge type anchors in concrete for tension and shear are lower than the values for the same concrete strength and embedment shown on Hilti's Report No. 8784 File No. H2189-S1. The factors of safety (F.S.) are normally above 4. The 3/4" anchor has a F.S. practically equal to 4.	X	
Factors of safety (masonry)	IE Bulletin 79-02	Ref. 1, Table 11.1-1, shows ultimate capacities for sleeve anchors in masonry walls. The values for 1/2" and 3/4" diameters are similar to Bechtel's test data for block walls. The 3/8" and 5/8" diameters compared values are different. This is expected since Bechtel's experience shows considerable variations on the test results of expansion anchors installed in block walls at different sites. The ultimate capacities shown on Table 11.1-1 are based on project unique tests and are lower than the test data shown in Ref. 3. The allowable loads have a minimum factor of safety equal to 4.2.	X	

Civil/Structural (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Expansion Anchors (Cont)				
Sampling method for testing	IE Bulletin 79-02	Ref. 2 (4.2.2.6) A minimum of one anchor per assembly selected at random is tested.	X	
Design requirements for cycle loads	IE Bulletin 79-02	Ref. 1 (11.1.2) reduces allowable loads by 50% for wind, seismic loads and mechanical vibrations. This approach for wind and seismic which are low cycle is acceptable based on Ref. 3 (2.5.2) and the FFTF tests where expansion anchors successfully withstood simulated seismic loads consisting of a minimum of 6000 cycles at 20% of the ultimate capacity.	X	
Preload	IE Bulletin 79-02	Ref. 3 (2.5.2) and Teledyne Report 3501-1 "Summary Report -- Expansion Anchors" concur that anchor preload is not required in order to withstand cyclic loads. Ref.2 (3.3) establishes tightening requirements.	X	

Control Systems

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Independent process taps for instruments of redundant trains	Regulatory Guide 1.151, July 1983 ISA Standard S67.02, June 1980	Westinghouse flow diagram for CCW 1094E28, Rev. 11, 3/29/83. S&L Diagram of CCW M-66, Sht. 3, Rev. Z, 3/5/84 S&L C&I Diagram M-2066 Sh. 2, Rev. L, 12/14/83 S&L M-66 Sh. 3 is a redraw of Westinghouse 1094E28, Rev. 11 to S&L format. The S&L redraw shows the instruments of each train connected to independent root valves and taps.	X	
Seismic instrument tube span support calculation	ASME B&PV Section III Article NC-3650	Procedure/Calculation EMD 015140, Rev. 4 Calc. EMD 015139, Rev. 0 Calc. EMD 030898, Rev. 0 Calc. EMD 030653, Rev. 0 Calc. EMD 019583, Rev. 0 Calc. EMD 042097, Rev. 0	X	

Mechanical-Process

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
RCP thermal barrier cooling water return overpressure protection	Auto signal to valve to protect low pressure CCW piping external to containment	W P&ID 1094E27, Rev. 7 C&I diag. M-2066/1, Rev. M SD-CAE-291, Rev. 2, page 16 High flow on FIS 1G closes containment isolation valve (gate) MO-ICC-685-2 Design implementation follows W input. Wording in FSAR imprecisely states a throttling rather than an isolation function.	X	
RCP thermal barrier CCW piping relief valve set point	Set pressure equal to the lower of system or component design pressure	P&ID M-66-1, Rev. AA Piping Design Table 1505BB, Rev. B, 7/1/76 Valve List, CCW System, Rev. 51, 2/15/84 Line List, Page 31, 8/30/83 W Precautions, Limitations and Setpoints, Section 11, page 96 Relief valve set pressure equal to system design pressure of 2485 psig.	X	
CCW sharing	The CCWS may not be shared during cool-down or recirculation phase because CCW temperature will exceed 105°F	P&ID M-66-3, Rev. Z W 1094E28, Rev. 11 By using manual and remote manual valves, splitting the units can be done. Design provides sufficient number of valves to accomplish isolation.	X	

Mechanical-Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW sharing (Cont)		The SER (9.2.2 of NUREG 0876, 2/82) states "during the limiting mode of plant operation ... the CCWS is split on receipt of an ESFAS." This SER description is incorrect in that the CCWS is not split on ESFAS*, neither automatically nor by the operator. The SER wording does not indicate this as "must meet" requirement. The Byron design consistently indicates that no automatic splitting occurs. *ESFAS = engineered safety features actuation signal		
CCW surge tank relief	Acceptable discharge path for surge tank relief	P&ID M-66-4, Rev. AE P&ID M-82-11, Rev. Z P&ID M-48-29, Rev. J W P&ID 1094E28, Rev. 11 SD-CAE-291, Rev. 2 Design consistently shows discharge goes to auxiliary bldg. equipment systems chromated drain tank, and not to the CVCS. Because the CCWS is chromated, and because chromated waste should not be sent to the CVCS, the actual design appears correct (and consistent with other PWR designs).	X	

Mechanical-Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW lines penetrating containment	Conformance to GDC for containment isolation	P&ID M-66-1, Rev. AA W P&ID 1094EZ7, Rev. 7 FSAR Table 6.2-58 Both the CCW supply and return for the excess letdown Hx have single valve isolation. Table 6.2-58 states that GDC 57 is met for these lines. Section 3.1.2.5.8 and the GDC clearly state that for closed systems, one outside containment automatic isolation valve is acceptable. The design is adequate with respect to the applicable GDC for containment isolation. Redundant isolation valves are not required to provide adequate containment isolation because this CCW line constitutes a closed system.	X	
Excess letdown heat exchanger CCW side	ASME III Class 2	P&ID M-66-1, Rev. AA W P&ID 1094E27, Rev. 7 W Heat Exchanger Specification Data Sheet: F/L 27020210, 3/1/78 Consistently shown as ASME III Class 2.	X	

Mechanical-Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW pump discharge pressure instrumentation		P&ID M-66-3, Rev. Z W P&ID 1094E28, Rev. 11 W Precaution, Limitation and Setpoint document, Section 11B (Page 93) C&I M-2066-2, Rev. L		
	Local indication exists	Local indication is provided, one for each unit.	X	
	Main control room alarm at preset limit	There are four pressure switches on the CCW pump common discharge header, two for each unit, each with an alarm at 85 psig.	X	
CCWS sampling capability	Grab sample exists	P&ID M-66-4, Rev. AE W P&ID 1094E28, Rev. 11	X	
Corrosion inhibitor addition	Capable of adding corrosion inhibitor	P&ID M-66-2, Rev. W A chemical addition tank with connection to the CCWS provides this capability.	X	
Failure of air-operated containment isolation valves	Fail closed on loss of either electrical power or air	P&ID M-66-1, Rev. AA W P&ID 1094E27/7 Valves do fail closed as required.	X	
Surge tank connection to CCWS	Each tank has two 4" lines to pump suction. Each line has locked open valve(s).	P&ID M-66-4, Rev. AE W P&ID 1094C28, Rev. 11 Valve list, Rev. 51 (2/15/84) Line list (8/30/83) Pg. 26	X	

Mechanical-Stress

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Adequacy of rod hanger support for seismic loading	There should be no resultant uplift load under seismic loading.	Stress calculation 1CC01, Rev. 01F0, support No. 1 CC01046 R, Rev. B is a rod hanger in the safety-related system with seismic loadings.	X	
Seismic response	The input spectra for the analysis should conform with the response spectra design criteria.	This calculation report is reviewed for the use of seismic response spectra identified in the "Response Spectra Design Criteria", Document No. DC-ST-04-BB, Rev. 2, and "Lesson Plan", EMD-TP-2, Rev. 4.	X	

Piping Engineering

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Piping				
Codes & standards	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Design Spec Rev. 2, DS-CC-01-BB Art. 301 & 302 & 303	X	
Code cases	Reg. Guides 1.84 & 1.85	Design Spec DS-CC-01-BB, Art. 3 & Div. 10 of F/L 2741 & F/L 2739	X	
Materials	Piping Design Tables-F/L 2741	Design Spec DS-CC-01-BB, Rev. 2, Art. 503 & Design Tables		
Wall thickness	Press/Temp & Material Stress	105BB & 1505BB-Tables & Art. 402 of DS-CC-01-BB, Rev. 2	X	
Fittings	F/L 2741 - Lgr than 2" F/L 2739 - 2" & under	Design Spec DS-CC-01-BB, Rev. 2, Art. 503 & Design Tables 105BB & 1505 BB	X	
Fabrication	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	F/L 2741, F/L 2739 - Design Spec DS-CC-01-BB Art. 108	X	
Overpressure protection	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Design Spec DS-CC-01-BB Rev. 2, Art. 801 Spec F/L 2702	X	
Inspection/stamping	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Design Spec DS-CC-01-BB Rev. 2, Art. 305	X	

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Piping Engineering (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Piping (Cont)				
Hydrotest reqmt.	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Design Spec DS-CC-01-BB Rev. 2, Art. 404, & Art. 701, 702, 704	X	
Code data report	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	See Inspection/stamping	X	
NOTE: All piping components are carbon steel				
Valves (line) *				
Codes & standards	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda & ANSI B16.5	Design Spec F-2718-01, Art. 108.1	X	
Code cases	Reg. guides	Design Spec F-2718-01, Art. 108.1	X	
Materials (pressure boundary)	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Piping Design Tables 1058B & 1505BB. Response to FSAR Question 110.57 states that disc is not a pressure boundary		X
Construction rqmts.	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Design Spec F-2718-01, Art. 301, 300.6, & Art. 110.11	X	

* Does not apply to control, safety or relief valves

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Piping Engineering (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Valves (line) (Cont)				
Hydrotesting	ASME B&PV Code Sec. III, 1974, and Summer of 1975 Addenda	Design Spec F-2718-01, Art. 110.11g	X	
Code data reports	ASME B&PV Code Sec. III, 1974 & Summer 1975 Addenda	Design Spec F2718-01, Art. 110.10	X	
Containment Penetrations (Nos. P-22, P-25, P-48)				
Codes & standards	ASME B&PV Code, Sec. III-1974	Design Spec F-2787 (6/23/83) Art. 108 & Art. 303	X	
Code cases	Reg. Guides 1.84 & 1.85	Design Spec F-2787 (6/23/83), Art. 108-Dwg M-197	X	
Materials	ASME B&PV Code, Sec. III-1974	Design Spec F-2787 (6/23/83), Art. 304 - Dwg M-197	X	
Construction rqmts.	ASME B&PV Code, Sec. III-1974	Design Spec F-2787 (6/23/83), Art. 110.10 -111.3 & Dwg M-197	X	
Code data reports	ASME B&PV Code, Sec. III-1974	Design Spec F-2787 (6/23/83), Art. 111.3	X	
Penetration type/class	ASME B&PV Code Class 2 & MC	Design Spec F-2787 (6/23/83), Art. 111.3(a)	X	
Stress report	ASME B&PV Code 1974	Design Spec F-2787 (6/23/83), Art. 111.3(a)	X	
Data report	ASME B&PV Code 1974	Design Spec F-2788 (6/23/83), Art. 111.3(d)2	X	

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Plant Design

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip				
M-155 Sh. 1 of 2 Rev. L Line No.				
1 CC 54AA-2"	Line not damaged	Reviewed high energy line 1HSOIAD-30.25" for pipe whip impact effects on CCW system. FSAR Figure 3.6-32 shows break and restraint locations evaluated:		

Break No.	Code *	
C-9	(P-8)	X
C-9X	B (P-11)	X
C-11	B (P-11)	X
C-12	B (P-10, P-15)	X
C-15	B (P-10, P-15)	X
C-16	B (P-14)	X
C-16A	(P-14)	X

* Codes For Review of Documents

A. Pipe whip poses no danger (i.e.: whips in safe direction, protected by barrier).
B. Pipe whip restraint No. (___) required to protect essential system.
C. System could be damaged by high energy pipe due to lack of existing restraint.

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-155 Sh. 1 of 2 Rev. L Line No.				
1 CC 54BA-4"	Line not damaged	No high energy lines in close proximity.	X	
M-155 Sh. 2 of 2 Rev. J Line No.				
1 CC 54AA-2"	Line not damaged	1 CV 15CA-2" high energy line routed parallel to subject piping. There is no cause for failure due to criteria in FSAR 3.6.2.3.3.3.	X	
1 CC 54BA-4"	Line not damaged	Reviewed and found no high energy line in close proximity.	X	
1 CC 39CA-2"	Line not damaged	1 RC 22AA-1-1/2" high energy line routed near to subject piping. There is no cause for failure due to criteria in FSAR 3.6.2.3.3.3.	X	
M-156 Sh. 2 of 2 Rev. J Line No.				
1 CC 54AB-2"	Line not damaged	Reviewed and evaluated high energy line No. 1 CV 15CV-2". There is no cause for failure due to criteria in FSAR 3.6.2.3.3.3.	X	

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Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-157 Sh. 1 of 2 Rev. N Line No.				
1 CC 54AB-2" 1 CC 54AC-2" 1 CC 54BB-2" 1 CC 03E-3" 1 CC 54BB-4"	Line not damaged	Reviewed piping and found no high energy lines in close proximity that will damage CCW system piping. The only high energy line near the reviewed piping (1 CC 54BB-4") is 1 CV 01E-3". There is no cause for failure due to criteria in FSAR 3.6.2.3.3.3.	X	
M-157 Sh. 2 of 2 Rev. N Line No.				
1 CC 54AC-2" 1 CC 54AB-2" 1 CC 54BB-4"	Line not damaged	Reviewed piping and found no high energy piping that will cause failure to the CCW system piping. There is no cause for failure due to criteria in FSAR 3.6.2.3.3.3.	X	

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-158 Sh. 1 of 2 Rev. N Line No.				
1 CC 83A-3/4"	Line not damaged	Reviewed piping and found no high energy piping in close proximity.	X	
1 CC 82A-3/4"				
1 CC A3A-3"				
1 CC 54C-4"				
1 CC 54D-4"				
1 CC 54E-4"				
1 CC 54BA-4"				
1 CC 56A-3/4"				
1 CC 56B-3/4"				
1 CC 38B-6"				
1 CC 38C-6"				
1 CC 50C-6"				
1 CC 50E-6"				
1 CC 50C-3"				
1 CC 52B-3/4"				
1 CC 50D-6"				
1 CC 54BA-4"				
1 CC 54AD-2"				

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-158 Sh. 2 of 2 Rev. N Line No.				
1 CC 38C-6"	Line not damaged	Reviewed piping and found no high energy piping in close proximity.	X	
1 CC 54D-4"				
1 CC 56B-3/4"				
1 CC 56A-3/4"				
1 CC A3A-2"				
1 CC A3B-2"				
1 CC 78A-3/4"				
1 CC 52A-3/4"				
1 CC 79A-3/4"				
1 CC 52B-3/4"				
1 CC 05D-6"				
1 CC 39CD-2"				
1 CC 54AD-2"				
1 CC 54BA-4"				

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-161 Sh. 1 of 1 Rev. L Line No.				
1 CC 50AA-3" 1 CC 39AA-3" 1 CC 38FA-3" 1 CC 39BA-2" 1 CC F7AA-3/4" 1 CC D6AA-2" 1 CC 39CA-2" 1 CC 40AA-3/4" 1 CC 53AA-3/4"	Line not damaged	Reviewed high energy line No. 1FW03DA-16" for pipe whip effects on CCW system. FSAR Figure 3.6-25 shows pipe break & restraint locations: Break No. — Code B20A — A, B (R20B, R30B) B20B — A, B (R30B) B40A — B (R40B) B (R45B) B (R30A)		X X X X X
M-162 Sh. 1 of 1 Rev. L Line No.				
1 CC 39BB-2" 1 CC 50AB-3" 1 CC 39AB-3" 1 CC 38FB-3/4" 1 CC 50AB-3/4" 1 CC 53AB-3/4" 1 CC 40AB-3/4" 1 CC 39CB-2"	Line not damaged	Reviewed high energy line No. 1FW03DB-16" for pipe whip effects on CCW system. FSAR Figure 3.6-26 shows pipe break and restraint locations: Break No. — Code B55A — A, B (R60B) B30B — B (R35B) B (R45A)		X X X

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Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-163 Sh. 1 of 1 Rev. N Line No.				
1 CC 03GA-3" 1 CC H6BA-4" 1 CC 03GB-3" 1 CC H6AA-4" 1 CC 05AA-3" 1 CC 05AB-3"	Line not damaged	Reviewed piping and found no high energy piping in area. CCW piping isolated in compartment with excess letdown heat exchangers.	X	
M-163 Sh. 1 of 1 Rev. N Line No.				
1 CC 38FC-3" 1 CC 39AC-3" 1 CC 50AC-3" 1 CC F7AC-3/4" 1 CC D6AC-2" 1 CC 53AC-3/4" 1 CC 40AC-3/4" 1 CC 39BC-2" 1 CC 53AC-3/4" 1 CC 38FE-3"	Line not damaged	Reviewed high energy line No. 1FW03DC-16" for pipe whip effects on the CCW system. FSAR Figure 3.6-27 shows pipe break and restraint locations:		
		Break No. — Code		
		B80A — A, B (80B)	X	
		B80B — B (80B)	X	
		B (R95A)	X	
		B (R95B)	X	
		B110A — A	X	
		B115A — A	X	

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-164 Sh. 1 of 1 Rev. L Line No.				
1 CC 38C-6" 1 CC 05C-3" 1 CC 50C-6" 1 CC A7A-2"	Line not damaged	Reviewed piping and found no high energy piping in area.	X	
M-164 Sh. 1 of 1 Rev. L Line No.				
1 CC 50AD-3" 1 CC 39CD-2" 1 CC 53AD-3/4" 1 CC 39BD-2" 1 CC D6AD-2" 1 CC 40AD-3/4"	Line not damaged	Reviewed piping and found pipe whip from 1FW03DD-16" poses no danger because reactor coolant pump acts as barrier.	X	

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
CCW System Inside Containment - Pipe Whip (Cont)				
M-164 Sh. 1 of 1 Rev. L Line No.				
1 CC 38FD-3" 1 CC 39AD-2"	Line not damaged	Reviewed high energy line No. 1FW03DD-16" for pipe whip effects on the CCW system. FSAR Figure 3.6-28 shows pipe break and restraint locations:		
		Break No. — Code		
		B80A — B (R80B)	X	
		B (R85A)	X	
		B (R85B)	X	
		B95A — B (R85A)	X	
		B95B — B (R95A)	X	
M-165 Sh. 1 of 2 Rev. L Line No.				
1 CC 38D-4" 1 CC 50B-4" 1 CC 50C-6" 1 CC 38C-6"	Line not damaged	Reviewed CCW system piping and found no high energy line in close proximity.	X	
M-166 Sh. 1 of 2 Rev. K Line No.				
1 CC 50B-4" 1 CC 38D-4"	Line not damaged	Reviewed piping and found no high energy piping in close proximity.	X	

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-167 Sh. 1 of 2 Rev. P Line No.				
1 CC 50B-4" 1 CC 38D-4" 1 CC 05BA-3" 1 CC 03E-3" 1 CC 84AA-3/4" 1 CC 84AB-3/4" 1 CC 05BB-3" 1 CC 05BB-3" 1 CC 43AB-3" 1 CC 36A-3" 1 CC 03GB-3" 1 CC 43AA-3" 1 CC 05AB-3" 1 CC 05C-3" 1 CC 38FC-3" 1 CC 50AC-3" 1 CC 05AB-3" 1 CC 05AA-3" 1 CC H7BA-4" 1 CC H7AA-4" 1 CC 05C-3" 1 CC 03E-3"	Line not damaged	Reviewed piping and found no high energy piping that will cause failure to the CCW system piping.	X	

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
CCW System Inside Containment - Pipe Whip (Cont)				
M-167 Sh. 1 of 2 Rev. P (Cont) Line No.				
1 CC 38D-4" 1 CC 50B-4"	Line not damaged	Reviewed high energy line Nc. 1SI09AC-10" for pipe whip effects on CCW system. FSAR Figure 3.6-41 shows break and restraint locations: Break No. — Code B-570 — A B540A — A, B (R540B) B540B — A, B (R555B) Location: Column J/2	X X X	
M-168 Sh. 1 of 2 Rev. L Line No.				
1 CC 05C-3" 1 CC 38C-6" 1 CC 05C-6"	Line not damaged	Reviewed piping and found no high energy lines in area.	X	

APPENDIX A-3

ADEQUACY OF DESIGN PROCESS

Civil/Structural (Seismic)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Seismic response spectra for Category I structures and components	Project QA manual, Rev. 7, Section 4.3	Response spectra were developed by three different divisions of the structural department. All data are put together in a controlled criteria document titled "Response Spectra Design Criteria" and distributed to all departments for use in the design of structures and components.	X	

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Mechanical - Pipe Support and Stress

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Pipe support and pipe stress	Meets the design requirements of ASME B&PV Code, Sec. III, 1974, & Summer 1975 Addenda	PI-BB-14 Rev. 2, 9/14/81; Interface and info. flow between pipe support and pipe stress	X	
		PI-BB-16 Rev. 2, 5/16/83; Formal piping analysis and component support design	X	
		PG. 3 Rev. 0, 7/28/81; Guidelines for piping analysis	X	
		Subsystem 1SX072 was reviewed against the above documents (PI-BB-14 Rev. 2, PI-BB-16, Rev. 2 and PG-3 Rev. 0) to verify the design process	X	
		PI-BB-15 Rev. 2, 8/21/79; Component support design	X	
		PI-BB-21 Rev. 0, 11/2/81 Piping, piping analysis, piping support design organization	X	
		PI-BB-34 Rev. 0, 3/2/83; Documentation of hanger loads	X	
		PI-BB-25 Rev. 0, 8/29/83; Onsite stress design	X	
		PI-BB-28 Rev. 3, 8/4/83; Piping design, support design and analysis, field personnel	X	
		PI-BB-29 Rev. 3, 8/2/83; Distribution & control of design documents	X	

Mechanical - Pipe Support and Stress (Cont)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Pipe support and pipe stress (Cont)	Meets the design requirements of ASME B&PV Code, Sec. III, 1974, & Summer 1975 Addenda	Status list of pipe support elements (This computerized list was checked for traceability of the status of supports)	X	
		PI-BB-32 Rev. 0, 8/5/83; Organization of S&L personnel assigned to the field	X	
		PI-BB-08 Rev. 5, 2/9/84; Processing of NCR & ECN	X	
		PI-BB-13 Rev. 9, 3/16/84; FCRS	X	
		ECN 9916, 3/20/84, for support 1SX17 053G Rev. C ECN 9053, 11/5/83, for support CC01010X Rev. G Above ECNs were reviewed to check the procedure PI-BB-08 Rev. 5	X	
		Validation & certification for computer programs. Aux. STL. 20.1 896-0.0D/09.7.; 191.4.0D 8/26/83 Frame, 20190500 D/09.7.20G-1.0I; 10/20/83 Sups/cinch 20 1870/09.7.200 - 1.0; 7/29/83 Pipsys 09.5.065-5.5/205730-0.0; 2/10/83	X	

APPENDIX A-4

DESIGN INTERFACES WITH WESTINGHOUSE (W) AND NUCLEAR POWER SERVICES (NPS)

Control Systems

Company	Interface Reviewed	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
W	Westinghouse P&ID redraw to S&L format	Westinghouse flow diagram CCW 1094E28 Rev. 11, 3/29/82 S&L diagram of component cooling water M-66, Sheet 3 of 4 Rev. Z, 3/5/83	X	

APPENDIX A-4

Mechanical-Pipe Support

Company	Interface Reviewed	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
NPS	Criteria for small pipe support and stress analysis	The following S&L standard documents are provided to NPS to meet the project commitments o Spec. 109 with Amendment #2, 11/29/83 o EMD Calc. 015140, dead wt. thermal & seismic loadings o EMD Calc. 021574, Rev. 4, support location o MSS 6.1.D, Std. Spec. for pipe support o Mech. Component Support Design Ref. Manual, Rev. 4 o Seismic criteria and respnse spectra o Request for information forms	X	

Mechanical-Pipe Support (Cont)

Company	Interface Reviewed	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
NPS (Cont)	S&L reviews of small pipe support and stress analysis	o Following QA audits were conducted by S&L to meet project requirements Audit # E-11 5/13-16/83 E-10 11/18/82 E-7 4/22/82 E-5 9/21-22/81 E-4 5/15-18/81 Audit # E-11 was reviewed Stress analysis technical audit by S&L and the reports provided via the following interoffice memos: IOM from L.G. Vetter to W.C. Cleff, 12/11/81 IOM from S.A. Boline to E.B. Branch, 1/19/83	X	

APPENDIX A-5

DESIGN CHANGE CONTROL

Mechanical-Stress

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
FCRs/ECNs	The pertinent FCRs/ECNs have been addressed and the reconciliation practice is acceptable. The applicable documents are listed in Appendix A-3.	X	

Mechanical - Process

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
Refer to Appendix D-5			

APPENDIX B

ESSENTIAL SERVICE WATER (ESW) SYSTEM

APPENDIX B-1

IDENTIFICATION/IMPLEMENTATION OF COMMITMENTS AND CRITERIA

Civil/Structural (Seismic)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	No
Seismic Design & Analysis			
Seismic input motion & response spectra (FSAR 2.5.2, 3.7.1.1 & 3.7.1.2 & NRC Reg. Guide 1.60, NRC Q130.5, 130.6, 130.6a)	Same as Appendix A-1. (Seismic design and analysis)	X	
Damping values used (FSAR 3.7.1.3 & WCAP-7921-AR, May 1974)		X	
Use of constant vertical static factors (FSAR 3.7.3.10)		X	
Torsional effects of eccentric masses (FSAR 3.7.3.11)		X	

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Civil/Structural

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Expansion Anchors			
	Refer to Appendix A-1 (Expansion Anchors)	X	
Stability of Subsurface & Slope			
River screenhouse, Makeup line, deep wells			
Responses to NRC Questions 241.1 thru 241.6	Evaluation of liquefaction potential and factor of safety. Calc. file # SAD 8.11.4	X	
Earthquake design basis (FSAR 2.5.4.9)	Structural design criteria, seismic response spectra criteria	X	
Static and dynamic stability (FSAR 2.5.4.10)	Calculation file # SAD 8.11.4	X	
River screenhouse slopes Minimum factor of safety for SSE+ rapid drawdown is larger than 1.1	Calculation file # SED 2.1.2	X	
FSAR 3.7, SER 3.7.1, NRC Questions 130.9 & 130.9A	1) Structural design criteria # DC-ST-03-BY/BR 2) Response spectra design criteria # DC-ST-04-BB 3) S&L calculation # SED, 2.1.1 and 2.1.2.	X	

Civil/Structural (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
The river screenhouse is designed for the following extreme loading conditions: - SSE + max. flood of record - OBE + combined event flood (FSAR 3.8.4.3)	These load combinations are considered in the evaluation of the stability of river screenhouse. Refer to calc. No. 2.1.2.1 dated 12/14/76	X	
The river screenhouse is supported on a 3 foot 0 inch thick mat foundation resting at elevation 666 feet 0 inch and 660 feet 6 inches. (FSAR 3.8.5.1.4)	This FSAR commitment is satisfied. Refer to following drawings. S-412-BY, Rev. G S-413-BY, Rev. J S-414-BY, Rev. E	X	
The following load combinations for overturning, sliding and flotation have been considered: (FSAR 3.8.5.3) (a) D + H + E (b) D + H + W (c) D + H + E^1 (d) D + H + W_t (e) D + F^1	The river screenhouse is evaluated for overturning, sliding and flotation for load combinations a, b, c, and e. Refer to calc. No. 2.1.2.1 dated 12/14/76 Load combination d is not considered. Refer to FSAR Table 3.2-1, Note 1, for justification.	X	

Where: D=dead load; H=lateral earth pressure; E=SSE; E^1=OBE; W=design wind load; W_t=design basis tornado; F^1=design basis flood

Civil/Structural (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Buried Essential Service Water Piping - Makeup lines 12" and 48" dia. (FSAR 2.5.4 Question 10.8)	Analysis of buried ESW 48" dia. piping (min. 25')		X
Stability of subsurface materials and seismic refraction survey	File EMD-033898, Oct. 21, 1981		
Groundwater control backfill surveillance	Dwg. M-900-2 & 3 Rev. E. outdoor piping M-900-1,4,6,7,8,9,13 outdoor piping	X	
Evaluation of liquefaction potential	FSAR Attachment 2.5H	X	
Slope stability (FSAR 2.5.5)	SER licensing condition- groundwater monitoring letter-report To J.T. Westermeier (CECo) from R. J. Netzel (S&L) Dec. 15, 1983 File 1.1/3.3.5	X	
Soil/structure interaction (FSAR 3.7.2)	Q/R 241-1 thru 241-6	X	

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Control Systems

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Placing the local selector switch in the local operating position gives an annunciating alarm in the control room (FSAR 7.4.1.2.1.d)	M-4042-1SX03 Rev. E 12/28/83 O-4030-SX09 Rev. F 2/10/84	X	
Leak detection is provided by means of system flow and pressure drop instrumentation and by means of leak detection sumps in the auxiliary building basement. Radiation monitors are provided to detect inleakage of radioactive material as discussed in Section 11.5. (FSAR 9.2.1.2.4)	M-4042-1SX02 Rev. C 12/28/83 M-42 Sht. 5 Rev. T 9/12/83	X	
A control switch is provided for each pump on the main control board (FSAR 7.3.1.1.7.a)	M-4042-1SX03 Rev. E 12/28/83 M-42 Sht. 1 Rev. S 12/23/82	X	
A transfer switch (remote, local) and a control switch are provided on the remote shutdown panel for each pump (FSAR 7.3.1.1.7.a)	M-4042-1SX03 Rev. E 12/28/83 M-42 Sht. 1 Rev. S 12/23/82	X	
The pump can be started manually provided that the pump suction valve and RCFC inlet and outlet valves of the corresponding safety train are open (FSAR 7.3.1.1.7.a.1)	M-4042-1SX03 Rev. E 12/28/83	X	

(1106o)

Control Systems (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
The pump can be started automatically by a safety injection signal provided that the suction valve is open (FSAR 7.3.1.1.7.a.1)	M-4042-1SX03 Rev. E 12/28/83	X	
Protective relays will trip the motor breaker open on over current conditions (FSAR 7.3.1.1.7.a.1)	M-4042-1SX03 Rev. E 12/28/83	X	
Low suction pressure at the pump will trip the pump off the line automatically and will sound a low suction pressure alarm on the main control board (FSAR 7.3.1.1.7.a.1)	M-4042-1SX03 Rev. E 12/28/83 1-4030-SX01 Rev. J 2/21/84	X	
The pump can be stopped manually, provided the safeguards actuation relays are reset (FSAR 7.3.1.1.7.a.1)	1-4030-SX01 Rev. J 2/21/84	X	
A pressure gauge and transmitter are provided in each pump discharge line for pressure indication locally and on the main control board (FSAR 7.3.1.1.7.a.2)	M-42 Sht. 1 Rev. S 12/23/82 M-2042 Sht. 2 Rev. E 12/28/83	X	
An ammeter is provided on the main control board to display motor current (FSAR 7.3.1.1.7.a.3)	1-4030-SX01 Rev. L 2/18/84	X	

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Control Systems (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Bearing temperatures for each pump and motor are sensed by thermocouples and monitored by the computer. Motor stator winding temperature is sensed by an RTD and monitored by the computer (FSAR 7.3.1.1.7.a.4)	1-4031-SX07 Rev. A 12/10/80	X	
A main control board alarm is annunciated whenever the transfer switch on the remote shutdown panel is in the local position. Placing the main control board control switch in pull-to-lock provides a signal to the ESF display system (FSAR 7.3.1.1.7.a.5)	0-4030-SX09 Rev. F 2/10/84 4042-1SX08 Rev. C 12/28/84	X	
A control switch is provided on the main board for each (suction) valve. Limit switches on each valve will provide (suction) valve position indication on the main control board (FSAR 7.3.1.1.7.b)	M-4042-1SX02 Rev. C 12/28/83	X	
Two switches are provided on the main control board for each cooling tower fan, one for high speed and one for low speed (FSAR 7.3.1.1.7.h.1)	M-4042-1SX12 Rev. C 12/28/83 M-4042-1SX13 Rev. C 12/28/83	X	

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Control Systems (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
A control and transfer switch are provided for the fan low speed winding on the remote shutdown panel. A local control alarm is annunciated at the main control board whenever the transfer switch is placed in the local position (FSAR 7.3.1.1.7.h.2)	M-4042-1SX12 Rev. C 12/28/83	X	
Contacts on each circuit breaker are used to prevent both high and low speed breakers from being closed at the same time (FSAR 7.3.1.1.7.h.3)	M-4042-1SX12 Rev. C 12/28/83 M-4042-1SX13 Rev. C 12/28/83	X	
The service water riser valve in the corresponding cooling tower section must be fully open to start the fan (FSAR 7.3.1.1.7.h.4)	M-42 Sht. 7 Rev. G 1/2/80 M-4042-1SX12 Rev. C 12/28/83 M-4042-1SX13 Rev. C 12/28/83	X	
Category I level controllers (switches) are provided in each ESW cooling tower basin. In the event of low level in a cooling tower basin, the corresponding makeup pump is started (FSAR 9.2.5.5)	M-42 Sht. 6 Rev. V 4/4/84 M-4042-1SX08 Rev. C 12/28/84 M-2042 Sht. 5 Rev. E 1/16/81 Byron Station Unit 1 Instrument Index (Blue) SX Rev. 34 Pg 12 3/30/84	X	

Control Systems (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Annunciation is transmitted to the main control room indicating "engine trouble" (shutdown) for each engine (FSAR 9.2.5.5)	M-4042-1SX08 Rev. C 12/28/83 0-4030-SX09 Rev. F 2/10/84 0 4030-SX23 Rev. F 12/9/83	X	
A fail to start signal is also transmitted to the main control room if a diesel engine fails to start subsequent to receipt of an automatic signal to start (FSAR 9.2.5.5)	M-4042-1SX08 Rev. C 12/28/84 0-4030-SX09 Rev. F 2/10/84 0-4030-SX23 Rev. F 12/9/83 0-4030-SX24 Rev. C 11/20/80		X
A Category I sensing element and temperature controller is provided for each cooling tower train for each unit. The controller provides visual indication of temperature in the control room (FSAR 9.2.5.5)	M-42 Sht. 7, Rev. G 1/2/80 M-42 Sht. 1, Rev. S 12/23/82 Byron Station Unit 1 Instrument Index (Blue) SX Page 13 Rev. 54 3/30/84	X	
The controller also maintains the cooling water temperature between 50° and 80°F in the basins by operating the bypass valves	S&L instrument data sheet TS 21 Rev. G 1/27/84	X	

Equipment Qualification - Seismic

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Seismic Analysis of Pumps (FSAR 3.9.3.2.1.1)			
Nozzle loads for the applicable plant conditions must be applied	Section 10.5 of Form 350-B, "Standard Specification for Seismic Qualification".	X	
Analysis of interaction between pump and motor is considered	Section 10.6 of Form 350-B, "Standard Specification for Seismic Qualification".	X	
For pumps having a natural frequency greater than 33 Hz, static analysis is acceptable. For pumps with a natural frequency less than 33 Hz, a dynamic or pseudodynamic analysis is performed	Section 10.7 of Form 350-B, "Standard Specification for Seismic Qualification".	X	
Seismic qualification of balance-of-plant safety-related mechanical equipment (testing or analysis) (FSAR 3.9.2.2.2)	Form 350-B "Standard Specification for Seismic Qualification" 9/19/75	X	
Seismic qualification of pumps and motors (BOP), reference IEEE-344-75 (testing or analysis) (FSAR 3.9.3.2.1.1)	Form 350-B "Standard Specification for Seismic Qualification" refers to latest revisions of IEEE standards listed in project purchase specification. IEEE-344 is referenced in purchase specifications. The Component Qualification Division checklist for seismic review indicates whether reports meet requirements of 344-75.	X	

Equipment Qualification - Seismic (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Design loading combination for ASME Code Class 2 and 3 components and supports (FSAR Table 3.9-5)	Form 350-B "Standard Specification for Seismic Qualification" Section 1.2.1 specifies the loading combinations for upset and faulted conditions.	X	
Stress criteria for safety-related ASME Class 2 and Class 3 vessels (Reference ASME III, Subsections NC & ND or Code Case 1607) (FSAR Table 3.9-6)	Form 350-B "Standard Specification for Seismic Qualification" Section 10.3 states "The stress limits for nonactive fluid system equipment shall be as stated in the ASME BPVC Section III." (Current revision per Form 350-B.)	X	
Stress criteria for ASME Class 2 and Class 3 inactive pumps and pump supports (Reference ASME III, Subsections NC & ND or Code Case 1607) (FSAR Table 3.9-7)	Form 350-B "Standard Specification for Seismic Qualification" Section 10.3 states "The stress limits for nonactive fluid system equipment shall be as stated in the ASME BPVC Section III." (Current revision per Form 350-B.)	X	
Design criteria for active pumps and pump supports (FSAR Table 3.9-8) Note: Stress limits specified are more restrictive than the ASME III limits to provide assurance of operability.	Form 350-B, Section 10.3.2, "Stress Limits for Active Fluid System Equipment", lists stress limits for upset and faulted conditions. Upset stress limits reference ASME Section III. Faulted stress limits are held to emergency condition stress levels specified in FSAR.	X	
Stress criteria for safety-related ASME Code Class 2 and Class 3 inactive BOP valves (Reference ASME III, Subsections NC and ND or Code Case 1635) (FSAR Table 3.9-9)	Form 350-B "Standard Specification for Seismic Qualification". Section 10.3 states, "The stress limits for nonactive fluid system equipment shall be as stated in the ASME BPVC Section III." (Current revision per Form 350-B.)	X	

Equipment Qualification - Seismic (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
BOP design criteria for active valves (Reference ASME III Subsections NC3500 and ND3500) (FSAR Table 3.9-10)	Form 350-B, Section 10.3.2, "Stress Limits for Active Fluid System Equipment", lists stress limits for upset and faulted conditions. Upset stress limits reference ASME Section III. Faulted stress limits are held to emergency condition stress levels specified in FSAR.	X	
Applicant will comply with IEEE-382-1972 "Trial Use Guide for the Type-Test of Class 1 Electric Valve Operators for Nuclear Power Generating Stations". (FSAR A1.73-1 - Reg. Guide 1.73)	Purchase Spec. F/L 2884 attachment "E" (Limitorque motor operator) references IEEE-382-72.	X	

Mechanical - Pipe Support

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
See Appendix A-1			

Mechanical - Process

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Two full-capacity coolers for each piece of essential equipment are available in each unit (FSAR Table 9.2-2)	P&ID M-42 Sh 1, Rev. S P&ID M-42 Sh 3, Rev. AC P&ID M-42 Sh 4, Rev. AC P&ID M-42 Sh 5, Rev. T P&ID M-42 Sh 6, Rev. V P&ID M-42 Sh 7, Rev. G P&ID M-42 Sh 8, Rev. D S&L Design Criteria, DC-SX-01-BB Rev. 3	X	
System satisfies single-failure criteria since all its components are multiple and redundant. (FSAR 9.2.1.2.3)	P&ID M-42 Sh 1, Rev. S P&ID M-42 Sh 2, Rev. Y P&ID M-42 Sh 3, Rev. AC P&ID M-42 Sh 4, Rev. AC P&ID M-42 Sh 5, Rev. T P&ID M-42 Sh 6, Rev. V P&ID M-42 Sh 7, Rev. G P&ID M-42 Sh 8, Rev. D S&L Design Criteria, DC-SX-0 -BB, Rev. 3	X	
Leak detection is provided by means of flow and pressure drop instrumentation and by leak detection sumps in auxiliary buildin basement. (FSAR 9.2.1.2.4)	P&ID M-42, Sh 1, Rev S P&ID M-42, Sh 2, Rev. Y P&ID M-42, Sh 3, Rev AC P&ID M-42, Sh 4, Rev AC P&ID M-42, Sh 5, Rev T P&ID M-42, Sh 19, (FSAR Fig. 11.2-20) P&ID M-42, Sh 28, (FSAR Fig. 11.2-27)	X	

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Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Emergency power is available to each ESW pump from its respective ESF bus. (FSAR 9.2.1.2.2)	P&ID M-42, Sh 1, Rev. S One line diagram 6E-1-4001A, Rev. D Scheme diagram 1-4030 SX01, Rev. J Scheme diagram 1-4030 SX02, Rev. J	X	
Pump suction supply is from basin located at grade level of cooling towers. Pumps are 70 feet below grade in lowest area of auxiliary building. Each pump has 81 feet of available NPSH based on minimum basin water level and 21 feet of friction loss in supply line. The 81 feet NPSH meets the 32 feet required by pumps at design capacity. (FSAR 9.2.1.2.3)	S&L Calc No. SX-2-76, Rev. 1 Outdoor Piping Dwg. No: M-900, Sh 8, Rev. U M-900, Sh 9, Rev. N Aux. Bldg. Piping Plan Elev. 330'-0", M-206, Sheet 1, Rev. N S&L Spec F-2758A, Amendment 2, 6/2/83	X	
ESW system, including supply lines, pumps, and return lines is designated Safety Class 1, Quality Group C (FSAR 9.2.1.2.3)	S&L Spec F-2758A, Amendment 2, 6/2/83 S&L Spec F-2749, Amendment 1, 6/15/83 S&L Design Criteria, DC-SX-01-BB, Rev. 3 P&ID M-42, Sh 1, Rev. S P&ID M-42, Sh 2, Rev. Y P&ID M-42, Sh 3, Rev. AC P&ID M-42, Sh 4, Rev. AC P&ID M-42, Sh 5, Rev. T P&ID M-42, Sh 6, Rev. V P&ID M-42, Sh 7, Rev. G	X	

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Each loop in each unit is supplied by a single pump rated at 24,000 gpm at 180 feet TDH (FSAR 9.2.1.2.2)	S&L Spec F-2758A, Amendment 2, 6/2/83 Bingham-Willamette Pump Performance Curve No. 35484, 6/27/78 P&ID M-42 Sh 1, Rev S	X	
Discharges from each loop are separate and fed to two separate and redundant return lines to the cooling towers (FSAR 9.2.1.2.2)	P&ID M-42 Sh 2, Rev. Y P&ID M-42 Sh 7, Rev. G Piping Arrangement Dwg: M-900 Sh 1A Rev AC M-900 Sh 1C Rev AH	X	
Each of the two pumps in a given unit takes suction from a separate supply line running from the cooling towers to the auxiliary building (FSAR 9.2.1.2.2)	P&ID M-42 Sh 1, Rev. S P&ID M-42 Sh 6, Rev. V Piping Arrangement Dwg: M-900 Sh 1A Rev AC M-900 Sh 1C Rev AH	X	
Radiation monitors are provided to detect inleakage of radioactive material (FSAR 9.2.1.2.4)	P&ID M-42, Sh 3, Rev AC P&ID M-42, Sh 5, Rev T	X	
The crosstie header valves on the discharge of each pair of ESW pumps are powered from separate ESF buses (FSAR 9.2.1.2.2)	P&ID M-42 Sh 1, Rev. S Scheme diagram 1-4030 SX13, Rev. C	X	

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Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
The suction line valves are each assigned to the same ESF bus as the associated pump (FSAR 9.2.1.2.2)	P&ID M-42 Sh 1, Rev. S Scheme diagram 1-4030 SX05, Rev. C	X	
System is treated periodically to control organic slime buildup (FSAR 9.2.1.2.5)	Design Criteria, DC-SX-01-BB, Rev. 3 P&ID M-42 Sh 1, Rev. S P&ID M-42 Sh 6, Rev. V P&ID M-42 Sh 8, Rev. D	X	
Only essential heat loads are rejected to the cooling towers during normal or emergency operation (FSAR 9.2.5.1)	Drawing M-42 (Sh 1-Rev S, Sh 2-Rev Y, Sh 3-Rev AC, Sh 4-Rev AC, Sh 5 - Rev T, Sh 6-Rev V, Sh 7-Rev S and Sh 8-Rev D)	X	
System diagram is provided as FSAR Figure 9.2-2 (FSAR 9.2.5.2)	Drawing M-42 (Sh 1-8, revision as noted above)	X	
Each cooling tower is supplied by a separate makeup train consisting of a pump and supply line (FSAR 9.2.5.2)	Drawing M-42 (Sh 6-Rev V)	X	
Deep well system is available as a Seismic Category II, Quality Group D makeup system (FSAR 9.2.5.2)	Dwg M-83 (Sh 1-Rev D)	X	

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	No
Onsite well system is not effected by a flood more severe than the combined event flood (FSAR 9.2.5.2)	FSAR Table 2.4-12 and FSAR Figure 2.4-24, providing the defined flood levels and showing the deep well locations and elevations	X	
Blowdown system for the towers is non-essential and is Seismic Category II (FSAR 9.2.5.2)	Dwg M-42 (Sh 7-Rev G)	X	
Failure of Oregon Dam concurrent with low river discharge results in a Rock River elevation of 664 ft msl (FSAR 9.2.5.3)	SER 2.4.8 accepts the hydrology presented in FSAR 2.4.8	X	
A Category I temperature controller is provided to activate each of two bypass valves per tower (FSAR 9.2.5.3)	Dwg. M-4042-18x10-Rev C Instrument Index, Byron Station Unit 1 (Blue), Rev 54 dated 3/30/84	X	
Bypass valves open at 50° and close at 80° F (FSAR 9.2.5.3)	S&L Instrument Data Sheet TS21, Rev. G	X	
The average wind speed across the tower basin is 10.7 mph (FSAR 9.2.5.3)	FSAR Chapter 2.3 Meteorological Data	X	
A 4.2 mph wind speed results from use of the half-speed fans (FSAR 9.2.5.3)	Specification F-2848 Amendment 2 (2/9/79)	X	
There are four cells per tower, each rated at 13,000 gpm with a 98°F cold water supply temp, a 138°F post-accident return temp and a 78°F wet bulb (FSAR 9.2.5.3)	Specification F-2848 Amendment 2 (2/9/79)	X	

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Assuming loss of one tower, the second tower can lose one cell and still provide adequate cooling for one unit undergoing post LOCA cooldown & the other unit undergoing hot shutdown (FSAR 9.2.5.3)	Specification F-2848 Amendment 2 (2/9/79), and Memo: B. H. Yee to J. C. Lavallee dated 3/18/75, file MAD 75-081	X	
Table 9.2.-6 shows heat loads rejected to the tower for the unit undergoing post-LOCA cooldown (FSAR 9.2.5.3)	Memo: B. H. Yee to J. C. Lavallee dated 3/18/75, file MAD 75-081	X	
Figure 9.2-5 shows the energy input to the containment vs. time (FSAR 9.2.5.3)	Memo: B. H. Yee to J. C. Lavallee dated 3/18/75, file MAD 75-081	X	
Figure 9.2-6 shows the heat removal rate vs. time for one reactor containment fan cooler and one RHR heater (FSAR 9.2.5.3)	Memo: B. H. Yee to J. C. Lavallee dated 3/18/75, file MAD 75-081	X	
Figure 9.2-7 shows the LOCA and cold shutdown heat rejection rate to the essential service water system (FSAR 9.2.5.3)	Memo: B. H. Yee to J. C. Lavallee dated 3/18/75, file MAD 75-081	X	
Worst case 3 hr meteorology is 76°F wet bulb, 110°F dry bulb (FSAR 9.2.5.3)	SER 2.4.8 accepts the meteorological data presented in FSAR 2.4.8	X	
Worst case 24 hr meteorology is 73°F average wet bulb, and 90.5°F average dry bulb (FSAR 9.2.5.3)	SER 2.4.8 accepts the meteorological data presented in FSAR 2.4.8	X	

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Based on above meteorology, 10.4 gpm of drift losses, 1000 ppm of TDS and continuous heat rejection of 580×10^6 Btu/hr post-LOCA: 24 hr / 3 hr Evap rate, gpm: 970.4 / 1092.4 Blowdown rate, gpm: 564.8 / 636.0 Makeup rate, gpm: 1545.6 / 1738.8 (FSAR 9.2.5.3)	Memo: B. H. Yee to J. C. LaVallee dated 3/18/75, file MAD 75-081	X	
Worst case heat transfer to atmosphere of 82°F wet bulb (3 hrs) results in a cold water outlet temp of 94.6°F at a heat rejection rate of 580×10^6 based on predicted tower performance (FSAR 9.2.5.3)	Memo: B. H. Yee to J. C. LaVallee dated 3/18/75, file MAD 75-081	X	
SX makeup pumps can be started manually from the control room, or locally at the river screenhouse, or automatically via level controls in the cooling tower basins (FSAR 9.2.5.3)	M-4042-1SX08, Rev. C 0-4030-SX09, Rev. F 0-4030-SX23, Rev. F 0-4030-SX30, Rev. C	X	
Category I level controllers are provided in each essential service water cooling tower basin (FSAR 9.2.5.5)	M-42 (Sheet 6, Rev. V), M-4042-1SX08, Rev. C, M-2042 (Sheet 5, Rev. E) and Byron Station Unit 1 Instrument Index (Blue), SX, Rev. 34, page 12	X	

Mechanical - Process (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
The SX makeup pump is automatically started upon low level in the corresponding tower basin (FSAR 9.2.5.5)	Dwg M-4042-ISX08 Rev C	X	
Local alarms and shutdown equipment in the SX makeup pump diesel drivers are provided for: - High cooling water temp in closed cooling water system - Low lubricating oil pressure - Engine overspeed (FSAR 9.2.5.5)	O-4030-SX24, Rev. C O-4030-SX09, Rev. F	X	
Annunciation is transmitted to CR indicating "engine trouble" for each SX makeup pump diesel engine (FSAR 9.2.5.5)	M-4042-1SX08, Rev. C O-4030-SX09, Rev. F O-4030-SX23, Rev. F	X	

Mechanical - Stress

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Loading combinations, design transients, and stress limits (FSAR 3.9.3.1)	S&L document "Piping Design Spec. for Indoor Essential Service Water System" Document No. DS-SX-01-BB, Rev. 4	X	

Piping Engineering

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
System is Safety Category I/Quality Group C (FSAR 9.2.1.2.3)	S&L P&IDs M-42 Sheets 1-7 Mech. Dept S&L piping line list, page 147 (Rev. not shown)	X	
Design basis Max temp 189°F (Design Spec DS/SX-01/BB Rev. 4) Art. 403)	Mech. Dept. S&L piping line list, page 147	X	
Design pressure 125 psig-pump shut off head 115 psig	Pump curve Bingham-Willamette #35437		
Piping materials (Not in FSAR)	S&L piping design, Table 105BB Rev. E, 1.1 & 1.2 1/28/77	X	
Piping joints (Not in FSAR)	S&L Piping Design Table 105BB Rev. E 1/28/77 Type of fabrication	X	
Relief valves (none)	Piping design spec DS-SX-01-BB Rev. 4 12/22/83	X	
All valve bodies B/W-Carbon steel-stellite or stainless steel trim (Not in FSAR)	S&L piping design Table 105BB Rev. E	X	

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APPENDIX B-2

DESIGN ADEQUACY

Civil/Structural

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
River Screenhouse				
Structural steel design, Calculation 2.1.1.14	AISC Manual, Structural design criteria	Calculation 2.1.1.14, structural steel framing included revised response spectra and loads due to the increased responses as a result of NRC Q130.9 & 130.9A.	X	
Substructure Calc. 2.1.2.7	ACI 318.71, Structural design criteria	Calculation 2.1.2.7, page 18 indicates that OBE loads are not considered with the screenhouse partially dewatered. However, since the water level drops down only during building maintenance and the system will not be in operation, the calculation assumption is reasonable.	X	
Substructure Calc. 2.1.2, Rev. 0 Dynamic water pressure	Structural design criteria	Calc. 2.1.2.7, Rev. 0, considers the dynamic water pressure effects of the vertical earthquake component. The formulas given on page 12-6 of the structural design criteria were used in the calculations and are acceptable based on information given in References 83 and 84, Sec. 2.5.7 of the FSAR.	X	

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Civil/Structural (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
River Screenhouse (Cont)				
Check a sample of fillet welds design	AISC Handbook Eighth Ed.	Calc. 2.1.1.6, pg 5. Our independent check of fillet weld shear bar to plate for combined shear force & bending indicated a 10% overstress which was determined to be within acceptable range.	X	
Structural steel design of floor beams	Structural design criteria, AISC Handbook	Calc. 2.1.1.16, page 2 infers underdesigned condition, but this is misleading. The revised cross sections are included in Calc. 2.1.1.17, pg. 6, Rev. 2.	X	
Horizontal steel bracing members at el. 744-4, 716-0, 702-0 and 699-6	The stresses and strains of structural steel are limited to those specified in AISC specification. No overstress is allowed for severe environmental load combination. The allowable loads are increased to 1.6 times the AISC allowable but not more than 0.95 times the steel yield strength for abnormal, extreme environmental,	Calc. No. 2.1.1.2 dated 1/27/77 Design of horizontal steel bracing members is reviewed. The forces in the bracing members are computed and $2L3x3x1_4$ are provided for all bracing members. It is verified to be adequate by independent calculation.	X	

Civil/Structural (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
River Screenhouse (Cont)				
Horizontal...(Cont)	abnormal/severe environmental and abnormal/extreme environmental load combinations. The steel yield strength can be actual average material yield strength based on mill certification.			
Design of column base plate	Same as in previous item	Calc. No. 2.1.1.14, page 255, dated 2/24/82. Bending stress in the base plate for column A-1 seems to exceed the committed allowable of (0.95 Fy) = 40.2 ksi. Our independent calculations indicate that a thicker base plate is required.		X
Design of concrete structures, walls, slabs and mat foundation	The allowable stresses and strains of various structural components are based on the ultimate strength design provisions in ACI-318.	Portions of Calculations 2.1.2.1 thru 2.1.2.12 are reviewed. The design is found to be generally adequate	X	

Civil/Structural (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
River Screenhouse (Cont)				
Factor of safety against flotation overturning and sliding	Factor of safety shall be 1.1 minimum.	Calc. No. 2.1.2.1 dated 12/14/76 Factor of safety against flotation overturning and sliding under various loading condition is in excess of 1.2.	X	
Stability of Subsurface and Slope				
River screenhouse, makeup line & deep wells				
Envelopes of three earthquakes to study liquefaction effects	FSAR 2.5.4.8.3.4, Minimum factor of safety specified below foundation level is 1.7.	Calculations related to NRC Question 241.4 & response presented in the SER, Q241.4-1	X	
Expansion Anchors				
		Refer to Appendix A-1 (expansion anchors)	X	

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Civil/Structural (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Buried Essential Service Water Piping - Makeup Lines 12" and 48" dia.				
Pipe stresses due to OBE and SSE	ASME Section III	EMD File 033898 Appendix A indicates that shear wave velocities were assumed higher than the test data, resulting in pipe stress reduction of factor of safety by 10% but it is negligible since the lowest FS = 4.5.	X	
Soil/structure interaction - liquefaction potential	Groundwater level should be below El. 840 ft (msl)	A system of four observation wells was installed indicating levels below El 809 ft.	X	

Control Systems

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Seismic instrument tube span calculation	ASME B&PV Section III Article NC-3650	Procedure/calculation EMD 015140, Rev. 4 Calc. EMD 015139, Rev. 0 Calc. EMD 030898, Rev. 0 Calc. EMD 030653, Rev. 0 Calc. EMD 019583, Rev. 0 Calc. EMD 042097, Rev. 0	X	

Equipment Qualification-Seismic

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Qualification report temperature switch supplier - United Electric. (Inst. #'s OTS-SX090 through -SX093)	IEEE-344-1975 Purch. Spec. F/L 2906	CQD File 012090 Rev. 0 CQD File 012462 Rev. 0 Wyle Report # 17619-1	X	
Qualification report ESW cooling tower fan motor Supplier - Reliance Electric	IEEE-344-1975 Purch. Spec. F/L 2848	EMD File 013705 EMD File 014044	X	
Qualification report 200 hp water make-up pump drive and control panel Supplier - Stewart & Stevenson Services	IEEE-344-1975 Purch. Spec. F/L 2891	EMD File 019783, Wyle Report # 44490-1 (Note - Revised 1982 river screenhouse spectra were considered.)	X	
Qualification report Limitorque motor operators - generic qualification	IEEE-344-1975 IEEE-382-1972 Purch. Specs. F/L 2718, 2794, 2884	CQD File 006450 Rev. 0	X	

Mechanical - Process

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
System redundancy to satisfy single-failure	All essential components are multiple and redundant	Design Criteria DC-SX-01-BB Rev. 3 and FSAR Table 9.2-1 (Amendment 43) have been reviewed and compared to P&ID M-42 Sh 1 to 8 for general completeness and consistency in meeting the component redundancy requirement. Safety Category I Class C components in the ESW system are redundant as reflected in P&ID M-42 except as follows: a) P&ID M-42 Sh 2, Rev. Y. The redundant CCW heat exchanger is actually on standby which is a backup to both Units 1 and 2. If ESW train A failed during a LOCA or LOP/shutdown, the backup CCW HX will be re-aligned to ESW train B, thus, meeting the redundancy requirement. b) P&ID M-42, Sh. 3 Rev. AC- Train A provides cooling to the motor-driven AFW pump cooler unit while train B provides cooling to the engine-driven AFW pump unit. This arrangement of redundancy meets the commitment. c) P&ID M-42 Sh 3, Rev. AC - The primary containment refrigeration unit, although redundant, is not a safety-related component and is isolated (Logic diagram M-042-1SX06 Rev. C) during LOCA/LOP. This is only needed during normal operation as indicated in FSAR Table 9.2-1.	X	

Mechanical - Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
		d) P&ID M-42 Sh 4, Rev. AC - Positive displacement charging pump cubicle cooler is only connected to train A. However, this is only needed during normal operation as shown in FSAR Table 9.2-1. This can also be cooled by train B via interties during normal mode. During LOCA/LOP, the redundant centrifugal charging pumps start upon receipt of a safety injection signal.		
		e) P&ID M-42 Sh 4, Rev. AC-Spent fuel pit pump cubicle coolers are connected to train B. Like the other cubicle coolers, this can also be cooled by train A via interties during normal operation. As shown in FSAR Figure 9.1-8 (P&ID M-63), Amendment 37, and para. 9.1.3.2, Amendment 43, the Safety Category I spent fuel pool cooling system consists of two complete trains, one per unit. Each train is designed to service the spent fuel pool. The system is not directly associated with either plant start-up, normal operation or shutdown but is operated when there is a need to cool, clarify or purify the pool water. Thus, although there is no redundancy within the unit, there is a 100% redundancy in relation to the other unit.		

Mechanical - Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Each ESW pump per loop is rated at 24,000 gpm at 180 feet TDH	The specified capacity and TDH should be adequate to support the system requirement	(a) P&ID M-42-Sh 1, Rev. S, reflects single pump per loop arrangement. (b) Bingham-Willamette pump performance curve No. 35484 (6/27/78) demonstrates the specified capacity and TDH of the pump. (c) Design Criteria DC-SX-01-BB, Rev. 3 and Spec F-2758A, Amendment 2, 6/2/83 specifies pump rating at 24,000 gpm at 180 feet TDH. Pump adequacy has been confirmed in the pre-operational test No. 2.76.10, ESW, Rev. 2.	X	
Discharges from each ESW loop are separate with redundant return lines to the cooling system	Separation of loops should be demonstrated	(a) Separate discharge line arrangement is reflected in Drawings M-900 Sh. 1A, Rev. AC and Sh. 1C, Rev. AH as well as P&ID M-42 Sh. 2, Rev. Y and Sh. 7 Rev. G. (b) Interties between the two loops downstream of the ESW pumps are provided with double isolation valves, thus meeting the separation criteria. (Note that each of the discharge headers going to the cooling tower is also being shared by the corresponding loop from Unit 2).	X	
Each ESW pump in a given unit takes suction from a separate supply line from the cooling tower to the auxiliary building	Separate suction lines should be demonstrated	(a) P&ID M-42 Sh. 1 Rev. S and Sh. 6 Rev. V reflect the separate suction line arrangement. (b) Piping arrangement Dwg M-900, Sh. 1A, Rev. AC and Sh. 1C Rev. AH also reflect this arrangement.	X	

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Mechanical - Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Each ESW pump per loop is rated at 24,000 gpm at 180 feet TDH	The specified capacity and TDH should be adequate to support the system requirement	(a) P&ID M-42-Sh 1, Rev. S, reflects single pump per loop arrangement. (b) Bingham-Willamette pump performance curve No. 35484 (6/27/78) demonstrates the specified capacity and TDH of the pump. (c) Design Criteria DC-SX-01-BB, Rev. 3 and Spec F-2758A, Amendment 2, 6/2/83 specifies pump rating at 24,000 gpm at 180 feet TDH. Pump adequacy has been confirmed in the pre-operational test No. 2.76.10, ESW, Rev. 2.	X	
Discharges from each ESW loop are separate with redundant return lines to the cooling system	Separation of loops should be demonstrated	(a) Separate discharge line arrangement is reflected in Drawings M-900 Sh. 1A, Rev. AC and Sh. 1C, Rev. AH as well as P&ID M-42 Sh. 2, Rev. Y and Sh. 7 Rev. G. (b) Interties between the two loops downstream of the ESW pumps are provided with double isolation valves, thus meeting the separation criteria. (Note that each of the discharge headers going to the cooling tower is also being shared by the corresponding loop from Unit 2).	X	
Each ESW pump in a given unit takes suction from a separate supply line from the cooling tower to the auxiliary building	Separate suction lines should be demonstrated	(a) P&ID M-42 Sh. 1 Rev. S and Sh. 6 Rev. V reflect the separate suction line arrangement. (b) Piping arrangement Dwg M-900, Sh. 1A, Rev. AC and Sh. 1C Rev. AH also reflect this arrangement.	X	

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Mechanical - Process (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
		(c) P&ID M-42, Sh. 1 shows the branching of each suction header to the corresponding Units 1 and 2 ESW pumps.		
ESW pump suction supply from the cooling tower basin to the pump located at auxiliary building provides the required NPSH	NPSH available should meet or exceed the 32 feet NPSH required	(a) Piping drawings M-900, Sh. 8, Rev. U and Sh. 9, Rev. N, and M-206 Sh. 1, Rev N, indicate the relative location of the suction inlet at the cooling tower and the ESW pumps at El 330'0" (b) S&L Calc. No. SX-2-76, Rev. 1, estimated the available NPSH = 84.43 ft which sufficiently exceeds the required NPSH of 32 ft at rated condition. (c) Bingham-Willamette pump performance Curve No. 35484, 6/27/78, confirms the required NPSH to be 32 feet at rated capacity (40 feet at 31,000 gpm) (d) S&L Spec F-2758A, Amendment 2, 6/2/83, specified minimum available NPSH = 40 feet. For procurement purposes, this value is acceptable provided the vendor accepted it. In this case the vendor, Bingham-Willamette, required 32 feet NPSH at rated capacity.	X	

Mechanical-Stress

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Loading combinations, design transients and stress limits	Loading combinations meet the stress limits specified in FSAR 3.9.3.1	Stress calculation report 1SX-16, Rev. 04F0 has complied with the load combinations and stress limits set by the FSAR commitments	X	
Piping design specification	To meet the requirements of NA-3250, ASME Section III Code	The piping design specification for indoor ESW system, DS-SX-01-BB, Rev. 4 is in accordance with the requirements of the ASME Code.	X	
Calculation of ESW piping system		Stress Calculation 1SX-16, Rev. 04F0		
- Code compliance	1974 ASME Code through Summer 1975 Addenda	Stress calculation has complied with the Code requirements.	X	
- Seismic modeling of piping	Adequacy of modeling techniques for mass point spacing based on the cut-off frequency of 33 Hz. Coupled analysis for run to branch pipe moment of inertia ratio less than 10.	Proper modeling is used for mass point spacing Decoupling practice based on the run to branch pipe moment of inertia ratio greater than 7 is acceptable.	X	
- ASME Code stress allowables	ASME Code, Section III, Subsection NC-3600.	The calculation report includes a summary of all the loading conditions for the piping and piping components. The stress results comply with the Code requirements.	X	
- Pipe support design loads and displacements	Adequate data for the design of pipe supports	Pipe support design loads and displacements summary is provided in the calculation report.	X	

Mechanical-Stress (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
- Seismic response spectra	The input spectra for the analysis should conform to the response spectra design criteria.	The stress calculations report 1SX-16, Rev. 04F0 was reviewed for the use of appropriate spectra identified in "Response Spectra Design Criteria", DC-ST-04-BB, Rev. 2 and "Lesson Plan", EMD-TP-2, Rev. 4. These spectra curves were reviewed and found to be in agreement with the input spectra used in the analysis except for the SSE N-S direction where the analysis used a more conservative spectrum.	X	

Piping Engineering

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Piping				
Codes & standards	ASME Sec. III, B&PV Code 1974 Addenda Summer of 1975	Design Spec. DS-SX-01-BB, Rev. 4, Art. 301 & 302 & 303	X	
Code cases	Reg. Guides 1.84 & 1.85	Design Spec. DS-SX-01-BB, Rev. 4, Art. 303; Spec F/L 2741 - F/L 2739	X	
Materials	Piping design tables-F/L 2741	Design Spec. DS-SX-01-BB, Rev. 4, Art. 503 & design tables	X	
Wall thickness	Press/temp reqmts Matl stress reqmts	105BB & 1505BB-Tables & Art. 402 of Design Spec. DS-SX-01-BB, Rev. 4	X	
Fittings	F/L2741-Lgr than 2" F/L 2739 2" & under	Tables 105BB & Art. 402 of Design Spec. DS-SX-01-BB, Rev.4	X	
Fabrication	F/L2741 - Lgr than 2" F/L2739 - 2" & under	F/L 2741, F/L 2739, Design Spec. DS-SX 01-BB, Rev. 4	X	
Overpressure protection	ASME Sec. III, 1974 & Summer 1975 Addenda	Design Spec. DS-SX-01-BB, Rev. 4 Div 8	X	
Inspection/stamping	ASME Sec. III, 1974 & Summer 1975 Addenda	Design Spec. DS-SX-01-BB, Rev. 4, Art. 305	X	
Hydrotest reqmt.	ASME Sec. III 1974 & Summer 1975 Addenda	Design Spec. DS-SX-01-BB Rev. 4	X	
Code data report	ASME Sec. III, 1974 & Summer 1975 Addenda	See Inspection/stamping	X	

Note: All piping components are carbon steel

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Piping Engineering (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Line Valves* (*Does not apply to control, safety or relief valves)				
Codes & standards	ASME III B&PV Code-1974, Addenda Summer of 1975 & ANSI B16.5	Design Spec. F-2718-01, Art 108.1	X	
Code cases	Reg guides 1.84 & 1.85	Design Spec. F-2718-01, Art 108.1	X	
Materials (pressure boundary)	ASME III B&PV Code 1974 & Summer 1975 Addenda	Piping Design Tables 105BB & 1505BB Note: S&L Response to FSAR Question 110.57 states that disc is not pressure boundary		X
Construction rqmts.	ASME III B&PV Code 1974 & Summer 1975 Addenda	Design Spec. F-2718-01, Art. 301 & Art. 110.11 Requirements & Art. 301.6		
Hydrotesting	ASME III B&PV Code 1974 & Summer 1975 Addenda	Design Spec. F2718-01, Art. 110.11g	X	
Code data reports	ASME III B&PV Code 1974 & Summer 1975 Addenda	Design Spec. F2718-01, Art. 110.10	X	
Stress reports	ASME III B&PV Code 1974 & Summer 1975 Addenda	Design Spec. F-2718, Art. 110.10.	X	

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Piping Engineering (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Containment penetrations				
Codes & standards	ASME III B&PV Code-1974	Design Spec. F-2787 (6-23-83) Art. 108 & Art. 303	X	
Code cases	Reg. Guides 1.84 & 1.85	Design Spec. F-2787 (6/23/83) Art. 108-Dwg. M-197	X	
Materials	ASME III B&PV Code 1974	Design Spec. F-2787 (6-23-83) Art. 304 - Dwg. M-197	X	
Construction rqmts.	ASME III B&PV Code 1974	Design Spec F-2787 (6/23/83) Art. 110.10-111.3 & Dwg. M-197	X	
Code data reports	ASME III B&PV Code 1974	Design Spec F-2787 (6/23/83) Art. 111. 3(a)	X	
Penetration type/class	ASME III B&PV Code Class 2 & MC	Design Spec F-2787 (6/23/83) Art. 111.3(a)	X	
Stress report	ASME III B&PV Code 1974	Design spec F-2787 (6/23/83) Art. 111.3(a)	X	
Data report	ASME III B&PV Code 1974	Design Spec F-2788 (6/23/83) Art. 111.3 (d)2	X	

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Plant Design

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
SX System Inside Containment - Pipe Whip M-155 Sh. 1 of 2 Rev. L				
Line No.				
1 SX 07EA-14" 1 SX 07EB-14" 1 SX 08AA-10" 1 SX 08CN-4" 1 SX 07EB-14" 1 SX 07CA-10" 1 SX 07AN-4" 1 SX 06GN-4" 1 SX 07BA-10"	Line not damaged	Reviewed high energy line IMSOIAA-30.25" & IMSOIAD-30.25" for pipe whip effects on SX system. Figure 3.6-32 in FSAR Sect. 3.6 shows break & restraint locations for IMSOIAD-30.25"		
		Break No. — Code* C-9 — (P-8) C-9X — B (P-11) C-11 — B (P-11) C-12 — B (P-15, P-10) C-15 — B (P-10) C-16 — B (P-14) C-16A — (P-14)	X X X X X X X	

*Codes For Review of Documents
A. Pipe whip poses no danger (i.e.: whips in safe direction, protected by barrier).
B. Pipe whip restraint No. (__) required to protect essential system.
C. Essential system could be damaged by high energy pipe due to lack of existing restraint.

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Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
SX System Inside Containment - Pipe Whip M-155 Sh. 1 of 2 Rev. L (Cont)		Figure 3.6-29 in FSAR Sect. 3.6 shows break and restraint locations for IMSOIAA-30.25"		
		Break No. — Code*		
		C-1 — (P-1)	X	
		C-2 — B (P-3)	X	
		C-3 — B (P-3)	X	
		C-4 — B (P-7)	X	
		C-7 — B (P-2)	X	
		C-8 — B (P-6)	X	
		C-8A — (P-6)	X	

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
SX System Inside Containment -Pipe Whip				
M-155 Sh. 2 of 2 Rev. J				
No SX piping on this drawing			X	
M-156 sh. 1 of 2 Rev. K Line No.				
1 SX 07CB-10" 1 SX 07BB-10" 1 SX 06EB-10" 1 SX 07AP-4" 1 SX 09CB-10" 1 SX 07EB-14"	Line not damaged	Reviewed piping and found no high energy lines in this area.	X	
M-155 Sh. 2 of 2 Rev. J				
1 SX 07EA-14"	Line not damaged	Reviewed piping and found high energy lines 1MSOAC-30.25", 1FW03DC-16", 1FW03DB-16" and 1FW87CB-6" for pipe whip effects on SX system. Figures 3.6-31, 3.6-30, 3.6-27, 3.6-26, 3.6-28c & 3.6-28b in FSAR Section 3.6 show break and restraint locations.	X	
M-156 Sh. 2 of 2 Rev. J				
No SX piping on this drawing			X	

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Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
SX System Inside Containment -Pipe Whip				
M-157 Sh. 1 of 2 Rev. N Line No.				
1 SX 07AQ-4" 1 SX 06GQ-4" 1 SX 06DC-10" 1 SX 07CC-10" 1 SX 07BC-10" 1 SX 07EA-14" 1 SX 08CQ-4" 1 SX 08AC-10" 1 SX 09AQ-4" 1 SX 09CC-10"	Line not damaged	Reviewed piping and found no high energy lines in close proximity.	X	
M-157 Sh. 1 of 2 Rev. N Line No.				
1 SX 07FA-16"	Line not damaged	Reviewed piping and found high energy line 1CVOIE-3" routed 4'0" below. In accordance with FSAR 3.6.2.3.3.3, no line break will occur because line hitting equal or larger lines of the same schedule will not cause failure of line being hit.	X	
M-157 Sh. 2 of 2 Rev. L				
No SX piping on this drawing			X	

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Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
SX System Inside Containment -Pipe Whip				
M-158 Sh. 1 of 2 Rev. M Line No.				
1 SX 07EB-14" 1 SX 07BD-10" 1 SX 07AR-4" 1 SX 08CR-4" 1 SX 08AD-10" 1 SX 09AR-4" 1 SX 06DD-10"	Line not damaged	Reviewed piping and found no high energy lines in close proximity.	X	
M-158 Sh. 2 of 2 Rev. K				
No SX piping on this drawing			X	
M-161 Sh. 1 of 1 Rev. L Line No.				
1 SX 08AA-10" 1 SX 06CB-14" 1 SX 06EA-10"	Line not damaged	Reviewed piping and found no high energy lines in close proximity.	X	
M-162 Sh. 1 of 1 Rev. L Line No				
1 SX 06CA-14" 1 SX 06CB-10" 1 SX 06CB-14"	Line not damaged	Reviewed piping and found no high energy lines in close proximity.	X	

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Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
SX System Inside Containment -Pipe Whip				
M-163 Sh. 1 of 1 Rev. N Line No				
1 SX 06CA-14" 1 SX 08AC-10" 1 SX 06DC-10" 1 SX 06BA-16" 1 SX 07FA-16"	Line not damaged	Reviewed piping and found no high energy lines in close proximity.	X	
M-164 Sh. 1 of 1 Rev. L Line No.				
1 SX 06BB-16" 1 SX 07FB-16" 1 SX 06DD-10" 1 SX 08AD-10" 1 SX 06CB-14"	Line not damaged	Reviewed piping and found no high energy lines in close proximity.	X	
M-165 Sh. 1 of 2 Rev. L				
No SX piping on this drawing			X	
M-166 Sh. 1 of 2 Rev. K				
No SX piping on this drawing			X	

(1101o)

Plant Design (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
SX System Inside Containment -Pipe Whip				
M-167 Sh. 1 of 2 Rev. P				
No SX piping on this drawing			X	
M-168 Sh. 1 of 2 Rev. L				
No SX piping on this drawing			X	

APPENDIX B-3

ADEQUACY OF DESIGN PROCESS

Civil/Structural

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
River Screenhouse				
Design process for substructure reinforced concrete design	General Q/A Manual Procedure GQ-3.08, Rev. 4	S&L's General Quality Assurance Procedure GQ-3.08, Rev. 4, Sections 3.0 "Preparation, Review & Approval" (A.1) and 4.0 "Revisions" do not appear to have been complied with as explained below. Reinforced concrete Calc. 2.1.2 was performed in 1976 based on seismic forces obtained from finite element representation of soil media. As a result of NRC Q130.9 & 9A, the seismic analysis of the structural steel was reviewed in 1981. The new response spectra and forces were transmitted from the Structural Analysis Division to the Structural Engineering Division through controlled criteria DC-ST-04-BB. However, the Structural Engineering Division failed to provide any evidence of reviewing the reinforced concrete calculations for the increased loads. Revision 2 of Calculation 2.1.2 was transmitted for IDR team review on 5/21/84. Although this calculation is still under review, IDR concurs tentatively with S&L that the design of the reinforced concrete substructure is adequate. However, it should be noted that a subsequent qualification of the piping and components is in progress.		X

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Civil/Structural (Cont)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Buried Essential Service Water Piping - Makeup lines 12" and 48" dia.				
Design of makeup pipes, concrete encasement, trench excavation, backfill, compaction testing	ASME Section III Stresses ACI-318-71 ASTM-D1557 FSAR 2.5.4.5.1.4	FSAR Attachement 2.5H The pipe design is done by Engineering Mechanics Div. and reviewed by same independently. Drawings are produced by the Project Mechanical Group showing geotechnical design for backfill and testing, and structural design of concrete encasement of the ESW pipes.	X	

Civil/Structural (Seismic)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Evaluation of steel and/or concrete structural members for attachment loads such as pipe hangers, cable trays, conduits, ducts, etc	All the structural members should be evaluated for any major attachment loads. Minor attachment loads should be provided for in miscellaneous uniform load or in the design live load.	Project Instruction PI-BB-34 "Documentation of Hanger Loads" is reviewed.	X	
Evaluation of equipment foundation and preparation of equipment foundation details	Equipment foundation should be designed for most critical load combinations and the supporting member should be evaluated for the reactions Equipment foundation details should be shown on the structural drawings.	Project Instruction PI-BB-43 "Equipment Foundation Evaluation" is reviewed.	X	
Seismic response spectra for Category I structures and components	Refer to Appendix A-3 (Seismic)			

Mechanical - Process

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
ESW pump design	The specified ESW pump design rating, as committed to in FSAR 9.2.1.2.2, i.e., 24,000 gpm at 180 feet TDH, should be demonstrated satisfactory for the ESW system.	1) Calc. No. SX1-75 Rev. 0, 3/24/75 established preliminary pump rating of 26,000 gpm at 155 ft TDH.	X	
		2) Design Criteria DC-SX-01-BB, Rev. 3. Initially issued Rev. 0 on 4/30/75 for comments, the latest revision reflects pump rating at 24,000 gpm at 180 ft TDH.	X	
		3) Calc. No. SX2-76, Rev. 0, 12/30/76. Provided more detailed calculation, pump rated at 24,000 gpm at 180 feet TDH.	X	
		4) S&L Spec. F-2758A, Amendment 2, 6/2/83. This ESW pump spec. was issued Revised, 5/27/76. Amendment 1 was issued 5/4/77 reflecting the design capacity at 24,000 gpm at 180 feet TDH.	X	
		5) Calc. SX2-76, Rev. 1, 4/20/84. This supersedes SX2-76, Rev.0; SX1-75, Rev. 0, further demonstrates the adequacy of the procured ESW pump.	X	
		6) ESW Pre-Op Test No. 2.76.10, Rev. 2, 12/83 also demonstrates the adequacy of the ESW pumps.	X	
		7) ESW pump performance curve No. 35484, 6/27/78, which is attached to Calculation SX2-76, Rev. 1, meets the specified pump capacity/head of 24,000 gpm at 180 feet TDH.	X	

Mechanical - Pipe Support and Stress

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Pipe support and stress		Refer to Appendix A-3		

APPENDIX B-4

DESIGN INTERFACES WITH WESTINGHOUSE AND NUCLEAR POWER SERVICES

Civil/Structural

Company	Interface Reviewed	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Westinghouse Electric Corp.	Loads transferred to structural members by hangers within the scope of Westinghouse Electric Corp.	Project Instruction PI-BB-34 "Documentation of Hanger Loads" is reviewed	X	
Nuclear Power Services	Loads transferred to structural members by hangers within the scope of Nuclear Power Services.	Same as above	X	

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Mechanical - Pipe Support and Stress

Company	Interface Reviewed	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
NPS	Small pipe support and stress analysis	Refer to Appendix A-4		

APPENDIX B-5

DESIGN CHANGE CONTROL

Mechanical - Stress

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
Sample calculation of ESW piping system	Stress calculation report No. ISX-16, Rev. 04F0		
FCRs/ECNs	The pertinent FCRs/ECNs have been addressed and the reconciliation practice is acceptable. The applicable documents are listed in Appendix A-3.	X	

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Mechanical - Process

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
	Refer to Appendix D-5		

APPENDIX B-6

SARGENT & LUNDY DESIGN REVIEWS

Civil/Structural

S&L Design Review	S&L Review Report Reviewed and Comments	Acceptability Yes	Acceptability No
Byron river screenhouse foundation (substructure) and sheet piling. Calculation # 2.1.2, Rev. 0	Report # DRR-SD-041-BY, Rev. 0. The review was performed on 6/8/77 by SAD. We agree with the review consideration and comments presented in this report. (Please note this review was performed for the unrevised concrete calc. "Rev. 0".	X	
Seismic analysis - river screenhouse Calc. 4.2.1, Item No. 3. The calculation mainly covers soil-structure interaction analysis using the finite element approach and the SHAKE computer program. Original calcs were performed by SES Division and review was performed by SA Division.	Review report #DRR-SD-053-BB, Rev. 0. The error in the input data for the damping value is determined to be on the conservative side.	X	
System & structure design review of river screenhouse - soil structure interaction (SSI) analysis by soil spring method. This analysis was performed as a response to NRC Question 130.9 and 9A; analysis was performed by SAD and review performed by SESD.	Review report #DRR-SD-076-BB, Rev. 0. Since the river structure has been strengthened, changes to seismic models were addressed. Calculation # 8-11-4.2, Rev. 1 incorporated the addition of bracing in the revised model.	X	

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Civil/Structural (Cont)

S&L Design Review	S&L Review Report Reviewed	Acceptability Yes	Acceptability No
Buried Essential Service Water Piping - Makeup lines 12" and 48" dia.			
EMD-033898 Design calculations	Checklist for (NSRA & NRA) Calculation Review	X	
Dwgs. M-900 sh 1 thru 4, 6 thru 9 and 13.			

APPENDIX C

DC DISTRIBUTION SYSTEM

APPENDIX C-1

IDENTIFICATION OF COMMITMENTS AND CRITERIA

Civil/Structural (Seismic)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Seismic Design & Analysis			
Seismic input motion & response spectra (FSAR 2.5.2, 3.7.1.1 & 3.7.1.2 & NRC Reg. Guide 1.60, NRC Q130.5, 130.6, 130.6a)	Refer to Appendix A-1 (Seismic Design and Analysis)	X	
Damping values used (FSAR 3.7.1.3 & WCAP-7921 ..., May 1974)		X	
Use of constant vertical static factors (FSAR 3.7.3.10)		X	
Torsional effects of eccentric masses (FSAR 3.7.3.11)		X	

(1099o)

Civil/Structural

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Expansion Anchors	Refer to Appendix A-1 (Expansion Anchors)		

Electrical

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
FSAR 8.1.6; 8.3.2.1; Table 8.1-1; Table 14.2-13; Appendix A; Q40.72; Q40.182 SER 8.1 10CFR50, GDC 5, 17, 18 IEEE 308-1974; NRC RG 1.32, Rev. 2			
Redundancy of load groups	These licensing commitments are covered by following design documents: ° Design criteria ° Single-line diagrams ° Key diagrams ° Logic diagrams ° Design calculations ° Equipment specifications ° S&L standards ° Schematic diagrams For identification of these documents refer to Appendix C-2	X	
Independence of safety actions by each redundant load group		X	
Power supplies to each redundant load group		X	
Common power supply to redundant load groups		X	
Common failure mode		X	
Provision of protective devices to limit degradation of Class 1E power system		X	
Battery supply -			
- Availability		X	
- Independence of each battery supply		X	

Electrical (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Battery charger supply -	Refer to design documents listed on page C.1-3		
- Disconnecting means		X	
- Feedback protection in case of loss of ac power to chargers		X	
Distribution system -			
- Independence of circuits to redundant equipment		X	
- Auxiliary devices		X	
- Feeder between Class 1E power system and system located in non-safety class structure		X	

Electrical (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
IEEE 485-1978			
General considerations to determine battery size	Refer to design documents listed on page C.1-3	X	
Momentary loads consideration to determine battery duty cycle		X	
Duty cycle diagram -			
- Steady-state loads		X	
- Random loads		X	
Considerations of limiting factors to determine battery size		X	
Additional considerations to determine battery size		X	
FSAR Table 8.1-1; Appendix A IEEE 484-1975; NRC RG 1.128, Rev. 1			
Installation design criteria			
- Ventilation		X	

Electrical (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
FSAR Appendix A SER 8.1 10CFR50, GDC 17; NRC RG 1.6, Rev. 0	Refer to design documents listed on page C.1-3		
Independence between redundant standby (onsite) power sources and between their distribution systems		X	
FSAR 8.1-1; Appendix A 10CFR50, GDC 5; NRC RG 1.81, Rev. 1 IEEE 379-1972; NRC RG 1.53, Rev. 0			
Application of single failure criterion to protection systems		X	
FSAR 8.1-1; Appendix A IEEE 384-1974; NRC RG 1.75, Rev. 2			
Isolation devices			X

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APPENDIX C-2

DESIGN ADEQUACY

Civil/Structural

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Expansion Anchors		Refer to Appendix A-2 (Expansion Anchors)		

Electrical

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
	IEEE 308-1974; NRC RG 1-32, Rev. 2; 10CFR50 GDC 5, 17, 18			
Redundant loads	The electric loads shall be separated into two or more redundant load groups.	(a) Design criteria DC-DC-01-BB, Rev. 4 (b) Single line diagram 6E-1-4001A, Rev. D (c) Key diagrams: 6E-1-4010A, Rev. E 6E-1-4010B, Rev. E (d) S&L Standard ESC-291 dated 1/30/79 SR 125 V dc loads are separated into two redundant groups.	X	
Safety actions	The safety actions by each load group shall be redundant and independent of the safety actions provided by its redundant counterparts.	Review documents same as (a), (b) and (c) above	X	
Power supplies	Each of the redundant load groups shall have access to a power supply that consists of a battery and one or more battery chargers.	Review documents same as (a), (b) and (c) above. SR 125 V system consists of two redundant subsystems per unit. Each subsystem consists of a battery, a battery charger and distribution bus.	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Common power supply	Two or more load groups may have a common power supply if the consequences of the loss of the common power supply to the load groups under design basis conditions are acceptable.	Review documents same as (b) and (c) above. There is no common power supply to the two redundant load groups.	X	
Common failure mode	The batteries shall not have a common failure mode for any design basis event (DBE).	Review document same as (a) above. Each SR 125 V dc equipment room is served by its dedicated ventilation system. SR 125 V dc equipment is located in Seismic Category I structure to protect against earthquake, missile and wind. Fire detection and protection equipment provided for fire protection. This ensures preventing common failure mode for any DBE.	X	
Protective devices	Protective devices shall be provided to limit the degradation of the Class 1E power systems. Sufficient indication shall be provided to identify the actuation of a protective device.	(a) Design criteria DC-DC-01-BB, Rev. 4 (b) Logic diagrams 6E-1-4029 DC01, Rev. C 6E-1-4029 DC02, Rev. C (c) Key diagrams 6E-1-4010A, Rev. E 6E-1-4010B, Rev. E (d) Schematic diagrams 6E-1-4030 DC01, Rev. G 6E-1-4010 DC02, Rev. G 6E-1-4010 DC05, Rev. K 6E-1-4010 DC06, Rev. H 6E-1-4010 DC09, Rev. H	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Protective devices (Cont)		Automatic circuit breakers have been provided for battery feed, battery charger feed, inter-unit tie feed, and for each of the feeders to NSR bus and other loads. For indication in case of actuation of protective device, see Battery supply, Battery charger supply, and Distribution system.		
Battery supply				
- Availability	Each battery supply shall be immediately available during normal operations and following the loss of power from the ac system.	(a) Single line diagram 6E-1-4001A, Rev. D (b) Key Diagram 6E-1-4010A, Rev. E During normal operation both battery and battery charger supply power to SR bus. Following loss of ac power, battery continues to supply power to SR bus without interruption. Battery charger is designed such that it does not become load on the battery in case of ac power failure or charger malfunction.	X	
- Independence	Each battery supply shall be independent of other battery supplies.	Single line diagram 6E-1-4001A, Rev. D	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
- Surveillance	Indicators shall be provided to maintain the status of the battery supply.	Following instruments, indicating lights and annunciators are provided Instrument: Voltage X 0; Amperes 0 Ind Lts: Brkr-Pos 0 Ann: Brkr-Pos X X - In Control Room 0 - Local on distr. center Design criteria DC-DC-01-BE, R4 Equip spec F/L-2822, Amend 2 Logic diag 6E-1-4029DC01&02-C Key diag 6E-1-4010A&B-E Schematic diag. 6E-1-4030DC01-G Schematic diag. 6E-1-4030DC05-K Schematic diag. 6E-1-4030DC06-H	X	
Battery charger supply				
- Surveillance	Indicators shall be provided to monitor the status of the battery charger supply. The instrumentation shall include indication of: - Output voltage - Output current - Circuit breaker position	Following instruments, indicating lights and annunciators are provided Instrument: Voltage 0; Amperes 0 Ind Lts: Voltage LO X, HI X; Brkr Position 0 AC X, DC X; Loss of Power AC X, DC X X - In Control Room 0 - Local on distr. center	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
- Surveillance (Cont)		High dc output voltage signal trips the 480 V ac input circuit breaker Documents: (a) 6E-1-4029DC01-C (b) 6E-1-4029DC02-C (c) 6E-1-4030DC01-G (d) 6E-1-4029DC05-G (e) 6E-1-4029DC06-H (f) 6E-1-4010A-E (g) 6E-1-4010B-E (h) Equip spec F/L-2820, Amend. 2 (i) Design criteria DC-DC-01-BB, Rev. 4		
- Disconnecting means	Each battery charger power supply shall have a disconnecting device in its ac power incoming feeder and its dc power output circuit for isolating the charger.	(a) Single line diagram 6E-1-4001A, Rev. D (b) Key diagram 6E-1-4010A, Rev. E (c) Schematic diagrams 6E-1-4030DC01, Rev. G 6E-1-4030DC02, Rev. G (d) Equipment specification F/L-2820, Amend. 2	X	
- Feedback protection	Each battery charger power supply shall be designed to prevent the ac power supply from becoming a load on the battery due to a power feedback as the result of the loss of ac power to the chargers.	Schematic diagrams 6E-1-4030DC01, Rev. G 6E-1-4030DC02, Rev. G	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Distribution system				
- Independence	Distribution circuits to redundant equipment shall be electrically independent of each other.	(a) Single line diagram 6E-1-4001A, Rev. D (b) Key diagram 6E-1-4010A&B, Rev. E (c) Schematic diagrams 6E-1-4030DC 05-K 6E-1-4030DC 06-H 6E-1-4030DC 07-F 6E-1-4030DC 08-K 6E-1-4030DC 09-H 6E-1-4030DC 10-F	X	
- Surveillance	The distribution system shall be monitored to the extent that it is shown to be ready to perform its intended function.	Following instruments, indicating lights, annunciators are provided	X	

Bus	Instrument	Ind Lts	Ann.
Voltage	O	O	LO X
Ground	O		X
NSR bus			
Feed brkr			OPEN X
Inter-unit			OPEN X
Tie breakers			CLOSE X

X - In Control Room O - Local on distr. center

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
- Surveillance (Cont)		(a) Design criteria DC-DC-01-BB, R4 (b) Equip spec F/L-2822, Amend. 2 (c) Logic diagrams GE-1-4029DC01-C GE-1-4029DC02-C (d) Key diagram GE-1-4010A&B-E (e) Schematic diagrams GE-1-4030DC01-G GE-1-4030DC05-K GE-1-4030DC06-H		
- Auxiliary devices	Auxiliary devices that are required to operate dependent equipment shall be supplied from a related bus section to prevent the loss of electric power in one load group from causing the loss of equipment in another load group.	(a) Single line diagram GE-1-4001A, Rev D (b) Key diagrams GE-1-4010A&B-E (c) Schematic diagrams GE-1-4030DC05-K GE-1-4030DC06-H GE-1-4030DC07-F GE-1-4030DC08-K GE-1-4030DC09-H GE-1-4030DC10-F	X	
- Feeders	Feeders between the Class 1E power systems located in safety class structure and systems located in non-safety class structures shall be provided with automatic circuit interrupting devices located in the safety class structures.	Documents same as for Auxiliary devices	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
	IEEE 485-1978			
General considerations	The most severe of the following conditions should be used to determine the battery size. - Load on dc system exceeds the maximum output of the battery charger - Output of the battery charger is interrupted - Auxiliary ac power is lost	(a) Design criteria DC-DC-01-BB, Rev. 4 (b) Single line diagram GE-1-4001A, Rev. D (c) Battery sizing calcs 4391/19-D-5, Rev. 0 Note: Auxiliary ac power is assumed to return within 10 seconds of a loss of operating power.	X	
Momentary loads	Although momentary loads may exist only for a fraction of a second, each is considered to last for a full minute because the instantaneous battery voltage drop for a given momentary load is essentially the same as voltage drop after 1 minute.	(a) Design criteria DC-DC-01-BB, Rev. 4 (b) Battery sizing calc. 43911 19-D-5, Rev. 0	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Duty cycle diagram	Loads with inception and shutdown times known are plotted on the diagram as they would occur. If inception time is known but the shutdown time is indefinite it shall be assumed that the load will continue through the remainder of the duty cycle.	Documents same as in Momentary loads Note: Only 1 minute rating is assumed critical due to auxiliary ac power return to battery chargers within 10 seconds.	X	
	Loads which occur at random shall be shown at the most critical time of the duty cycle in order to simulate the worst case load on the battery.	No random loads identified	X	
Battery size	- Maximum system voltage as limiting factor - Minimum system voltage as limiting factor - Float voltage as limiting factor - Charging rate as limiting factor	Battery consists of 58 cells and is sized based on minimum bus voltage of 105V (cell discharge voltage of 1.81V per cell) and maximum bus (equalizing charge) voltage of 138V (2.38V per cell). Documents same as in Additional considerations (below).	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Additional considerations	- Temperature correction factor	Battery sizing calc. 4391/19-D-5, Rev. 0 Temp. correction factor 1.05 for 69°F	X	
	- Design margin - A method of providing this design margin is to add 10-15 percent to the cell size determined by calculations.	Design margin 15% Aging factor 125%	X	
	- Compensating for age, the battery rated capacity should be at least 125% of the load expected at the end of the service life.		X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
	IEEE 484-1975 NRC RG 1.128, Rev. 1		X	
Installation design criteria				
- Ventilation	The battery area shall be ventilated, either by a natural or induced ventilation system, to prevent accumulation of hydrogen and to maintain design temperature. The ventilation system shall limit hydrogen accumulation to less than 2 percent of the total volume of the battery area. Maximum hydrogen evolution rate is 0.000269 cubic feet per minute per charging ampere per cell at 77°F, one atm. The worst expected condition is forcing maximum current into fully charged battery.	(a) Elect. equip install location dwg. 6E-1-3371B, Rev. P (b) Hydrogen evolution calc. 4391/19-AI-10, Rev. 2 (c) Heat dissipation calc. 4391/19 AI-15, Rev. 2 (d) Equip. spec. F/L-2819, Amend 2 F/L-2820, Amend 2 (e) S&L IOM from HVAC Dept, 1/24/78 Battery areas are ventilated to prevent accumulation of gases produced during charging operations. Each battery area is provided with independent SR ventilation system. A separate SR exhaust fan and duct is provided for each Class 1E battery area. Environment in battery area per S&L IOM from HVAC dept. is from 69°F to 108°F. Environment specified in equipment specs F/L-2819 and 2820 is 77°F for battery and 65°F to 112°F for chargers. Battery area temp. is higher than specified. Battery qualified life is reduced because of higher temperature.		

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
	NRC RG 1.6 10CFR50 GDC 17			
Independence between redundant standby (onsite) power sources and between their distribution systems	The electrically powered SR dc loads should be separated into redundant load groups such that loss of any one group will not prevent the minimum safety function from being performed.	(a) Design criteria DC-DC-01-BB, Rev. 4 (b) Single line diag. GE-1-4001A, Rev. D (c) Key diagram GE-1-4010A&B, Rev. E (d) Schematic diagrams GE-1-4030DC 05-K GE-1-4030DC 06-H GE-1-4030DC 07-F GE-1-4030DC 08-K GE-1-4030DC 09-H GE-1-4030DC 10-F	X	
	Each dc load group should be energized by a battery and battery charger. The battery charger combination should have no automatic connection to any other redundant dc load group.		X	
	No provision should exist for automatically connecting one load group to another load group.	There are no bus ties or sharing of power supplies between redundant load groups in each unit.	X	
	No provision should exist for automatically transferring loads between redundant power sources.		X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Independence... (Cont)	If means exist for manually connecting redundant load groups together, at least one interlock should be provided to prevent an operator error that would parallel their standby power sources.		X	
	The standby source of any load group should not be automatically paralleled with the standby source of another load group under accident conditions.		X	
	NRC RG 1.81, Rev.1 IEEE 379-1972 NRC RG 1.53, Rev. 0 10CFR50 GDC 5	Refer to documents in a, b, c & d above		
Application of single failure criterion to protection systems	In case of multiunit nuclear power plants, each unit should have separate and independent onsite emergency and shutdown dc system capable of supplying minimum ESF loads and the loads required for attaining a safe and orderly cold shutdown of the unit, assuming a single failure and loss of offsite power.	Redundancy and independence of components preclude the loss of both redundant subsystems as a result of a single failure	X	

Electrical (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
	IEEE 384-1974 NRC RG 1.75, Rev. 2			
Isolation devices	Provide two interrupting devices in series actuated only by fault current to isolate non-Class 1E circuit connected to Class 1E circuit. Alternatively, provide an interrupting device, which shall be tripped from Class 1E bus with a safety injection coincident with loss of offsite power signal.	Schematic diagrams 6E-1-4030DC05-K 6E-1-4030DC06-K SR 125 V dc control center has two NSR devices: undervoltage relay and ground detector recording voltmeter. These devices are isolated from SR bus by an interrupting device actuated by fault current. FSAR commitment is to provide two interrupting devices (actuated by fault current) in series when nonsafety-related circuit is connected to safety-related circuit.		X

Equipment Qualification (Seismic)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Qualification report storage batteries Supplier - Gould (Tag #'s 1&2DC01E, 1&2DC02E).	IEEE-344-1975 Purch. Spec. F/L 2819	CQD File 005567, Rev. 0	X	
Qualification report storage battery racks Supplier - Gould (Tag #'s 1&2DC01EA, EB & 1&2DC02EA, EB).	IEEE-344-1975 Purch. Spec. F/L 2819	CQD File 005567, Rev. 0	X	
Qualification report dc distribution center Supplier - G.E. (Tag #'s 1&2DC05E, 6E, 5EA, 5EB, 6EA, 6EB).	IEEE-344-1975 Purch. Spec. F/L 2822	CQD File 005960, Rev. 01	X	
Qualification report battery chargers Supplier - Power Conversion Products (Tag #'s 1&2DC03E, 1&2DC04E).	IEEE-344-1975 Purch. Spec. F/L 2820	CQD File 012527, Rev. 0	X	
Qualification report fuse panel Supplier - Systems Control (Tag #'s 1&2DC10J, 1&2DC11J).	IEEE-344-1975 Purch. Spec. F/L 2788	EMD Files 022749, 023119, 024103 (Note - Operability of internal components will be verified in a separate report.)	X	

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APPENDIX C-3

ADEQUACY OF DESIGN PROCESS

Civil/Structural(Seismic)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Seismic response spectra for Category I structures and components		Refer to Appendix A-3 (Seismic)	X	

(1099o)

Electrical

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Verification of the actual loads connected to the battery	Verify that the actual loads connected to the battery are within those used in duty cycle based on which battery is sized	The design process does not document verification of actual loads connected to the battery to verify the duty cycle used in the battery sizing design calculation.		X
Battery area ventilation	Verify that the actual temperature in battery area is same as one at which battery life was decided, since higher temperature reduces battery life	In the conceptual design of the battery room, this room had walls on all sides and the environment in the room was controlled at 77°F + 2°F. The design was subsequently finalized with wire fence on north side of battery and walls on other three sides. As a result, the environment in the battery room changed from 77°F to 69°F/108°F. Actual higher temp. of 108°F resulted in reduced qualified life. This has no safety impact.	X	
		Overall there was good interdiscipline interface with HVAC. Electrical group provided heat load information to HVAC to design ventilation system. HVAC in turn provided year round temperature in the battery area to Electrical group for their use for battery qualified life evaluation.	X	
Control power circuits voltage drop	Verify that the minimum voltage for various control components is higher than the minimum voltage for which they are designed in order for them to do their safety function	In order to ensure the capability of various SR 125 V dc power voltage drop feeds for controls to various switchgear, S&L did detailed voltage drop calculations with actual pulled length and size of cables and either used auxiliary relay or parallelled the conductor so that the control devices will have adequate voltage level at their terminals for them to function properly. Minimum - maximum voltage range information was coordinated with the switchgear vendor.	X	

Electrical (Cont)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Maximum battery short circuit current	Verify breakers rating and trip setting for proper selection so that they do their safety function as designed	S&L coordinated the information on maximum battery short circuit current with Gould to select breaker ratings and the trip setpoint	X	
Design documents	Design documents shall be consistent in respect of same design information shown on more than one design document in order to avoid confusion and possible error	Some inconsistencies were found in the design documents: o Design criteria do not list all IEEE standards and NRC RGs committed to in the FSAR. o The battery rating in the battery charger specification was not revised when battery rating changed from 900 AH to 1200 AH. o The vendor data information attached to the battery and the battery charger conformed specification are proposal data and are out of date. The above inconsistencies have no impact on actual installation or procurement. The above design process was covered by review of the following documents: 1. (a) Design calculation 4391/19-D-5, Rev. 0 (b) Single line diagram 6E-1-4001A, Rev. D	X	

Electrical (Cont)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
		2. -Equipment specification F/1-2819, Amend. 2 -HVAC memo 1-24-78 3. -Design calculation 4391/19-AO-16, Rev. 1 4. -S&L telecon memo, 3/24/80. 5. -Design criteria DC-DC-01-BB, Rev. 4 -Equipment specification F/L-2920, Amend. 2 -Equipment specification F/L-2819, Amend. 2		

APPENDIX C-4

S&L INTERFACE WITH WESTINGHOUSE AND NUCLEAR POWER SYSTEMS

Electrical

Company	Interface Reviewed	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Westinghouse	Westinghouse equipment specification for static inverter power supply system for critical single phase loads.	Equip. Specif. No. G676573 dated 9-13-67, Rev. 3. S&L reviewed this equip. spec., and used it as a basis for the inverter load in the battery duty cycle.	X	

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APPENDIX C-5

DESIGN CHANGE CONTROL

Electrical

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	No
	Refer to Appendix D-5		

APPENDIX C-6

REVIEW OF S&L DESIGN REVIEW

Electrical

S&L Design Review	S&L Review Report Review	Acceptability Yes	Acceptability No
S&L Design Review Team reviewed the following electrical design aspects of SR 125 V dc system: - Independence from the ac offsite power system - Failure of redundant dc onsite power circuits from the effects of missile, a pipe whipping, a charging fluid or a fire - Redundancy - Independence of redundant dc power circuits - Battery capacity - Battery charger capacity - Isolation of NSR loads from Class 1E dc power system per NRC RG 1.75 - Surveillance - Sharing of dc onsite power system between two units	EDRR No. C2-004-BY dated 6-30-82 C1-005-BY dated 6-30-82 S&L has an established engineering practice of having a formalized design review at system level by an independent group. This review is done with the help of a checklist which addresses considerations relevant to design requirements and licensing commitments. The review group findings summary is sent to Elect. Dept. Manager, who either agrees or disagrees with the findings and provides resolution in case of disagreement. We concur with the review considerations and comments presented in the above reports, and find the procedure and its implementation acceptable.	X	

APPENDIX D

COMMON SAFETY REQUIREMENTS

APPENDIX D-1

IDENTIFICATION/IMPLEMENTATION OF COMMITMENTS AND CRITERIA

Electrical Layout

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Appendix A; R.G. 1.75, Rev. 2 (Sect. 8.3.2.1)/IEEE 384-1974:			
The physical separation of the circuits and equipment comprising or associated with the Class 1E power systems, protection systems and equipment shall meet the criteria set forth by IEEE 384-74 as amended by R.G. 1.75 and exceptions stated in FSAR Appendix A. The major areas of licensing commitment include the following: - Compatibility with mechanical systems - Associated circuit separation - Separation analysis requirements - Non-Class 1E circuit separation - Cable & raceway design basis - Cable spreading area separation - General plant area separation - Identification	For the Interim Report, the following documents which address portions of separation licensing commitments, were reviewed to determine whether the Byron design meets the licensing commitment concerning separation. For details of the areas within separation reviewed, refer to Appendices A-2 through D-2.		
	1. Design criteria - cable sepration (EL-1) DC-EE-01-BB, Rev. 11	X	
	2. Class 1 cable termination & splicing - Proc. 11, Rev. 19 (EL-3)	X	
	3. Documentation of cable sep. criteria violations Proc. BBP-6, Rev. 0 (EL-4)	X	
	4. Project instruction - electrical separation walkdown Instruction PI-BB-42, Rev. 1 (EL-5)	X	
	5. Project instruction - Walkdown - 1 inch separation of conduit Instruction - PI-BB-53, Rev. 0 (EL-6)	X	

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Electrical Layout (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Appendix A; R.G. 1.75, Rev. 2 (Sect. 8.3.2.1)/IEEE 384-1974: (Cont)	6. Project instruction-safety-related/NSR Interface Review Report PI-BB-54, Rev. 0 (EL-13)	X	
	7. Cable separation criteria composite table Dwg 6E-0-4027B Rev. A (EL-15)	X	
	8. Elect. notes & sym. 6E-0-3390 Sh. 1 Rev. AP (EL-17) 6E-0-3390 Sh. 2 Rev. AG (EL-17) 6E-0-3390 Sh. 3 Rev. G (EL-17)	X	
	9. Cable pan gen. notes & details 6E-0-8250 Rev. AD (EL-18) 6E-0-8251 Rev. AA (EL-18)	X	
	10. Cable pan install. details 6E-0-3237 Rev. Z (EL-19) 6E-0-3237A Rev. L (EL-19) 6E-0-3237B Rev. L (EL-19)	X	

Electrical Layout (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Appendix A; R.G. 1.75, Rev. 2 (Sect. 8.3.2.1)/IEEE 384-1974: (Cont)	11. CECo Ltr. to S&L - Sept. 7, 1982 Subject: Splicing of Cables in Aux. FWR Tunnel (EL-22)	X	
	12. Cable separation conflict reports (CSCR)		
	a. CSCR #2 3/11/83 (EL-29A)	X	
	b. CSCR #3 3/17/83 (EL-29B)	X	
	c. CSCR #5 4/14/83 (EL-29C)	X	
	d. CSCR #6 5/3/83 (EL-29D)	X	
	e. CSCR #7 9/8/83 (EL-29E)	X	
	f. CSCR #8 10/24/83 (EL- 29F)	X	
	g. CSCR #16 3/8/84 (EL-29G)	X	
	h. CSCR #19 4/23/84 (EL-29H)	X	
Cable Rating Design Basis (Derating) (FSAR 8.3.1.4.1.2)			
The ampacity for each cable size shall be determined by the appropriate derating factors	For the Interim Report, the following documents, which address only portions of the licensing commitment, were reviewed to determine whether the Byron design meets the licensing commitment concerning cable derating. For details, refer to Appendix A-2.		

Electrical Layout (Cont)

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Cable Rating Design Basis (Derating): (FSAR 8.3.1.4.1.2) (Cont)	1. Cable tray power cable ampacity AMPAC 3/27/84 (EL-16)	X	
	2. Fire barrier cable ampacity evaluation & Std ESI-151 (EL-25)	X	
	3. Removing/deleting previously installed cables Instruction PI-BB-51 Rev. 0 (EL-8)	X	

Equipment Qualification - Seismic

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
Seismic qualification of Seismic Category I instrumentation and electrical equipment (BOP) reference IEEE-344-75 and IEEE 344-71 "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations" (IEEE 344-71 for existing test reports) (FSAR 3.10.2.2)	Standard spec. for seismic qualification - Form 350-B references project purchase spec. which references IEEE-344 current revision. Component Qualification Division seismic checklist indicates if the qualification report meets the requirements of IEEE-344-1975.	X	
References Reg. Guide 1.89 "Qualification of Class 1E Equipment for Nuclear Power Plants" (FSAR 3.10.5)	For seismic qualification, Reg. Guide 1.89 references IEEE-344. (See above, FSAR 3.10.2.2)	X	
Reg. Guide 1.100,"Seismic Qualification of Electric Equipment for Nuclear Power Plants". Applicant complies with the objectives of this reg. guide (FSAR A1.100-1)	Reg. Guide 1.100 references IEEE-344-1975. (See above, FSAR 3.10.2.2)	X	

Mechanical - Stress

FSAR/Licensing Commitment	Covered By Design Document/Requirement	Acceptability Yes	Acceptability No
"Moderate-Energy Fluid System Inside and Outside Containment" for postulating through wall leakage cracks (FSAR 3.6.2.1.2.2)	EMD-045602, Rev. 00, dated 10/18/83 Moderate energy piping, Units 1 & 2, for essential service water and component cooling water piping systems	X	

APPENDIX D-2

DESIGN ADEQUACY

Electrical Layout

Areas Reviewed For Adequacy	Acceptance Criteria	Procedure/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Reg. Guide 1.75, Rev 2				
Associated circuits	Associated circuits shall be identified, separated and analyzed/tested per IEEE 383-1975.	S&L design precludes associated circuits. Circuits are either Class 1E or non-Class 1E. Documents supporting this position are as follows: 1. Design criteria - cable separation DC-EE-01-BB Rev. 11 (EL-1) 2. Cable separation criteria composite table Dwg 6E-0-4027B	X	
Cable & raceway design basis	The design basis shall be that the cable trays will not be filled above the side rails.	In determining the cable tray loading, a S&L design restraint is that cables are below the top level the side rails. This is shown in Project Instruction PI-BB-17, Rev. 3 (EL-10).	X	
	Splices shall be documented on design documents.	Splices are generally prohibited in S&L design. If required, splices are performed per S&L Std. EA-20B, Section 6, Method 1. Splices are also identified as shown in Dwg 6E-0-3587 Rev. AA. Splices which are required but not documented on drawings are documented on FCRs per Hatfield Electric Co.'s Procedure #11.	X	

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Electrical Layout (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Reg. Guide 1.75, Rev 2 (cont)				
Specific equipment separation:	Redundant Class 1E batteries shall be placed in separate safety class structures.	The Class 1E batteries, battery chargers and associated distribution centers are located in separate rooms within a Category I structure. This is shown on Dwg 6E-1-3371B, Rev P.	X	
	Battery chargers for redundant Class 1E batteries shall be physically separated in accordance with the requirements of IEEE 384, Section 4.	Refer to discussion above.	X	
	Redundant Class 1E distribution centers shall be physically separated in accordance with the requirements of IEEE 384, Section 4.	Refer to discussion above.	X	

Electrical Layout (Cont)

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Reg. Guide 1.75, Rev 2 (cont)				
Identification	Exposed Class 1E raceways shall be marked in a permanent manner at intervals not to exceed 15 ft and at points of entry to and exiting from enclosed areas.	Cable trays in safety-related areas are identified with segregation labels on both sides every 15 ft and on both sides of wall and floor penetrations. All exposed conduits in safety-related areas are identified at ends of conduit, every 15 ft and on both sides of floors and walls. Embedded conduits are identified where conduit extends to reach cable trays. This is shown on Dwg. 6E-0-3390 Rev. AP.	X	
Cable Rating Design Basis (Derating) (FSAR 8.3.1.4.1.2)				
Ambient derating	Ampacity of each cable size shall be derated for proper ambient.	Appropriate ambient derating was applied to power cables and shown on a computer program - Cable tray power ampacity (AMPAC) 3/27/84 (EL-16)	X	
Tray cover derating	Ampacity for each cable size shall be derated for tray covers.	Five percent derating for tray covers was applied on all power cables. This is shown on a computer program -- Cable tray power ampacity (AMPAC) 3/27/84 (EL-16)	X	
Penetration (fire stop)	Ampacity for each cable size shall be derated for fire stops.	Derating for cables penetrating a 3-hour fire wall, floor, or ceiling was covered by the Fire Barrier Cable Ampacity Evaluation (EL-25). S&L Std. ESI-151 (EL-25) provides guidance for performing this evaluation. Derating for each penetration and cable was considered.	X	

(1108o)

Mechanical - Stress

Areas Reviewed For Adequacy	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Moderate energy piping (FSAR 3.6.2.1.2.2)	No through-wall leakage cracks are postulated if the maximum stress range as calculated by the sum of Eq (9) and (10) of Para NC-3652 does not exceed $0.4(1.2\ S_h+S_A)$.	Piping analysis calculation 1SX-16, Rev. 04F0, ESW piping system: the highest stress at node 200A is 12449 psi which is less than $0.4(1.2\ Sh+S_A)$ = 16,200 psi. As a result, moderate energy leakage cracks are not required.	Y	

APPENDIX D-3

ADEQUACY OF DESIGN PROCESS

Control Systems

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Design calculations for instrument tube spans	Statement of objective is clear and complete	Procedure/calculation EMD 015140, Rev. 4 Calc. EMD 015139, Rev. 0 Calc. EMD 030898, Rev. 0	X	
	Sources of equations used have been documented	Calc. EMD 030653, Rev. 0 Calc. EMD 019583, Rev. 0 Calc. EMD 042097, Rev. 0 Procedure GQ-3.08 Rev. 4	X	
	Sources of constants and input data have been documented		X	
	Computer programs used are identified		X	
	Computer programs used have been validated and documented		X	
	Code requirements have been identified and documented		X	
	Calculations have been reviewed (checked) in accordance with S&L procedures		X	
	Calculations have been approved in accordance with S&L procedures		X	

Electrical Layout

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
Implementation of separation requirements	The process of ensuring separation compliance shall be comprehensive and shall result in compliance with the criteria set forth in IEEE 384-1974 as amended by RG 1.75 and exceptions stated in FSAR, Appendix A.	S&L electrical separation program is comprehensive, methodical and detailed. The process is governed by the design criteria for cable separation (DC-EE-01-BB). To ensure cable separation, the cable routing computer program will not allow improper cable routing in wrong raceways. All SR & NSR interfaces are listed in the Internal Review Report (IRR) Index. These interfaces are detailed and analyzed for compliance with separation requirements in the IRR. To ensure raceway separation, S&L Stds. ESO-292 and ESO-295 require review of cable tray and electrical installation drawings to verify separation compliance. Any apparent exceptions is required to be identified, documented, justified and approved by Procedure BBP-6. Furthermore, the electrical contractor is required to report any apparent exceptions by Hatfield Elect. Co. Procedure 11. Document reviewed are as follows:		
		1. Design Criteria - Cable Separation (EL-1) DC-EE-01-BB Rev. 11	X	
		2. Class 1 Cable Termination & Splicing - Proc. 11, Rev. 19 (EL-3)	X	
		3. Documentation of Cable Sep. Criteria Violations-Proc. BBP-6 (EL-4)	X	

Electrical Layout (Cont)

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	No
		4. Project Instruction-Electrical Separation Walkdown Instruction PI-BB-42 Rev. 1 (EL-5)	X	
		5. Project Instruction-Walkdown-1" Separation of Conduit Instruction PI-BB-53 (EL-6)	X	
		6. Project Instruction-Safety-Related/NSR Interface Review Report PI-BB-54 (EL-13)	X	
		7. Cable Separation Criteria Composite Table Dwg 6E-0-4027B; Rev. A (EL-15)	X	
		8. Elect. Notes & Sym. 6E-0-3390 Sh. 1 Rev. AP (EL-17) 6E-0-3390 Sh. 2 Rev. AG (EL-17) 6E-0-3390 Sh. 3 Rev. G (EL-17)	X	
		9. Cable Pan Gen. Notes & Details 6E-0-8250 Rev. AD (EL-18) 6E-0-8251 Rev. AA (EL-18)	X	
		10. Cable Pan Install. Details 6E-0-3237 Rev. Z (EL-19) 6E-0-3237A Rev. L (EL-19) 6E-0-3237B Rev. L (EL-19)	X	
		11. Cable Separation Conflict Reports (CSCR)		
		a. CSCR #2 3/11/83 (EL-29A)	X	
		b. CSCR #3 3/17/83 (EL-29B)	X	
		c. CSCR #5 4/14/83 (EL-29C)	X	
		d. CSCR #6 5/3/83 (EL-29D)	X	
		e. CSCR #7 9/8/83 (EL-29E)	X	
		f. CSCR #8 10/24/83 (EL-29F)	X	
		g. CSCR #16 3/8/84 (EL-29G)	X	
		h. CSCR #19 4/23/84 (EL-29H)	X	

Equipment Qualification-Seismic

Design Process Reviewed	Acceptance Criteria	Procedures/Documents Reviewed and Comments	Acceptability Yes	Acceptability No
Dynamic qualification review procedure	IEEE-344-1975	MSS-6.2-D, "Dynamic Qualification Criteria". This document summarizes qualification requirements sanctioned by IEEE-344-1975. Additionally, the Byron Station qualification commitments are identified.	X	
		Form MAS-EMD-2.A Rev. A, "Checklist for Dynamic Qualification of Mechanical and Electrical Equipment." Sargent and Lundy qualification review is performed against this checklist to ensure complete evaluation of applicable requirements.	X	
		Report CQD-4391-DQSR, "Status Report for Dynamic Qualification". This report contains current qualification for any given piece of equipment. Tracking of all qualification documents and required actions enable efficient qualification management.	X	

APPENDIX D-5

DESIGN CHANGE CONTROL

Quality Engineering

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
Quality Assurance procedures	The following QA procedures were reviewed for compliance with 10CFR50 Appendix B		
	GQ-2.04 Rev. 5 Indoctrination and Training	X	
	GQ-3.04 Rev. 6 Design Criteria	X	
	GQ-3.07 Rev. 6 S&L Drawings	X	
	GQ-3.08 Rev. 4 Design Calculations	X	
	GQ-3.09 Rev. 5 Foreign Design Documents	X	
	GQ-3.13 Rev. 6 Engineering Change Notice	X	
	GQ-4.01 Rev. 10 Procurement Specifications	X	
	GQ-16.01 Rev. 6 Corrective Action Reports	X	
	GQ-16.03 Rev. 1 Design Errors & Deficiencies	X	
	GQ-5.01 Rev. 2 Project Instructions	X	

(1108o)

Quality Engineering (Cont)

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
Project instructions	The following project instructions were reviewed for compliance with S&L QA Procedure GQ 5.01 Rev. 2		
	PI-BB-05 Rev. 9 Mech. Dept. Dwg. Review & Comment Requirements	X	
	PI-BB-06 Rev. 0 Elect. Dwg. Preparation Review & Approval	X	
	PI-BB-08 Rev. 5 Processing Non-Conformance Reports and S&L Engineering Change Notices	X	
	PI-BB-10 Rev. 1 Mech. & Stuctured Drawing Prep., Review & Approval	X	
	PI-BB-12 Rev. 2 Processing Offsite Vendor Non-Conformance Reports	X	
	PI-BB-13 Rev. 9 Processing Field Change Requests (FCRs)	X	
	PI-3B-14 Rev. 2 Interface Flow Requirements Piping and Analysis and Component Support Design	X	
	PI-BB-15 Rev. 2 Formal Piping Analysis and Component Support Design	X	
	PI-BB-16 Rev. 2 Procedure for Handling As-Built Information	X	
	PI-BB-24 Rev. 3 Processing and Monitoring of Contractor Technical Data Documents	X	
	PI-BB-27 Rev. 2 As-Built Piping Reconciliation	X	
	PI-BB-30 Rev. 1 HVAC Ductwork Seismic Support Design Verification	X	
	PI-BB-44 Rev. 1 Superseded Pipe Support Drawings	X	

Quality Engineering (Cont)

Area of Change Control Reviewed	Documents/Procedures Reviewed and Comments	Acceptability Yes	Acceptability No
Design criteria	S&L Procedure GQ 3.04 Rev. 6 Design Criteria The following design criteria documents were reviewed for their compliance to the noted QA procedure for: a. Project identification b. Safety-related identification c. Revision control sheet signed off by reviewer/approver d. Latest revision noted on revised pages e. Are regulatory guides/PSAR/FSAR/standards/codes noted? f. Is latest revision noted in design criteria status report?		
	DC-AN-01-BB Rev. 4 Annunciator System	X	
	DC-DC-01-BB Rev. 4 Battery & dc Distribution	X	
	DC-EE-01-BB Rev. 11 Cable Separation Electrical Install.	X	
	DC-EE-02-BB Rev. 3 Relay Protection for Elect. System	X	
	DC-PR-01-BB Rev. 1 Radiation Monitoring System	X	
	DC-IP-01-BB Rev. 3 Instrument and Control Power	X	
	DC-ST-03-BB Rev. 11 Structural Design Criteria	X	
	DC-ST-04-BB Rev. 1 Seismic Subsystems & Equip. Response Spectra	X	
	DC-SX-01-BB Rev. 3 Essential Service Water System	X	

APPENDIX E

PROGRAM PLAN

Rev. 0

PROGRAM PLAN

INDEPENDENT DESIGN REVIEW

OF

BYRON GENERATING STATION, UNITS 1 & 2

Prepared for

Commonwealth Edison Company

Chicago, Illinois

Approved by _____ Date 5/4/84
Project Manager

Concurrence by _____ Date 5/4/84
Manager of Engineering, BPC

Bechtel Power Corporation
San Francisco, California
April, 1984

TABLE OF CONTENTS

BYRON STATION
INDEPENDENT DESIGN REVIEW PLAN

Program Description

Byron Independent Design Review

I. - Introduction and Summary

This document describes the proposed program for the independent review of the design for Units 1 and 2 of the Byron Station of Commonwealth Edison Company, covering work by Sargent & Lundy Engineers. It is intended to be fully responsive to the requirements set forth in the letter of April 12, 1984 from Messrs. B. R. Shelton and R. E. Van Derway of Commonwealth Edison Company to Mr. Peter Karpa of Bechtel Power Corp.

The purpose of this design review will be to provide an additional level of confidence in the design of the Byron Station through a review of the technical adequacy of several selected systems and the design process employed by Sargent & Lundy (S & L). Three systems have been selected for this review: the Component Cooling Water System, the Essential Service Water System, and the DC Distribution System. From this review, an assessment will be made both of the adequacy of the systems reviewed, and of areas of the plant design which were not specifically reviewed, including positive aspects of the design work.

The review will be performed by a dedicated project team, comprised of qualified personnel from Bechtel Power Corp. (Bechtel). The work will be performed under the direct surveillance of the Manager of

Engineering, Bechtel Power Corporation (BPC) to whom the Project Manager of the review team will report for project direction. The majority of the review team will be comprised of personnel from Bechtel's San Francisco Power Division and the Corporate group, but there will be some individuals drawn from other Bechtel entities when beneficial to the effort. Activities of the team will be physically divided between the Chicago offices of S & L and Bechtel offices in San Francisco, so as to achieve objectives of the review, expeditiously.

The program for the review of each system is divided into the tasks listed below. However, these divisions are mainly for convenience and clarity of reporting, and do not imply different personnel will necessarily perform each task.

Task - 1	Design Requirements
Task - 2	Design Adequacy
Task - 3	Design Process
Task - 4	General Assessment

Each of these tasks is described in more detail in the respective sections and is intended to incorporate all of the work requested in the April 12 letter and its Attachment - A.

The Bechtel work will be performed under the requirements of its corporate quality assurance program (BQ-TOP-1, Rev. 3A), which has been approved by the NRC. Implementing procedures will comply with applicable requirements of the quality assurance program, and some will be based upon the standard Bechtel Engineering Department Procedures (EDP's). The quality assurance program for the review is described in Appendix A, and will be implemented in accordance with approved procedures. Procedures will also be issued, as required, to provide additional detail for performing activities of the Review.

There are no known conflicts of interest by Bechtel Power Corporation, or by individuals on the review teams, which should prevent this review team from arriving at objective conclusions from the review, or which would otherwise compromise purposes of the review.

Work will be scheduled for an interim report to be submitted by May 31, 1984, and a final report by approximately July 31, 1984.

II. - Task Descriptions

The tasks described here have been organized to allow a thorough review of the specified systems listed below, and at the conclusion of review, to draw conclusions appropriate to the objectives and commensurate with the review work performed.

The systems reviewed will be as follows:

Component cooling water (CCW) system.

Essential service water (ESW) system.

DC distribution system (Class 1E portions, only)

System boundaries will be as generally described in the FSAR. However, the review will be extended, as necessary, to cover areas related to CECo responses to specific NRC questions. The review will cover mechanical, electrical, environmental, and structural aspects of the design of each system. It will also include instrumentation and control design, plant arrangements, and relevant nuclear engineering.

Task - 1

Design Requirements

General

Task - 1 will determine the extent to which design criteria or other design objectives, match licensing commitments. These will be used to implement Tasks 2 and 3, and to assess how design inputs are specified.

Source of the commitments will be the FSAR, responses to NRC questions on the FSAR, and such other documents as Commonwealth Edison (CECo) specifically identifies.

Sub-Tasks

1A Establish checklists to perform Task - 1.

1B Review FSAR and other documents specified by CECo to identify safety-related design criteria or other safety-related commitments and design requirements. This includes CECo responses to NRC questions.

1C Review CECo and S & L procedures for specifying design requirements.

Compare design requirements to the inputs used by S & L in developing designs or other documents, such as specifications. In doing this, due recognition will be given that there are many ways design requirements may be specified. Also, where interpretations of requirements are made, the justifications for apparent differences will be sought.

Effective dates for codes and standards will be confirmed.

1D Review output documents as appropriate, to determine if requirements are suitably reflected. These include procurement specifications, construction drawings, and design changes.

1E Identify and process Observations and incorporate results in the reports issued.

Task - 2

Design Adequacy

General

Task - 2 will review each of the selected systems for adequacy in meeting the licensing commitments and safety-related design requirements. These commitments and requirements will be those determined from Task - 1.

To assess design adequacy, primary reliance will be placed on the results as described in output documents. It will be recognized there are many ways to arrive at an adequate design which meets requirements. No attempt will be made to re-verify each step in designing the specified systems. Instead, the designs will be reviewed for accurate inputs and reasonableness of outputs, and adequacy of the design techniques based on a review and sampling of the work. Independent calculations will be performed only to the extent necessary, and not as a general rule.

In judging accuracy and completeness of design documents, due recognition will be given to established professional engineering practices and other precedents established in the nuclear industry. This will consider the level of detail needed to link design requirements with the output documents, and the process employed. It will also consider needs to justify design decisions and assumptions.

Sub-Tasks

2A Establish checklists to perform Task - 2.

2B Assemble design requirements for the specified systems.

2C Review selected design documents for the following:

1. Safety classifications, to determine if the structures systems, and components have been properly classified as to safety significance as defined in 10CFR50.

2. Accuracy and completeness of the design criteria and other inputs, including assumptions and codes or standards.

3. Applicability of standard design methods.

4. Method of analysis, to determine if an appropriate method was used, including mathematical models, and use of standards.

5. Engineering judgments and assumptions and the basis on which they were exercised and utilized.

6. Accuracy of implementing the analysis, including use of properly validated computer codes.

7. Adequacy of means by which designs were verified.

8. Translation of design into output documents, for completeness, clarity, and proper control.

9. Reasonableness of the output, in relation to similar designs.

In performing the above reviews, each system will be reviewed from the standpoint of an integrated design, properly coordinated between disciplines. It will include mechanical, electrical, nuclear, and civil/structural aspects of the design.

The last design revision will be considered for basis of the review This may be a field change request or other change notice. Also, in-process work will be included, where appropriate.

2D Forward potential Observations resulting from the above to the Internal Review Committee, for review and processing.

Task - 3

Design Process

General

Task - 3 will provide an assessment of the effectiveness of the S & L design process, for the specified systems. In performing this task, reviews will be made to evaluate the extent to which the design process is sufficiently controlled so that safety-related design requirements are met, and that relevant commitments in the FSAR are complied with. In the event there are activities for which procedures were not followed (e.g., not available, deviation from procedures, or no commitment) the actual practices used will be evaluated.

In making this assessment, due consideration will be given to the extent to which engineering judgement is appropriate, in lieu of written procedures. Recognition will be made of the complexity of the work, how unique it is, qualifications of personnel performing it, and other relevant factors.

Care will be taken to establish the time-frame of the design, to assure correct applicability of changing requirements.

Sub-Tasks

3A Establish checklists to perform Task - 3.

3B Review FSAR, S & L procedures (including its QA program), and referenced documents to identify requirements for the design process.

3C Interview selected, key S & L personnel so that reviewers correctly understand how requirements are interpreted and how they should be implemented.

3D Develop flow charts for design of the specified systems.

3E Review selected documents in the specified systems for adequacy and completeness of procedural requirements. Where procedural requirements are not available, the actual process will be evaluated to determine the extent to which the design is adequately controlled.

Documents reviewed will include those related to design criteria, calculations (both by hand and computer), drawings, specifications, and design change authorizations.

The documents will be reviewed for elements which include the following:

1. Adequacy of documentation of the design calculations,
2. Interface design control between S & L and Westinghouse, and between S & L and Nuclear Power Services,
3. Design change controls including use of Field Change Requests(FCR's), Non-Conformance Reports (NCR's) and Engineering Change Notices (ECN's).
4. Design reviews performed by S & L covering the specified systems, for technical adequacy.
5. Such other elements related to design control which are embodied in the FSAR and its referenced documents.

3F Forward potential Observations resulting from the above to the Internal Review Committee for review and processing.

Task - 4

General Assessment

General

In Task - 4, the results of Tasks 2 and 3 will be assembled and analyzed to determine what conclusions can be drawn regarding systems, structures and components which were not reviewed.

This analysis will be performed near the end of the review, using all available information, recognizing that conclusions must be commensurate with the nature of what was reviewed.

A balanced assessment will be sought, and one which emphasizes the likely impact on safety from observations made. As such, both positive and negative results will be considered, and the significance of all of them will be weighed.

Sub-Tasks

4A Consolidate all observations into a summary list.

4B Analyze the list in 4A for trends and root causes, and possible implications for unreviewed, safety-related areas.

4C Report those broader conclusions commensurate with what was actually reviewed and provide an analysis of results.

III. Processing of Observations

In the event the review of the specified systems reveals certain design activities which cannot be accepted by the reviewer, such as potential discrepancies, they will be termed Observations and processed in accordance with an established procedure.

The program for processing will seek to assure that Observations made as a result of the review are fully understood, validated, evaluated as to safety-significance, and closed-out through appropriate corrective action. Accordingly, provision is made for complete investigation and examination by Bechtel (the Reviewer). To this end, two internal review committees will be established within the Reviewer's organization.

It is also intended that results of the processing will not be compromised by any lack of independer e by the Reviewer. Accordingly, the functions of CECo (the Owner) and of S & L (The Engineer) are essentially restricted to providing information and otherwise clarifying the basis of design, while Observations are being considered. Subsequently, corrective action will be mutually agreed to by the Owner, Engineer, and Reviewer. Then, it will be implemented by the Engineer.

Key steps in processing of potential Observations, all the way to close-out by reviewer, are shown in Table - 1. At any point, however, the processing may be terminated and closed-out, if Reviewer determines no reporting or other action is appropriate.

TABLE - 1

Processing of Observations

	Activity	Responsibility
1.	Potential Observation developed during review and forwarded to Level - 1 Internal Review Committee.	R
2.	Item discussed in detail with cognizant personnel.	E, R
3.	Level - 1 Internal Review Committee confirms Observation and determines if it is of potential safety significance.	R
4.	Notification to CECo, for potential safety significant items.	R
5.	For other accurate but non-safety significant items, process as in Steps 9, 10 and 11. For invalid items, process as in Step 9.	E, R
6.	For potential safety significant items Level - 2 Internal Review Committee confirms Observation. Confirms if safety significant.	R
7.	Prompt notification to CECo for safety significant items.	R
8.	For safety-significant and for other accurate but non-safety significant items, process as in Steps 9, 10 and 11. For invalid items, process as in Step 9.	E, R
9.	Report issued.	R
10.	Response made, including proposed corrective action, if appropriate.	E
11.	Corrective action proposal accepted.	R
12.	Monitoring of above activities	O

KEY

E - Engineer

O - Owner

R - Reviewer

IV. Reports and Documentation

One Interim Report is planned, describing overall results of the work to date, and including a description of the review program. Also, a Final Report will be issued covering results of all work performed and including whatever broader conclusions can be drawn on areas not reviewed.

Reports on individual Observations will be issued when they are confirmed by the Level-1 or Level-2 Internal Review Committee in accordance with Section III. This will be done promptly to permit responses to be immediately initiated and corrective action begun. A standard form will be used for these reports.

All reports will be issued to CECo with copies to S & L and others specified by CECo.

A copy of all calculations and other documentation which support the individual, interim, and final reports will be provided to CECo.

V. Organization

The review will be performed by a Review Team, mostly comprised of senior engineering and project management personnel from Bechtel Power Corp.

The work of the Review Team will be under the overall direction of the Manager of Engineering, Bechtel Power Corp. The day-to-day activities, however, will be managed by its Project Manager, who reports to the Manager of Engineering. The Project Manager also receives direction from the Projects Engineering Manager, Commonwealth Edison Co., under terms of the contract and to the extent permitted by this review program.

Organization of the Review Team is shown on Figure - 1.

The team is organized around the systems to be reviewed. Each of these will be reviewed by an identified System Group, led by an experienced member of engineering management. These groups will be responsible for performance of all the identified tasks for each system. Their leaders will also develop the broader conclusions, described in Task - 4 for un-reviewed areas.

Members of the groups have been carefully selected to assure qualified, objective, and balanced assessments of what is reviewed. In some cases,

individuals may serve on two or more System Groups, where the workload permits. In all cases, their review work will be carefully monitored by management of the Review Team.

The necessary discipline and other technical expertise will be represented within the Review Team, and usually on each System Group. It is not expected that additional entities will be involved, apart from the Review Team and the Review Committee; although this does not preclude occasional assistance from elsewhere in Bechtel where some special expertise is available. Current membership of the Review Team and Review Committees is shown in the Byron Review Roster, on Table - 2, however needed changes may be made from time-to-time.

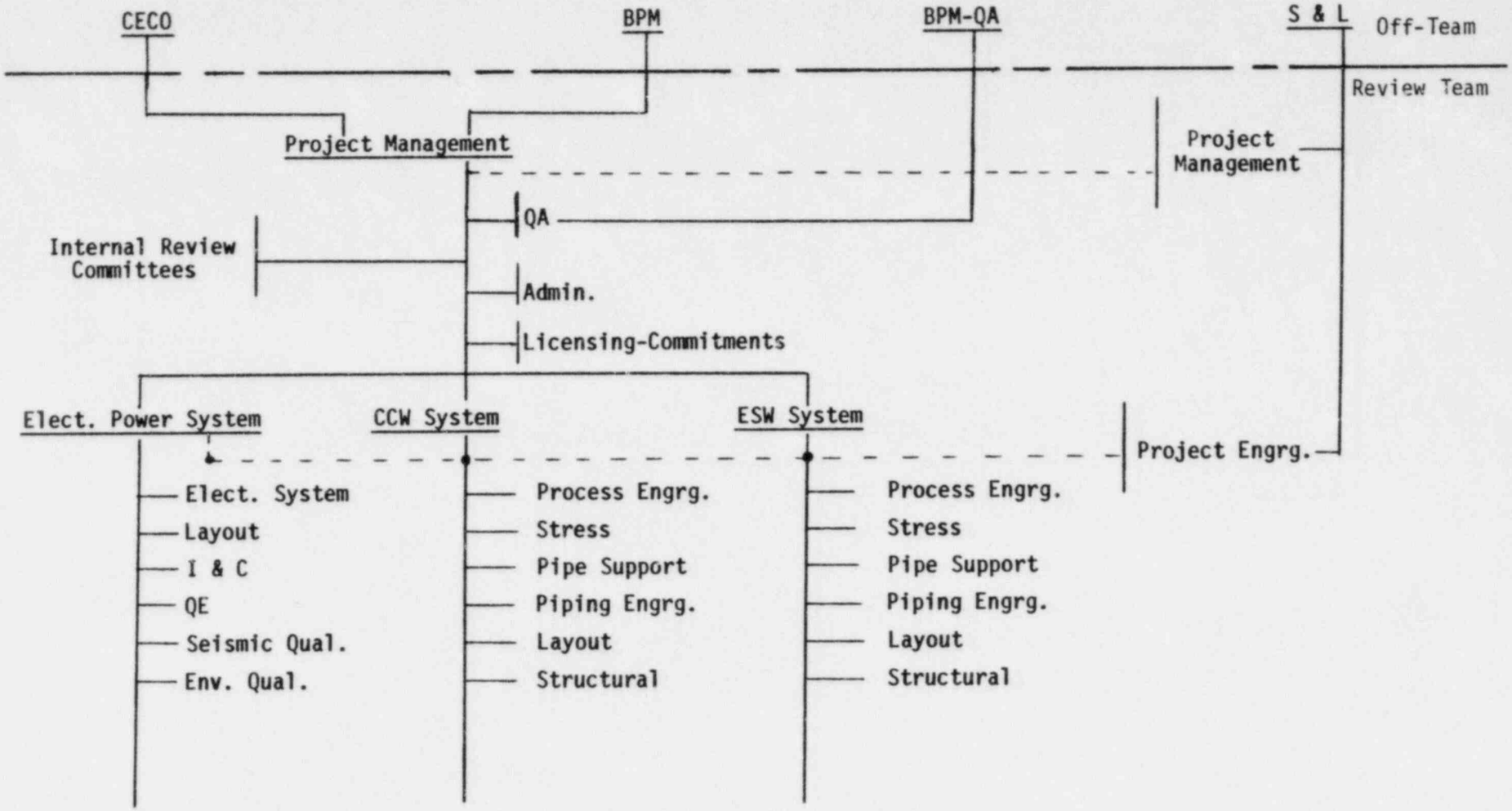
Quality Assurance surveillance will be from an assigned Quality Assurance Engineer, who will report directly to the Manager of Quality Assurance, Bechtel Power Corp.

Team-wide support will be provided in the areas of licensing commitments and administration by individuals reporting to the Project Manager.

Qualifications of Bechtel Power Corporation for design review work are summarized in Appendix - B. Resumes of key members of the Review Team and of the Review Committees are included in Appendix - C.

FIGURE - 1

BYRON REVIEW PROJECT ORGANIZATION



_____Direction ----------Communication

Note: Each System Group provides services to others, as required

TABLE - 2

Byron Review Roster

Corporate Management	
P. Karpa	Management Sponsor
J. M. Amaral	Quality Assurance Management
Review Team Staff	
C. W. Dick	Project Manager
G. L. Parkinson	Deputy Project Manager
R. S. Cahn	Licensing - Commitments
D. W. Wolfe	Quality Assurance Engineer
K. G. Purcell	Administrator
D. B. Hardie	Quality Engineering
System Groups	
A. M. Appleford	Structural Engineering
A. W. Davis	I & C Engineering
C. M. Hazari	Electrical System Engineer
E. M. Hughes	CCW Systems Group Leader
A. T. Jocson	Process Design
C. W. Jordan	Electrical Systems Group Leader
R. J. Lodwick	Process Design
W. D. Lowe	Plant Design
M. H. Malkani	Stress Engineering
A. S. Meyers	Piping Engineering
M. G. Michail	Structural Engineering
R. S. Powell	ESW Systems Group Leader
E. Salinas	Structural Engineering
H. Shah	Pipe Support Design
B. S. Shicker	Structural Engineering
J. A. Shoulders	Process Design
L. S. Spensko	Quality Engineering
J. M. Strohm	Environmental Qualification
A. Valahovic, Jr.	Fire Protection
C. R. Whitehurst	Seismic Qualification
G. K. Young	Electrical Systems Engineering
Level -1 Internal Review Committee	
C. W. Dick	Project Manager
G. L. Parkinson	Deputy Project Manager
R. S. Powell	ESW System Group Leader
E. M. Hughes	CCW System Group Leader
C. W. Jordan	Electrical System Group Leader
R. S. Cahn	Licensing - Commitments
Level -2 Internal Review Committee	
A. L. Cahn	Bechtel Power Management Consultant
R. P. Schmitz	Chief Nuclear Engineer, BPC
S. A. Bernsen	Project Manager, BPC

VI. Schedule

Review work will be keyed to the target milestone dates shown below:

May 31, 1984	Issue Interim Report
July 31, 1984	Issue Final Report

More detailed schedules will be developed after initial reviews have taken place. However, it is not expected that the nature of the work will permit the detail of scheduling that is normally performed on a design - construction project.

The date for the Interim Report will be considered firm, in which the results of work performed to that time will be reported.

The date for the Final Report will be considered as a target date, which may be adjusted several weeks earlier or later, depending on progress and results of the review. In the event ongoing work justifies completion and limited additional time is needed, the completion date may be delayed. Likewise, every reasonable effort will be made to complete the review in the shortest possible time, consistent with achieving objectives of the Review.

The overall guidelines to be employed will be to complete sufficient review work by July 31, 1984, to produce a Final Report, which will not require further review work by the Reviewer or others.

APPENDIX F

LIST OF GENERAL MEETINGS

APPENDIX F

LIST OF GENERAL MEETINGS

April 5	San Francisco	Bechtel kickoff meeting to discuss scope of work and mode of operation.
April 10	San Francisco	Bechtel meeting to establish review team assignments.
April 17	Chicago	CECo/S&L/Bechtel combined IDR kickoff meeting.
April 23	Chicago	CECo/S&L/Bechtel meeting. S&L presentation on HELB/MELB design.
April 24	O'Hare Airport	CECo/Bechtel joint presentation to NRC personnel, describing plans for the IDR.
April 25	Byron	Bechtel visit to Byron Generating Station. Meeting with S&L jobsite personnel to discuss IDR program, review selected work.
April 26	Chicago	Bechtel design review team status presentation of IDR to S&L personnel.
May 10	Chicago	Bechtel design review team status presentation of IDR to S&L personnel.

Note: Meetings listed do not include meetings held by individual reviewers.