AUDIT REPORT

ENERGY INCORPORATED/FERGUSON INCORPORATED
AUDIT REPORT OF SARGENT & LUNDY FOR
COMMONWEALTH EDISON COMPANY

JULY 6, 1982

ENERGY INCORPORATED

R. N. CURRAN R. N. Curran DATE 7/6/82

R. J. HARRIS Robert J. Harris DATE 7/6/82

FERGUSON INCORPORATED

R. N. FERGUSON R. N. Ferguson DATE 7/6/82

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I. SCOPE, SUMMARY, AND ASSESSMENT

1.0 SCOPE

Energy Incorporated/Ferguson Incorporated (EI/FI) have completed an audit for Commonwealth Edison Company (CECo) of the Sargent & Lundy (S&L) Engineers Quality Assurance Program as implemented on the Byron/Braidwood and LaSalle Projects. The audit was conducted in conjunction with but independent of the regularly scheduled CECo QA Department audit. The audit was performed at the S&L offices in Chicago, Illinois on June 7 through 11, 1982.

The areas audited by the EI/FI team were: QA administration; QA program; design control, including: Engineering Document Control, Engineering Procedure Control, Computer Program Verification, Analysis Control, Interface Control, including S&L and NSSS interfaces, 1E equipment qualification program, and 1E equipment design control.

The purpose of the audit was to provide CECo with an independent assessment of the S&L QA program from both a management and technical point of view and to assess the adequacy of the CECo audit team. The EI/FI audit team consisted of the following individuals:

R. N. Ferguson (Team Leader, Management) - Ferguson Incorporated
R. J. Harris (Mechanical/Structural disciplines) - Energy Incorporated
R. N. Curran (Electrical/Instrumentation disciplines) - Energy Incorporated

Mr. George Marcus, Director, Quality Assurance-Engineering/Construction, CECo, coordinated the overall activities of the S&L audit.

In preparation for the audit, the EI/FI and CECo audit team held a two-day meeting to discuss the audit checklist questions. This meeting was under the direction of Mr. W. J. Shewski, CECo Manager of Quality Assurance, and Mr. George Marcus.

During the meeting each auditor's questions were reviewed to assure that all important areas were covered. This resulted in a final comprehensive set of questions for the audit.

During the audit the complete audit team met daily with Mr. Shewski to review the audit progress and discuss all preliminary findings, observations, and comments. At the conclusion of the audit, the EI/FI team reviewed and concurred with the CECo audit team's findings, observations, and comments.

2.0 SUMMARY AND ASSESSMENT

The results of the EI/FI audit are as noted below.

The details of the Observations and Comments are provided in subsequent sections of this report for each auditor. The audit checklist questions and the responses for each team member are included in Attachments A, B, and C to this report. Attachment D contains the assessment of the CECo audit team.

2.1 Findings

All findings are included in the CECo audit report.

2.2 Observations

(1) Section 7.0 of the QA Program (SL-TR-1A), Control of Purchased Material, Equipment, and Services, does not have a corresponding GQ, specifically for the control of purchased services. It is recommended that procedures be generated to guide the procurement of services.

(2) The control of the design interface between the NSSS vendor and S&L does not appear to be under a written department standard or project instruction which would require the formal tracking of

this design interface. This interface should be formally tracked. It is suggested that this interface be controlled by GQ 3.09, Foreign Design Documents.

2.3 Comments

(1) Documented training in the QA Coordination Section consists solely of the Friday meetings. Attention should be placed in this area to strengthen the training program. This could consist of documenting the training performed covering QA Codes and Standards, etc. The training documentation for this section appears weak in contrast to some of the other sections within the division.

(2) In the General Office Procedures there are two procedures that appear to be safety related in some applications. These two procedures are B.14 (Part 21 Reporting) and 4.1 (Computer Code Verification). It is suggested that these procedures be removed from the GOPs and placed in the safety-related procedure control system.

(3) The General Office Procedure, 4.1, which governs the verification of computer programs, establishes the need for documentation but does not address the details of documenting the verification. This has resulted in verification documentation which is inconsistent in format and very difficult to trace through the computer programs' development history. GOP 4.1 should be more explicit regarding the verification documentation.

2.4 Assessment

It is the assessment of the EI/FI audit team that the S&L QA program as implemented, on the Byron/Braidwood and LaSalle Projects, is definitely adequate in scope and is being effectively implemented. The Quality Control Program procedures and instructions reviewed were very thorough and

well understood by S&L's staff. These procedures and instructions comply with the appropriate criteria of 10CFR50 Appendix B and Section III of the ASME Code. A detailed assessment is provided for by each audit team member in subsequent sections of this report.

II. MANAGEMENT AREA (R. N. FERGUSON - TEAM LEADER)

1.0 INTRODUCTION

The management area was divided into two sections: QA Administration and QA Program. This area was primarily audited by Mr. M. Stannish, CECo, and Mr. R. N. Ferguson, Ferguson Incorporated. In addition, a portion of Mr. B. Harl's and Mr. E. Martin's questions covered the management area. Each auditor had a separate checklist and independently evaluated the areas being audited. The audit results of all team members were evaluated by Mr. Ferguson on a daily basis.

This section of the audit report covers the results of Mr. Ferguson's audit. Mr. Ferguson's audit questions and responses are contained in Attachment A of this report.

2.0 ASSESSMENT

It is Mr. Ferguson's assessment after investigating many areas of the S&L QA management and program implementation that its status and adequacy are satisfactory. The S&L management is intimately involved in and supportive of the program. The QA Division leadership is committed to not only implementing but improving the program. An example of this involvement is the QA Task Force (established by Management), the Trend Review Committee, and the QA Coordinating Committee. The results of these functioning groups are reported to upper management and acted upon appropriately. This commitment by management is vital to the continued success of not only the QA Program but S&L as an A/E firm in the commercial nuclear power industry.

All of the S&L staff interviewed are knowledgeable of the QA program and procedures. There appears to be good coordination of the QA requirements in the interface between the project organizations and the S&L departments and divisions.

3.0 FINDINGS, OBSERVATIONS, AND COMMENTS

3.1 Findings

None.

3.2 Observations

Section 7.0 of the QA Program (SL-TR-1A) - Control of Purchased Material, Equipment, and Services - does not have a corresponding GQ, specifically for Control of Purchased Services. GQs 4.01 and 4.02 have some information on the procurement specifications and bid evaluations but do not apply to the control of Service Consultants after award of contract. However, neither GQ is referenced in Section 7. It is recommended that procedures be generated to guide the procurement of Service Consultants.

3.3 Comments

(1) Documented training in the QA Coordination Section consists solely of the Friday meetings. Attention should be placed in this area to strengthen the training program. This could consist of documenting the training performed covering QA Codes and Standards, etc. The training documentation for this section appears weak in contrast to some of the other sections within the division.

(2) In the General Office Procedures there are at least two procedures that appear to be safety related in some applications. These two procedures are B-14 (Part 21 Reporting) and 4-1 (Computer Code Verification). It is suggested that these procedures be removed from the GOPs and placed in the safety-related procedure control system.

III. MECHANICAL-STRUCTURAL AREA (R. J. HARRIS AUDITOR)

1.0 INTRODUCTION

The mechanical and structural area of the audit was conducted by Mr. Mike Gorski of CECo and Mr. Robert Harris of Energy Incorporated. Mr. Gorski's portion of the audit dealt with explicit FSAR requirements where Mr. Harris's dealt with assessing the effectiveness of S&L's Quality Assurance Program in the design and analysis area. Mr. Gorski and Mr. Harris worked together for the portion of the audit concerning computer program verification and documentation. The remainder of the time both auditors worked independently but in the same areas.

This section of the audit report covers the results of Mr. Harris' audit. Mr. Harris' audit questions and responses are contained in Attachment B of this report.

2.0 ASSESSMENT

Mr. Harris' audit approach was to review the S&L's Quality Assurance Procedures, Department Standards, and Project Instructions covering design and analysis activities to determine if these procedures, standards, and instructions are sufficient. Specific design and analysis activities were then checked to determine if the existing procedures and instructions were being effectively applied. Except for the two conditions noted in Section 3.0, Findings, Observations, and Comments, it was found that S&L's program is very thorough, well understood by the engineering staff, and effectively implemented. During the audit, all S&L staff members contacted not only understood the required procedural steps involved in their work but were knowledgeable of the procedures themselves. Although staff training was not covered as a specific audit question by Mr. Harris, it was apparent S&L's staff has been well trained in both the use of the procedures and the total integration of the Quality Assurance program.

S&L's Quality Assurance Manual gives the overall direction for the quality program. This manual contains the GQ Procedures which give additional direction to the staff concerning implementation of the quality program. GQ-5.01, Project Instructions, requires the development of Project Instructions for additional direction to the staff members assigned to the project. These instructions contained most of the design interface requirements and contained tracking requirement to assure the various interfaces have occurred. It should be noted that all the project instructions reviewed during the audit did contain the level of detail necessary to assure continuity throughout the program. Again during the audit it was found that the staff was very familiar with these instructions.

In addition to the GQs and Project Instructions, each department within S&L has its own department standards. These standards contain instructions covering the engineering work completed by the given department. Again, the department standards reviewed during the course of the audit were found to be excellent training and instructional documents well understood by the department staffs.

The engineering documents (drawings, specifications, analysis reports, and criteria) were all well done and cross referenced. Specifically, the stress analysis reports thoroughly referenced the drawings and criteria documents by both number and revision. This thoroughness seemed to be consistent in all documents reviewed.

To aid the staff members in applying the correct design criteria, the projects had developed general project design criteria documents (see response to audit question V-1 discussing seismic loading). These documents were not necessarily a program requirement but were generated to aid the staff during the design and analysis activities. These documents are excellent reference documents and will be invaluable during the life of the plant for future reference.

At the conclusion of the audit, it was Mr. Harris' opinion that S&L has a very thorough Quality Assurance Program. The program is well documented

and understood by the staff. It appears to also be well applied. Even in the areas where explicit instructions did not exist, such as the distribution of the NSSS design data (see Observation III-3.2), the staff was following good engineering practices and was initiating the proper design interfaces.

3.0 FINDINGS, OBSERVATIONS, AND COMMENTS

3.1 Findings

None.

3.2 Observations

The control of the design interface between the NSSS vendor and S&L does not appear to be under a written department standard or project instruction which would require the formal tracking of this interface (see response to audit question IV-3).

Discussion: The NSSS design interface should be formally tracked. It would appear that the control of this interface should come under GQ 3.09. GQ 3.09, Foreign Design Document, requires the project manager by project instructions or the department manager by department standard to establish a system for monitoring receipt of contractors' technical documents. This monitoring is to include maintaining a list of documents received with the review status of each document. If these PIs or DSs exist, they were not made available. However, in tracing a G.E. pipe hanger loads report through the system, it was apparent that the reviews are being completed and loads the information is being included in the design of the structures.

3.3 Comments

The General Office Procedure, 4.1, which governs the verification of computer programs establishes the need for documentation but does not address

the details of documenting the verification (see response to audit question II-5). This has resulted in the verification documentation which is inconsistent in format and very difficult to trace through the computer programs' development history.

Discussion: GOP 4.1 requires each computer program to have a unique program number, a completed verification certification form, the Computer Library to maintain a listing of all documented computer programs, and the verification to be documented. The explicit requirements in GOP 4.1 are being applied. However, the documentation of the verification process is not explicitly defined in 4.01. This has resulted in the documentation being inconsistent with poor traceability between the earlier and current versions of the programs. The format and information included in the verification report are left to the auditor's discretion. In reviewing the documentation for the PIPSYS computer program, this problem was apparent. In addition, the program version and user's manual are not tied together as a unique set.

IV. ELECTRICAL AREA (R. N. CURRAN AUDITOR)

1.0 INTRODUCTION

The electrical area of the audit was conducted by Mr. Tom Sommerfield of CECo and Mr. Robert Curran of Energy Incorporated. Mr. Sommerfield prepared his questions based on requirements of the FSAR while Mr. Curran's questions dealt with assessing the areas of equipment qualification, control of plant design changes, NSSS supplier interfaces, and the effectiveness of S&L in applying their Quality Assurance programs in these areas. Mr. Sommerfield and Mr. Curran worked together where their questions covered a common area of documentation. The remainder of the time the two auditors worked independently.

2.0 ASSESSMENT

Mr. Curran's audit approach was to review the S&L procedures, design criteria, and drawings to determine if these documents are sufficient to control interfaces with the NSSS suppliers, provide and maintain required separation of 1E equipment and cable, and to ensure the qualification of 1E equipment.

At the conclusion of the audit it was the opinion of Mr. Curran that S&L engineering staff contacted had a thorough knowledge of the Quality Assurance program and were implementing said program. Changes, resulting from NSSS design changes, which were reviewed, were found to be completely documented. The establishment of 1E equipment and cable separation and the maintenance of these separations was found to be well documented. In particular, he found the documentation of 1E equipment qualifications to be very thorough, both by the engineering staff for Byron/Braidwood and CQD for LaSalle County.

3.0 FINDINGS, OBSERVATIONS, AND COMMENTS

3.1 Findings

None.

3.2 Observations

None.

3.3 Comments

None.

ATTACHMENT A

AUDIT CHECKLIST QUESTIONS AND RESPONSES
R. N. FERGUSON

RESPONSE TO AUDIT CHECKLIST QUESTIONS

Checklist Item Number

Questions/Responses

1. QA Administration

   a. Organization charts identify the "on-site" and "off-site" organizational elements which function under the cognizance of the QA program and the lines of authority. Ref. NUREG-75/087, Item 1A5 (SL-TR-1A, Fig. 01.01-1 and 01.02-1).

      NOTE: Is the QA department involvement with the project (on-site and off-site) effective?

   b. The QA responsibilities of each of the organizational elements noted on the organization charts are described. Ref. NUREG-75/087, Item 1A6, ie.d., examine difference between organization charts in SL-TR-1, Rev. 5 and those in QA 1.02 (SL-TR-1A, Section 01.00).

Response

The organization charts in the GQ are up to date and do identify the corporate and project interfaces. The topical report has not been updated since 1977 so the organization charts in it are out of date. Draft 7 was submitted to the NRC on September 29, 1980 and 22 comments were received on October 24, 1980. No formal reply has been made by S&L. Draft 9 is to be submitted in about three months. This item is adequately covered in the CECo portion of the audit. The QA Division involvement with the S&L on-site activities consists of a QA coordinator making an on-site visit (surveillance) on a one day every two or three weeks basis plus scheduled audits which involve the on-site activities (six scheduled for 1982). The surveillance activities of the on-site work

is minimal and this area should be carefully observed by S&L QA management to assure its effectiveness.

Considerable time was spent individually with Mr. H. S. Taylor (Director of QA), Mr. D. L. Leone (Byron/Braidwood Project Director), and Mr. R. Mazza (LaSalle Project Director) discussing the S&L QA Program and the involvement by management. The company management appears to have extensive knowledge of the program and is involved in formulating QA policy and implementing the program.

2. QA Program

2-a. Management Audit performed annually and the corrective action is identified and tracked. Ref. NUREG-75/087, Item 2C.1b.

Response

The internal S&L management audit for 1981 is scheduled to begin on June 28. The formal assessment for the year 1980 was not done. This was an audit finding by Cincinnati Gas & Electric so was not further pursued by this auditor. The management audits are informally tracked by the QA Division, but this is the responsibility of the Director of Services. An integral part of the management audit process is the QA Task Force which was appointed by management. This task force issued a report on 1-14-82 which was reviewed by this auditor and found to be very comprehensive and well done.

2-b. Management regularly assesses the scope, status, adequacy, and compliance of the QA program to 10CFR50, Appendix B by receiving copies of the audit reports, etc. Ref. NUREG 75/087, Item 2.C.1a.

Response

Management regularly receives copies of the audit reports in accordance with the distribution requirements as stated in GQ 18.01. Also, management regularly attends the audit exit meetings.

2-c. Committed to the development, control, and use of computer code programs conducted in accordance with the QA program and a description of how the QA program will be applied is in the program. Ref. NUREG 75/087, item 2.A.1c.

Response

This item was covered in-depth by Mr. R. J. Harris in Item III of his audit checklist. The SL-TR-1A Section 03.03 provides the commitment to apply QA to the control of computer programs and the actual procedures are covered in the department procedures.

2-d. QA manuals are issued to the proper personnel and the revisions are controlled.

Response

QA manuals are issued to the key personnel and the revisions are controlled. Specifically checked the following: Leone (Manual #28), Gallagher (#189), Kelnosky (#432), Raef (#181), C. B. Martin (#149), and Treece (#106).

Section 7 of SL-TR-1A does not have an implementing GQ which would apply to the control of purchased services. Some information is in GQ 4.02, but it is not sufficient. This is reported as an observation.

The General Office Procedures were stated to be "non-safety-related" and therefore not subject to the same controls as QA-related procedures would be. There are at least two procedures - B-14 (Part 21 Reporting) and 4-1 (Computer Code Verification) - that appear to affect safety-related work and as such should be subject to the same controls as the other safety-related procedures. This is reported as a comment.

2-e. QA audit program (internal and external) is effective? Audit reports are distributed to management and appropriate actions are taken.

Response

The QA audit program (both internal and external) appears to be comprehensive and effective under the direction of Mr. Bob Martin. Several audit reports (including audit 60 (BLM) dated 6-3-82) were reviewed. This area was audited in-depth by M. Stanish of CECo.

2-f. QA staffing is adequate to accomplish program objectives.

Response

The QA Division staff consists of approximately 40 people with 11 of them as auditors and 5 coordinators. This appears to be an adequate staff to accomplish their program objectives.

2-g. QA training program is described in a written document and implemented and effective.

Response

A considerable amount of time was spent evaluating the S&L training program. All company QA training except that of the QA

Department is coordinated by the QA Division in the Training Group headed by Pat DeBlake. Tests are given every two years primarily on the GQs. The problem with this is that unless it was decided by the training group that special training was necessary, the person to be trained could be two years out of date on being trained in the GQ revisions. The method for determining if all applicable people are on the training schedule is the Quarterly Update issued by the department heads. This method may allow some people to be missed since there is not an independent check against personnel records to assure that all people (both S&L and contract people) are indeed on the schedule.

Training of the QA Department is not coordinated by the QA Department Training Group. This training is covered by department procedures GDIP 7 and 8 and requires each group to maintain their own training records. Some groups do better than others in this area. For example, training in the QA Coordination Section is not well documented with the exception of the Friday meetings. This is reported as a comment.

Department technical training is being performed in accordance with procedures ESI-230, MAS-8, and SAS-24. This program is set up and performing reasonably well. For example, they have a power plant design course 16 weeks long (1.5 hrs/wk) which is required of everyone down to designer-2 level. This course is required to be completed within two years after entering the company and they hold a new course every year to 1.5 years. Randomly checked S. G. H. Ashrafti and J. S. Steele and others and they had received training. Project instruction training is being performed on both the Byron/Braidwood and LaSalle projects. Project training records are required to be maintained in a project instruction training file by the project manager per GQ 2.07, page 3, and this is being done.

2-h. Nonconformances are evaluated and corrected on a timely basis.

Response

The timeliness of evaluating nonconformances is good and they are being evaluated.

2-i. Nonconformances are trended and corrective action taken as a result of these trends and reported to management for review and assessment. Ref. NUREG 75/087, Item 15.5.

Response

S&L has established a Trend Review Committee which trends not only S&L detected nonconformances but also those nonconforming conditions identified by companies who audit S&L. Reviewed the Trend Review Committee Report dated 2-12-82. This information is presented to management through routine status reports from the QA Director.

2-j. Nonconformance control program applies to computer codes also (and services). Ref. NUREG 75/087, Item 15.1.

Response

Nonconformance control of computer codes and services is primarily done on the basis of audit and the resulting CARs. They have audited these functions. Some thought should be given to establishing a formal nonconformance system associated with computer codes.

AUDIT CHECKLIST

ENERGY INCORPORATED

DATE: June 7 thru 11

ORGANIZATION TO BE AUDITED: Sargent & Lundy	AUDIT NO:	AUDITOR: RNFerguson

CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
1. QA Administration			
a. Organization charts identify the "on-site" and "offsite" organizational elements which function under the cognizance of the QA program and the lines of authority. Ref. NUREG-75/087, Item 1A5 (SL-TR-1A, Fig. 01.01-1 and 01.02-1). NOTE: Is the QA department involvement with the project (onsite and offsite) effective?		ACC	See response to audit questions following this audit checklist.
b. The QA responsibilities of each of the organizational elements noted on the organization charts are described. Ref. NUREG-75/087, Item 1A6, i.e., examine difference between organization charts in SL-TR-1, Rev. 5 and those in GQ 1.02. (SL-TR-1A, Section 01.00).		ACC	
2. QA Program			
a. Management Audit performed annually and the corrective action is identified and tracked. Ref. NUREG-75/087, Item 2C.1b.	(SL-TR-1A) (02.07)	ACC	

* DISPOSITION: ACC.= ACCEPTABLE OBS.= OBSERVATION DEF.= DEFICIENCY

CHECKLIST APPROVED BY: R N Ferguson 5-26-82

FORM QA-014 (REV. 2, 4-82)

AUDIT CHECKLIST
CONTINUATION SHEET

ENERGY INCORPORATED

DATE: June 7 thru 11

PAGE: 2 OF 3

CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
2. QA Program - (Con't)			
b. Management regularly assess the scope, status, adequacy, and compliance of the QA program to 10CFR50, Appendix B by receiving copies of the audit reports and etc. Ref. NUREG 75/087, Item 2.C.1a.	(SL-TR-1A) (02.07)	ACC	
c. Committed to the development, control, and use of computer code programs conducted in accordance with the QA program and a description of how the QA program will be applied is in the program. Ref. NUREG 75/087, Item 2.A.1c.	(SL-TR-1A) (03.03)	ACC	
d. QA manuals are issued to the proper personnel and the revisions are controlled.	02.01	ACC with OBS.	
e. QA audit program (internal and external) is effective? Audit reports are distributed to management and appropriate actions are taken.	18.01 and 18.02	ACC	
f. QA staffing is adequate to accomplish program objectives.		ACC	
g. QA training program is described in a written document and implemented and effective.	02.05	ACC with comments	

* DISPOSITION: ACC.= ACCEPTABLE OBS.= OBSERVATION DEF.= DEFICIENCY

FORM QA-014 (REV. 2, 4-82)

AUDIT CHECKLIST
CONTINUATION SHEET

ENERGY INCORPORATED

DATE: June 7 thru 11

PAGE: 3 OF 3

CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
2. QA Program - (Con't)			
h. Nonconformances are evaluated and corrected on a timely basis.	16.01 GQ 16.01 3.0C.2	ACC	
i. Nonconformances are trended and corrective action taken as a result of these trends and reported to management for review and assessment. Ref. NUREG 75/087, Item 15.5.		ACC	
j. Nonconformance control program applies to computer codes also (and services). Ref. NUREG 75/087, Item 15.1.		ACC	

* DISPOSITION: ACC.= ACCEPTABLE OBS.= OBSERVATION DEF.= DEFICIENCY

ATTACHMENT B

AUDIT CHECKLIST QUESTIONS AND RESPONSES

R. J. HARRIS

RESPONSE TO AUDIT CHECKLIST QUESTIONS

Checklist Item Number	Question/Response

I. Document Control

I-1. Are the following engineering documents controlled (distribution, traceability, and revision)?

a. Procedures

b. Specifications

c. Drawings

Response

The engineering documents (specifications and drawings) are basically controlled (filed, distributed, and revision controlled) by the department that generates the document on the given project. There is not a central document control for the entire company or for each project. This type of system results in document files throughout the company; however, the control of documents appears to be very good. Company procedures for the control process are contained in S&L's Quality Assurance Manual, under the GQ procedures, GQ 3.07 and 4.01 for drawings and specifications, respectively. In addition, these procedures contain instructions for the preparation of these documents. It does not appear that S&L's work involves the preparation of procedures. Therefore, instructions for the preparation, issuance, and control of procedures was not audited.

I-2. Are the following engineering analysis reports controlled (maintained revised)?

a. Stress analysis

b. Transient analysis

c. Shielding and criticality

Response

GQ-3.08, Design Calculations, gives the preparation and issuance instructions for design calculations. Again, the control of analysis reports is the responsibility of the department on the given project that generates the analysis.

I-3. Are revisions at the analysis, specification, or drawing level fed back through the system to determine the effects of all levels (analysis, specification, design) in the design?

Response

As noted in the response to audit questions I-1 and I-2, procedures which control the preparation of specifications, drawings, and design calculations do exist. These instructions also cover revisions. However, a different department may be responsible for the design calculations than is responsible for the drawings and specifications. Therefore, the control and carrythrough of a design change from the specification to the drawing or analysis becomes an interface problem between departments. These interfaces are specified by the project instructions required by GQ 5.01 of the Quality Assurance Manual and by department standards.

II. Engineering Procedures

II-1. Do procedures exist that control design reviews from a requirements scheduling and documentation standpoint (by system, by plant area, etc.)?

Response

The S&L Quality Assurance manual, Section 3.03, line 98 gives the requirements for the design reviews and the direction to consult the specific department standards and project instructions for further instruction covering design reviews carried out by the given department. An example of the department standards and project instructions for design reviews was: "Structural Standard Document", Standard SAS-2, Rev. 2, and Project Instruction for LaSalle County Station; PI-LS-06, "Mechanical System Design Reviews", and PI-LS-08, "Overall Design Review".

Per these standards, the structural department at LaSalle was required to maintain a design review status list "System and Structural Design Review Status Report". From this list, the design review report for the Containment Embedment Plates, DRR-SD-062-LS, Rev. 0, 7/23/76, was reviewed for completeness. The review report was short but did contain all the pertinent data, including the drawing and analysis reports.

II-2. Do the procedures governing second level reviews identify by who and how the reviews are to be completed and are the reviews documented?

Response

As noted in the response to audit questions I-1 and I-2, GQs 3.07, 3.08, 3.12.1, and 4.01 give the instructions for the

preparation and control of drawings, calculations, and specifications. These procedures do give thorough design review requirements.

II-3. Do the procedures governing design groups cover the following interfaces?

a. Civil/Mechanical

b. Mechanical/Electrical

c. System Response/Mechanical

d. Shielding/Civil

Response

Design interface control between the various engineering disciplines is controlled by project instructions (PI) and department standards. An example of LaSalle County station design interface control is PI-LS-27, "Documentation of Hanger Loads and Final Loads Check of Structures". An example of department standards covering the design interface between the mechanical and electrical discipline is the Mechanical Department Standard which requires the mechanical staff to request valve actuator information from the electrical staff by the use of Valve Data Sheet MES 5.5.1 and 5.6.1. These procedures which controlled the S&L design interfaces are very thorough in that they require documented responses from each affected discipline.

The containment spray system containment isolation valve was checked and it was determined that these data sheets were in use for valve MO ICS 007A-1, B-5000.

II-4. Do the engineering procedures specify the signatures approval requirements and are they adequate to assure proper design interface control?

Response

Signature approval requirements are covered by project instructions. On Byron and Braidwood PI-BB-10, Rev. 1, dated 1-10-79, gives the level of signature and in addition references the GQs and department standards which govern signature requirements.

II-5. Is the computer program verification procedure adequate and implemented?

Response

The computer program verification procedure is part of the S&L General Office Procedures, number 4.1, "Checking and Validation Requirements for Engineering Applications and Programs", dated 1-19-77. This procedure requires the validation of each computer program to be documented and a "Validation Certification Form" be completed for each program. It also required a listing of all verified computer programs to be maintained by the Computer Library on the "Program Library List". Documentation of the verification was required, but the instructions for the verification report or packages were not detailed. In addition, there were no explicit instructions requiring the user's manual and a given version (update) of the computer program to be tied together. As a result of these limited instructions, the verification documentation for the computer programs reviewed varied considerably. The format and information included were inconsistent, and a clear correspondence between the program version and the user's manual was not evident.

The verif ..tion reports were reviewed for the PIPSYS computer program. Several verification reports were reviewed, starting with the report designated as TASK/PROGRAM #095-065-5.3 dated 11/10/81. The explicit requirements stated in 4.1 were included in the report. However, the correspondence between the user manual revision and the revision number of the program was not clear. S&L's staff stated that this correspondence was traced through the release dates of the manual and computer program revisions. That is, the revision of the manual in force when the program is released is the appropriate manual. They felt very comfortable with this system. However, the lack of specific documentation made it very difficult to trace the correspondence between program versions and manuals. This difficulty was noted as an audit comment in Section III-3.0 of this report.

III. Computer Program Verification

III-1. Is there a list of properly verified computer programs which can be used on the project and does it contain the programs used?

Response

As noted in the response to audit question II-5, a computer program listing of properly verified program is maintained and the engineering staff only has access to programs on this list. All programs on this list can be used per Alfred Pebler and John Gary, staff members on the Byron and Braidwood project.

III-2. Is the documentation for the computer programs such that each program and program version is?

a. Uniquely identified.

b. Manuals specify version/revision traceability.

c. Computer output identifies which version of the program the runs were made on.

Response

As noted in response to audit question II-5, GOP 4.1 does require a unique program number but the manuals can only be related back to a version of the program by the release dates. Two piping stress analyses were reviewed to determine if the program version and release date were printed on the computer output. It was found in both cases that the runs did have this information printed out by the computer. Analyses checked were:

1. Auxiliary feedwater system, Byron and Braidwood Unit #1, 1AF-01, Rev. 03FØ, dated 2/18/81. Analysis was completed on PIPSYS program 9.5-065.5.3 dated 2/6/81.

2. High pressure core spray, LaSalle County Unit #1, EMD-033718, Rev. 4, dated 1/13/82. Analysis was completed on PIPSYS program 9.5-065-5.1 dated 9/11/80.

Again, the appropriate manuals must be traced by the dates.

III-3. Does the project assure that only programs on the approved verified computer program list get used on the project?

Response

As noted in response to audit question II-5, the only programs available to the engineering staff are the programs on the "Program Library List" and all these programs are verified. Therefore, per this system, it appears only verified programs

can be used. Department standards give the instructions for the use of verified programs.

III-4. Do computer programs which are not on a verified computer program list get approved by the project prior to use?

Response

As noted in response to audit question II-5, only verified computer programs which are on the "Program Library List" can be used by the engineering staff for analysis. Therefore, if a new program was to be used, it would first have to be verified then included on the computer program list, and at that time, it could be used for analysis on the project.

III-5. How is computer program verification documented?

Response

Computer program verification is documented. See response to audit question II-5.

IV. Design Control

IV-1. Does the project criteria specified for a project include requirements from the following?

a. Regulatory Requirements.

b. Codes and Standards.

c. Client Imposed Requirements.

Response

Yes - these criteria are imposed at several levels starting with the PSAR/FSAR, the S&L Quality Assurance Manual, the department standards, system design specifications, and project design criteria reports. These documents are well written and are very complete. Examples are:

1. QA Manual, Section 3.03, line 85, and GQ 3.08 impose the requirements of Regulatory Guide 1.64.

2. Byron and Braidwood criteria, Structural Project Design Criteria, DC-ST-03-BY/BR, Rev. 8, Section 10. This section contained the NRC Standard Review Plan load combinations and stress limits to be used for the analysis of structures on the project.

IV-2. Do the criteria get imposed at the engineering design level on the project and are they effective?

Response

Yes - The department standards and project design criteria manuals were well distributed. In literally all work areas which were visited during the audit, these manuals were visually available. During the course of the audit many sets of design calculations were reviewed for various reasons by both myself and Mike Gorski. In review of these analyes, the design criteria were well documented. Specific analysis reviewed for this purpose was:

LaSalle County Station high pressure core spray. The system Design Specification, DS-HP-01-LS, Rev. 2, dated 11/16/81, imposes the 1974 edition of the ASME Code, no addenda. The specification gave the piping class and the

load conditions. The design analysis for this system for Unit 2 referenced the Unit 1 analysis, EMD-033718, Rev. 3, dated 1/13/82. The analysis was completed to the 1974 edition of the ASME Code, no addenda.

IV-3. Does the design information (loadings, configuration, operational controls, and revisions to same) from the NSSS vendor get into S&L design process and is it effective?

Response

No formal project instructions or department standards exist for tracing the integration of the NSSS design information into the S&L design. The lack of formal tracking was noted as an audit observation in Section III-3.0 of this report. However, on both the Byron and Braidwood and LaSalle Projects the design information is distributed to the proper staff members and the current NSSS design information is being used. For example, on Byron and Braidwood, Westinghouse submitted containment hanger loads summary sheets, for use, in letter number S.O EMXP-1000, MNTC-1048, SMD-BY1-10615. These loads would affect the design of the structure. This information was properly distributed to D. C. Patal, Structural Design Engineer, for action.

In addition, a detailed check of this interface was made on the LaSalle project. The Project Management Department document control file was checked for the latest GE hanger loads submitted to Sargent & Lundy. They were GE report number 22A7429, 30,31,32, Revision 2. The Structure Engineering Staff under S. Kazmi had completed the structural design using the revision 0 and 1 GE reports. The structural drawing associated with the pipe hangers was HLS-373 Rev. 16, dated 1/18/82. This drawing was in the process of being revised to incorporate the revision two design data.

IV-4. Are the design interfaces between the following design groups adequately identified and controlled?

a. Mechanical/Civil

b. Nuclear/Mechanical

c. Civil/Electrical

d. Mechanical/Electrical

Response

As noted in response to audit question II-3, project instructions do exist for these interfaces. These procedures and instructions are very thorough and are being effectively applied. Response to audit questions IV-5, IV-6, and IV-7 addresses the mechanical/structural interface in detail.

IV-5. Do the results of the analysis (such as piping support locations, nozzle loads, structural steel sizing, component support loads, etc.) get factored into the design process (design drawings or equipment specifications)?

IV-6. Does a change at the design (drawing) level get reverified by analysis if an analysis was involved in the original design?

IV-7. Are field change requests acted on and approved by the same engineering organizations that approved the original design and is that action timely?

Response to Questions IV-5, 6, and 7

It was determined that the detailed effectiveness of the design interfaces (the analysis results and the drawing revision/analysis followthrough) was very effective. This was determined by the following check on the Byron and Braidwood project: The project instruction, PI-BB-14, requires that the civil/structures staff must review and act on all changes to the piping support loads resulting from analysis or design revisions by official transmittal. This process was checked for the Auxiliary Building Subsystem 2S x 17 containing 25 supports. The revised design was transmitted by Mechanical Design and Drafting on transmittal F-158 dated 12/31/81 by an interoffice memo dated 12/31/81 with all supports defined. Structural design and drafting did document the review by interoffice memo dated 1/8/82 returning the original transmittal. The transmittal was very thorough, well documented, and acted on very timely. Similar project instruction exists for other interfaces. Field changes which result in a design change follow the same change and review process.

IV-8. Are the safety-related system structures and components protected (separated) from the non-safety-related equipment? What procedures exist to identify safety-related systems from non-safety-related systems on the plant composite drawings?

Response

The safety-related systems are protected from the non-safety-related systems by designing all supports for the non-safety systems to withstand all seismic loadings without failure. This design approach is not covered by Project Instructions according to Mr. Rakowski and Mr. Green, but on the Byron and Braidwood project, this commitment has been made to the NRC in response to NRC questions on this subject. It appears this

issue is being addressed; however, no S&L procedures addressed this issue. In the discussion with the project staff it was pointed out that all areas in a safety-related building are designated as safety-related areas. Then, if through a review of the composite drawing for a given area of the plant, it can be determined that no safety-related equipment exists, the equipment/system supports will not be designed to resist seismic loads. However, if any safety-related equipment is located in the area, all supports will be designed for seismic loads.

IV-9. What procedures or documentation exist to assure the plant environmental conditions (sprays, radiation, temperature, pressure, and pipe break loadings) get factored into the design of the safety-related equipment?

Response

See Attachment C, Audit Checklist Questions and Responses, R. N. Curran, Audit, question 5A.

IV-10. What action has S&L initiated to assure that the plant design considered the NRC concerns noted in IE Bulletin 79-02?

Response

An installation specification was written covering the installation of concrete expansion anchors: Standard Specification for Concrete Expansion Anchor Work, Aug. 1976. This specification is imposed on all contractors involved in the installation of concrete anchors. It requires the contractor to develop an installation procedure, including the use of a traveler for each anchor documenting the installation and inspection.

To determine the flexibility of the base plate, an extensive test program was carried out to determine the allowable loadings without overstressing the expansion anchors. This program was reported in "Static, Dynamic and Relaxation Testing of Expansion Anchors in Response to NRC IE Bulletin 79-02", 7/20/81.

The results of this testing formed the basis for the design loading on the standard configuration base plates. This report is currently under review by the NRC.

V. Analysis Control

V-1. Are the seismic loading criteria imposed into the stress analysis and testing of the systems, structures, and components?

Response

To assure that the proper seismic loading is used for design analysis and testing, a seismic design criteria document containing the seismic loading throughout the plant has been generated. This document is for use by the project design staff. On the Byron and Braidwood project this document is "Development of Seismic Subsystem Design Criteria and Response Spectra", DE-ST-04-BB, Rev. 0, 3/23/82. This document was used to determine the seismic loading for subsystem analysis and testing. It has been updated periodically and on 3/23/82 it was changed from an engineering report to a controlled document and released as Revision 0. This type of document should aid in getting the proper seismic loading used in both test specification and in stress analysis.

V-2. Are the system loadings (pressure, temperature, and fluid momentum) factored into the stress analysis for the system?

Response

Yes - The ASME design specifications for the systems do specify the loading conditions. These loads are being used in the stress analysis. The design specification, stress analysis, and drawing correlations were checked in detail on the LaSalle County project and found to be in agreement. The high pressure core spray line was checked. The Design Specification DS-HP-01-LS, Revision 2, 11/16/81, defined the ASME Code as the 1974 edition, no addenda, and gave both the design and operating conditions. The stress analysis report for the high pressure line on Unit 2 was Subsystem 2HP-01, Vol 45, Quad 1-98-937, EMD 035336, Rev. 1, 2/8/82, referenced in response to audit question III-2. The analysis referenced the design specification and used the design conditions as stated.

On the Byron and Braidwood project the analysis checked (see analysis for the auxiliary feedwater system referenced in the response to audit checklist question III-2) did not thoroughly reference the ASME design specification. In checking further it was found that the design specification was not in existence when the analysis was completed (the original analysis was dated 9/8/75 and the design specification was dated 3/15/82). A review of the design specification and the analysis indicated that the design conditions used were as specified. It was S&L staff's opinion that the ASME Code did not require the design specification to be completed before the design effort for the system was initiated. It is the auditor's understanding that this issue has been addressed in an earlier CECo audit.

V-3. Are the piping system supports and component support loadings factored into the design of the structures (concrete and steel)?

Response

The interface between the piping analysis (support loadings) and the design of the structures was very good. As noted in response to audit questions IV-5, IV-6, and IV-7, the application of the project instruction which governed this interface is being very effectively applied. In addition, in response to audit question IV-3, it was determined that integration of the NSSS vendor piping support loadings into the design of the structures was also effective even though no formal procedures or instructions governed this interface.

V-4. Do procedures/specifications governing the loading case combinations for the system, structures, and components exist?

Response

Procedures do exist and were found to be very thorough. See response to audit question IV-1.

V-5. Are the loading conditions and combinations generated and specified in the component/systems design specification and are they imposed on the analysis process?

Response

Yes - As noted in response to audit question V-2.

V-6. Are analysis reports identified back to the system configuration by drawing number and revision?

Response

In the analysis reviewed during the audit, it was found that the analyses referenced applicable documents (drawings,

specifications, and ASME Code) giving the revision numbers and or addenda. The correctness of these references was documented when reviewing the high pressure core spray analysis referenced in response to audit questions IV-2 and V-2. In this check, the design specification, DS-HP-01-LS, imposed the 1974 edition, no addenda, of the ASME Code. The analysis was then checked to determine if the analysis used the proper references. Both the Unit 2 and 1 analyses were checked because the HP line Unit 2 was not analyzed in detail but referenced the Unit 1 analysis and made a geometry comparison between Units 1 and 2 to determine if the Unit 1 analysis was appropriate. (The comparison concluded that Unit 1 analysis was appropriate.)

The Unit 2 analysis (subsystem 2HP-01, Vol. 45, QUAD 1-81-937, Rev. 1, 2/8/82) referenced the M-938 SH1, Rev. L, 4/10/81 Unit 2 drawing and the M-1040-01, Rev. J, 4/21/81 Unit 1 drawing. Both were the drawing revision in effect during the analysis. In checking Unit 1 stress report, it was determined that the proper 1974 ASME Code was used. Later revisions of the above drawings have been released since the above analyses were completed. These design changes are currently in progress.

AUDIT CHECKLIST

ENERGY INCORPORATED

DATE: June 7 thru 11

ORGANIZATION TO BE AUDITED:	AUDIT NO:	AUDITOR:
Sargent & Lundy		RJHarris

CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
I. Document Control			See response to audit questions following this audit checklist.
1. Are the following engineering documents controlled (distribution, traceability, and revision)?	GQ 3.07, 4.01, 5.01 & 3.12 John Wojeik/ Drafting Supv. c. Reebel - D.C. - LaSalle	ACC	
a. Procedures			
b. Specifications			
c. Drawings			
2. Are the following engineering analysis reports controlled (maintained revised)?	Bruce Rarduhn Mechanical Project Engineer	ACC	
a. Stress analysis			
b. Transient analysis			
c. Shielding and criticality			

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CHECKLIST APPROVED BY: R.F. Ferguson 5-26-82

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AUDIT CHECKLIST
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CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
I. Document Control - (Con't)	GQ 5.01	ACC	
3. Are revisions at the analysis, specification, or drawing level fed back through the system to determine the effects of all levels (analysis, specification, design) in the design.			
II. Engineering Procedures	QA Manual Section 3.03 Dept. Standard SAS-2, Rev. 2 Proj. Instruction PI-LS-06 PI-LS-08 Mr. S. Kazmi Struct. Eng. Div.	ACC	
1. Do procedures exist that control design reviews from a requirements, scheduling and documentation standpoint - (by system, by plant area, etc.)			
2. Do the procedures governing second level reviews identify by who and how the reviews are to be completed and are the reviews documented?	GQ 3.07, 3.08, 3.12.1 & 4.01	ACC	
3. Do the procedures governing design groups cover the following interfaces?	Proj. Instruction PI-LS-27 and Dept. Standards MES 5.5.1 & 5.6.1	ACC	

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CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
II. Engineering Procedures - (Con't) a. Civil/Mechanical b. Mechanical/Electrical c. System Response/Mechanical d. Shielding/Civil			
4. Do the engineering procedures specify the signatures approval requirements and are they adequate to assure proper design interface control?	Proj. Instructions PI-BB-10, Rev. 1 Ron Rakowski Mech. Proj. Eng.	ACC	
5. Is the computer program verification procedure adequate and implemented?	GPO 4.1 Judy Yamamota Nancy Holmen	ACC With Comment	

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CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
III. Computer Program Verification	John Gray Alfred Pebler B&B Project	ACC	
1. Is there a list of properly verified computer programs which can be used on the project and does it contain the programs used?			
2. Is the documentation for the computer programs such that each program and program version is?	Piping Analysis 1AF-01, B&B and EMD-033718, LC	ACC With Comment See II-5	
a. Uniquely identified.			
b. Manuals specify version/revision traceability.			
c. Computer output identifies which version of the program the runs were made on.			
3. Does the project assure that only programs on the approved verified computer program list get used on the project?	John Gray B/B Alfred Pebble B/B Guy Deboo/LaSalle Std. EMD TP-1, Rev. 0		

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CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
III. Computer Program Verification - (Con't)	Judy Yamamota Nancy Holmen	ACC	
4. Do computer programs which are not on a verified computer program list get approved by the project prior to use?			
5. How is computer program verification documented?	See response to audit questions II-5	ACC With Comment Per II-5	
IV. Design Control	QA Manual, Dept. Standards, FSAR, Project Design Criteria R. J. Netzel Ron Rakowski Bruce Parduhn	ACC	
1. Does the design criteria specified for a project include requirements from the following?			
a. Regulatory Requirements.			
b. Codes and Standards.			
c. Client Imposed Requirements.			

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CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
IV. Design Control - (Con't)	Bruce Parduhn Design Spec. DS-HP-01-LS Piping Analysis AMD-033718	ACC	
2. Does the criteria get imposed at the engineering design level on the project and is it effective?			
3. Does the design information (loadings, configuration, operational controls and revisions to same) from the NSSS vendor get into Sargent and Lundy design process and is it effective?	Ron Rakowski D. C. Patel S. Kazmi GE and Westinghouse hanger load reports Dwg. HLS-373	OBS	
4. Are the design interfaces between the following design groups adequately identified and controlled?	Project Instructions	ACC	
a. Mechanical/Civil			
b. Nuclear/Mechanical			
c. Civil/Electrical			
d. Mechanical/Electrical			

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CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
IV. Design Control - (Con't) 5. Does the results of the analysis (such as piping support locations, nozzle loads, structural steel sizing, component support loads, etc.) get factored into the design process (design drawings or equipment specifications)? 6. Does a change at the design (drawing) level get re-verified by analysis if an analysis was involved in the original design? 7. Are field change requests acted on and approved by the same engineering organizations that approved the original design and is that action timely?	Ron Rakowski PI-BB-14 Transmittal F-158	ACC	

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CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
IV. Design Control - (Con't)	Ron Rakowski Ken Green B/B Project	ACC	
8. Are the safety related system structures, and component protected (separated) from the non-safety related equipment? What procedures exist to identify safety related systems from non-safety related system on the plant composite drawings?			
9. What procedures or documentation exist to assure the plant environmental conditions (sprays, radiation, temperature, pressure, and pipe break loadings) get factored into the design of the safety related equipment?	R. N. Curran	ACC	
10. What action has Sargent & Lundy initiated to assure that the plant design considered the NRC concerns noted in IE Bulletin 79-02?	R. J. Netzel Sr. Proj. Eng. B&B Reports Std. Spec. for Concrete Expansion Anchors Static Dynamic & Relaxation Testing of expansion anchor in Response to NRC IE Bulleting 79-02	ACC	

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CHARACTERISTIC	REFERENCE	DISP*	COMMENTS
V. Analysis Control	Ron Rakowski B&B Seismic Criteria Development of Seismic Subsystem Design Criteria and Response Spectra DE-ST-04-BB	ACC	
1. Are the seismic loadings criteria imposed into the stress analysis and testing of the systems, structures, and components?			
2. Are the system loadings (pressure, temperature and fluid momentum) factored into the stress analysis for the system?	Bruce Parduhn	ACC	
3. Are the piping system supports and component supports loadings factored into the design of the structures (concrete and steel)?	S. Kazmi Ron Rakowski	ACC	
4. Do procedure/specification governing the loading case combinations for the system, structures, and components exist?	R. J. Netzel Structural Project Design Criteria B&B, DC-ST-03-BY/BR Rev. 8 Section 10	ACC	

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CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
V. Analysis Control - (Con't)		ACC	
5. Are the loading conditions and combinations generated and specified in the component/systems design specification and are they imposed on the analysis process?			
6. Are analysis reports identified back to the system configuration by drawing number and revision?		ACC	

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ATTACHMENT C

AUDIT CHECKLIST QUESTIONS AND RESPONSES

R. N. CURRAN

AUDIT CHECKLIST QUESTIONS AND RESPONSES

Checklist Item Number	Question/Response
1.	Are the NSSS and S&L design interface controls, procedures, and lines of communications established and implemented for review, approval, release, distribution, and revision of documents involving the following? a. Reactivity control b. Reactor shutdown mechanisms c. Reactor safety systems

Response

Design interfaces between the NSSS supplier and S&L occur in only the area of actuation of ESF equipment. Specifications for these actuation circuits are provided by the NSSS supplier. Reactivity control, reactor shutdown mechanisms, and reactor safety systems, other than ESF equipments, are the responsibility of and are supplied by the NSSS supplier.

Changes in NSSS design are transmitted to S&L as a Field Change Notice in the case of Westinghouse and Field Deviation Dispositions Request in the case of General Electric. In reviewing Field Deviation Disposition Request HAI-1511 for LaSalle County and Field Change Notice CAEM-10585 for Byron/Braidwood, it was found that review, approval, revision of documents, release, and distribution of documents were in accordance with the provisions of S&L QA manual GQ.07 Section 4, Revisions.

2. Do the engineering analysis personnel interface, for example, in establishing safety system configurations and in establishing instrument accuracies, stability, and response time and is this effort documented?

Response

All interfaces between analysis and engineering personnel occur within the NSSS supplier organization. There is no direct contact with S&L unless a change occurs which impacts S&L design in which case it is handled as a field change described in question 1.

The subject, therefore, was not pursued.

3. Does S&L have a documented basis for providing separation of 1E equipment and cables? In the event of field changes, is there documented verification that the required separation is being maintained?

Response

Separation of 1E equipment and cables is specified in the FSAR. Minimum requirements are described in S&L specification F/L-2788, including reference to the requirements of IEEE-420-1973.

Separation of cables, conduits, and trays is specified in design criteria DC-EE-01-BB Revision 8, 9/1/81. Separation of 1E equipment is specified by the design criteria for the 1E system on a case-by-case basis.

Computer codes, Electrical Design and Drafting Procedure for Cable Information System CIS-4 Input, EDSB-127, and Electrical Design and Drafting Procedure CIS-4 Output Reports

and Cable Tabulation EDSB-128 are used to route cables or to verify routing for the purpose of maintaining separation of Byron/Braidwood. Similar codes designated CIS-3 are used for LaSalle County.

Verification of separation and isolation is documented in the Safe Shutdown Analysis for Byron/Braidwood. This document will become part of the Fire Protection Report in the FSAR.

4. Does S&L have a 1E grounding and shielding policy? Is any specific recommended practice followed, e.g., IEEE or Air Force Rocket Propulsion Lab manual? Is adherence to the grounding and shielding policy controlled?

Response

Grounding and shielding standards are defined in EA-216 which includes seven shielded cable standards and 39 grounding standards. Control of grounding and shielding is provided by installation drawings such as 6/20 E-0-3301A. Revisions of these drawings are given the same level of review and approval as the original drawing.

5. Is qualification of 1E equipment controlled with respect to the following?

   a. What design document specifies the environmental conditions under which 1E equipment must operate?

   b. Is certification of qualification required from vendors of 1E equipment and are the certification requirements in accordance with the design document specifications?

c. What procedures govern review of vendor qualification reports and are these reports reviewed for adequacy by qualified S&L personnel?

Response

The FSAR specifies environmental conditions under which 1E equipment must operate. Qualification reports are required of vendors of 1E equipment. These reports are reviewed by engineering personnel for Byron/Braidwood and by the CQD personnel for LaSalle County.

Each qualification is documented and includes S&L specifications, vendor's qualification report, and engineering's or CQD's evaluation documents and acceptance reports. Reviewed were qualification documentation for Okonite and Rockbestos 600-volt cable, S&L specification F/L 2823; Okonite 5 and 8 KV cable, S&L specification F/L 2851; and Samual Moore instrument cables, S&L specification F/L 2852 for Byron/ Braidwood.

Also reviewed for LaSalle County were qualification reports for Kerite 5KV cable, CQD No. 001978, and Limitorque SMB-3 operator, CQD No. 001667.

6. In cable spreading rroms shared by more than one 1E train, is separation provided meeting the fire protection guidelines of Regulatory Guide 1.120?

Response

Separation requirements are specified by the FSAR. Separation of cables is provided by separation of cable trays and conduits. Separation is controlled by the electrical installation drawings. Separation of cables is verified by

computer codes CIS-3 and CIS-4 as discussed in question 3. Reviewed were the Fire Safety Report, Safe Shutdown Analysis, and cable spreading room drawings for Byron/Braidwood.

AUDIT CHECKLIST

ENERGY INCORPORATED

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ORGANIZATION TO BE AUDITED: Sargent and Lundy	AUDIT NO:	AUDITOR: RNCurran

CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
1. Are the NSSS and S&L design interface controls, procedures and lines of communications established and implemented for review, approval, release, distribution and revision of documents involving the following? a. Reactivity control b. Reactor shutdown mechanisms c. Reactor safety systems	GQ .07 HA1-1511 CAEM-10585 J. Esterman T. Thorsell V. Naschansky	ACC.	See response to audit questions following this audit checklist.
2. Do the engineering analysis personnel interface, for example, in establishing safety system configurations and in establishing instrument accuracies, stability and response time and is this effort documented?	N/A T. Thorsell V. Naschansky		

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* DISPOSITION: ACC.= ACCEPTABLE OBS.= OBSERVATION DEF.= DEFICIENCY

FORM QA-014 (REV. 2, 4-82)

CHECKLIST APPROVED BY: R V Ferguson 5-26-82

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CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
3. Does S&L have a documented basis for providing separation of 1E equipment and cables? In the event of field changes is there documented verification that the required separation is being maintained?	GQ .07 FSAR F/L-2788 CIS-3 and 4 HAI-1511 CAEM-10585 R. Schiavoni J. Esterman T. Thorsell V. Naschansky M. Murskyj T. Eisenbart K. Green	ACC.	
4. Does S&L have a 1E grounding and shielding policy? Is any specific recommended practice followed, e.g., IEEE or Air Force Rocket Propulsion Lab Manual? Is adherence to the grounding and shielding policy controlled?	EA-216 6/20 E-O-3301A J. Esterman V. Naschansky	ACC.	
5. Is qualification of 1E equipment controlled with respect to the following? a. What design document specifies the environmental conditions under which 1E equipment must operate?	CQD #001978 CQD #001667 F/L 2823 F/L 2851 F/L 2852 FSAR app. M IPS-364 NUREG 0J88 Reg. Guide 1-60	ACC.	

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* DISPOSITION: ACC.= ACCEPTABLE OBS.= OBSERVATION DEF.= DEFICIENCY

ENERGY INCORPORATED

AUDIT CHECKLIST
CONTINUATION SHEET

DATE: June 7 thru 11

CHARACTERISTIC	REFERENCE	DISP.*	COMMENTS
b. Is certification of qualification required from vendors of 1E equipment and are the certification requirements in accordance with the design document specifications?	J. Sinnappan V. Naschansky T. Eisenbart M. Murskyj		
c. What procedures govern review of vendor qualification reports and are these reports reviewed for adequacy by qualified S&L personnel?			
6. In cable spreading rooms shared by more than one 1E train is separation provided meeting the fire protection guidelines of Regulatory Guide 1.120?	Fire Safety Report Safe Shutdown Analysis 6E-0-3390 et.al. 6E-1-3361 6E-1-3362 CIS-3 and 4 J. Esterman V. Naschansky	ACC.	

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ATTACHMENT D

ASSESSMENT OF THE COMMONWEALTH EDISON COMPANY AUDIT TEAM

1.0 INTRODUCTION

The unique approach of two independent audit teams preparing for the audit and auditing at the same time provided several benefits:

(1) The opportunity for the EI/FI team to assess the performance of the CECo audit team.

(2) Less disruption to the organization being audited than if the audits were being conducted at different times.

(3) Allowed the EI/FI team members to benefit from the CECo team members' intimate knowledge of the way CECo and S&L functioned. Therefore, the EI/FI personnel were able to function efficiently much sooner than would normally be the case.

(4) Provided the opportunity for the EI/FI team to review the CECo audit questions prior to conducting the audit and thereby being assured that the audit was comprehensive.

This attachment contains the EI/FI assessment of the CECo audit team's performance. This assessment is provided to give CECo Quality Assurance Management an independent evaluation of their audit team's effectiveness.

2.0 ASSESSMENT

R. N. Ferguson (Team Leader)

It is this auditor's assessment that the two independent teams approach utilized by CECo for the 1982 S&L audit is very effective. Mr. G. Marcus' extensive experience in both QA and as a team leader was apparent in all phases of the audit. The audit was well organized and managed. The auditors I worked with were: Mr. M. Stanish, Mr. B. Harl, and Mr. E. Martin. All three of these individuals are senior personnel with considerable experience in the audit areas they were assigned, as well as the process of

how to audit and, as would be expected, performed in a professional and thorough manner.

R. J. Harris (Auditor)

During the audit preparation and the audit I worked with Mr. Mike Gorski and Mr. Al Montalto. Both auditors prepared well for the audit and had obviously been through the audit process before. Mr. Gorski's technical background qualified him to audit both the Quality Assurance program and the technical work completed by S&L. Mike was able to review the FSAR commitments and translate them into thorough audit questions. During the audit he knew where to look for the information and was able to assess the information given. When required he was able to ask additional questions necessary to determine if S&L was effectively meeting the FSAR commitments. Mr. Montalto did an excellent job in preparing the audit checklist and was well aware of the design requirements for the pipe hangers. His audit approach was good and he definitely knows his way around the S&L organization. However, his limited educational background effected his ability to interpret other analytical methods used by the analyst to design the hanger supports.

R. N. Curran (Auditor)

During preparation for the audit and during the audit I worked with Mr. Tom Sommerfield. Both during preparation and the audit it was obvious that Mr. Sommerfield had previous audit experience. Mr. Sommerfield's engineering background and quality assurance experience qualified him to audit the technical aspects of the S&L engineering work as well as the Quality Assurance program.

Mr. Sommerfield prepared his audit questions from a review of the FSAR. During the audit he knew what questions to ask to gain access to the information necessary to determine if S&L were effectively meeting their FSAR requirements. During the audit Mr. Sommerfield exhibited considerable competence in assessing the technical information provided him.