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QUALITY

ASSURANCE

MANUAL

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QUALITY ASSURANCE MANUAL

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QUALITY ASSURANCE MANUAL

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RECORD OF REVISIONS

REVISION NUMBER	ISSUE DATE	PREPARED BY	APPROVED BY	QA BY	PAGES REVISED AND DESCRIPTION
0	12/16/82	TMM/WMR	CRF	JAD	original issue
1	05/27/83	TMM/WMR	CRF	JAD	Complete revision

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POLICY STATEMENT

Farwell & Hendricks, Incorporated provide engineering services to regulated industries. Farwell & Hendricks will achieve a high level of engineering excellence through the application of proven technology and standardization techniques.

Farwell & Hendricks Quality Assurance Program is a management tool and a working philosophy utilized in achieving engineering excellence.

The purpose of the Quality Assurance Program is to satisfy federal requirements and provide a system of checks and balances within the organization. This program will be kept simple, practical and manageable.

Farwell & Hendricks specializes in the qualification of equipment utilized in the nuclear and military related application. The applications involve (1) seismic and vibration test and analysis, (2) environmental condition simulation and analysis, and (3) related technical consulting.

This manual is in accordance with quality assurance requirements specified in 10 CFR 50, Appendix B; ANSI N45.2; and ANSI NQA-1-1979.

It is the responsibility of all Department Managers and Supervisors to (1) know the general requirements of the Quality Assurance Program, (2) know specific requirements applied to his department, and (3) train his subordinates.

The Quality Assurance Manager is given the responsibility of maintaining the Quality Assurance Program, assuring the requirements are met, and has the authority to resolve any problems relating to quality. Personnel performing Quality Assurance activities report directly to the Quality Assurance Manager.

John R. Hendricks, P.E.
President

Dr. Charles R. Farwell, Jr., P.E.
Chief Executive Officer

1. ORGANIZATION, AUTHORITY AND RESPONSIBILITY

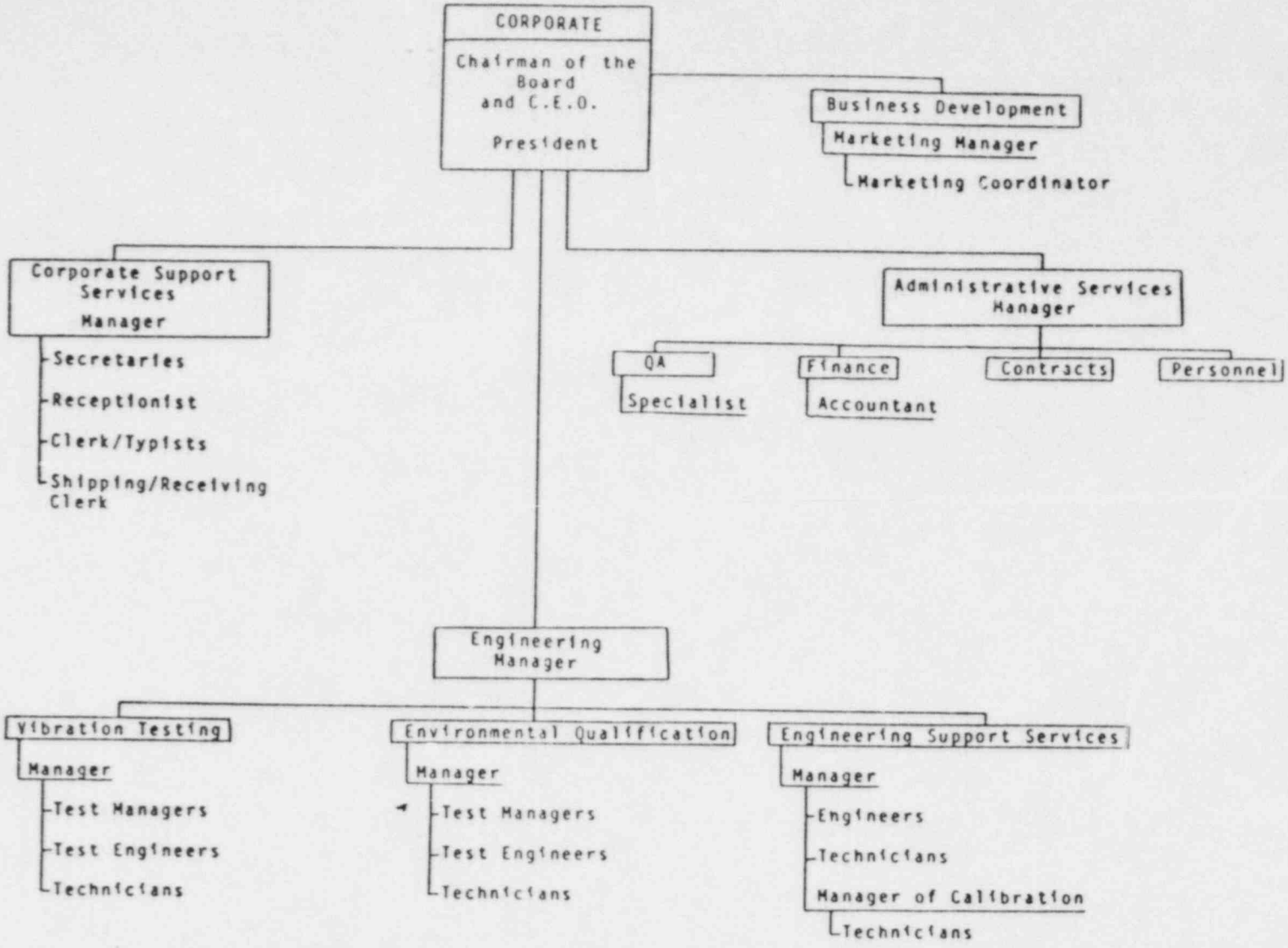
Farwell & Hendricks, Incorporated was incorporated in the State of Ohio on December 20, 1982. Figure 1.1 shows the organizational chart for Farwell & Hendricks, Incorporated (hereafter referred to as Farwell & Hendricks).

The Corporate Officers are responsible for the initial development of the Quality Assurance Program. Their years of experience in engineering, quality assurance management, and auditing qualify them for this management task, as well as the requirements placed on Corporate Officers under 10 CFR, 21.

The Quality Assurance Program at Farwell & Hendricks is led by the Quality Assurance Manager. The Quality Assurance Manager reports to the Chief Executive Officer and Chairman of the Board. The QA Manager has sufficient organizational freedom and authority to identify quality related problems, initiate, recommend and provide solutions, and verify their implementation. The Quality Assurance Manager is responsible for maintaining and enhancing the QA Program, and auditing its implementation by all other applicable organizations in the Company. The manager may delegate QA duties to other organizations, but will retain responsibility for their performance. The QA Manager shall have the authority to defer issuance of all work for which nonconformances have been identified. The further processing or operation of a nonconforming item shall be controlled until that corrective action has been completed, which is approved by the QA Manager or his representative prior to and through completion.

The QA Manager reports the effectiveness of the program via scheduled staff meetings, performance reviews, etc., to his immediate supervisor on a regular basis.

The Manager of Engineering is responsible for the daily activities performed by the company. The Manager of Administrative Services is responsible for financial control reporting, contract administration, and supervision of the QA personnel. The Chief Executive Officer and President have sales and marketing responsibilities as well as the investigation of new business opportunities. The Manager of Engineering has total responsibilities for all Farwell & Hendricks contractual work performed by Farwell & Hendricks. The Department Manager is responsible for the implementation and control of technically related activities in their department. The QA Department reviews, audits and advises the Department Managers on quality procedures. The QA Department is the responsible organization to ensure conformance to the QA Program. Figure 1.2 lists QA functions.



ORGANIZATION CHART

FIGURE 1.1

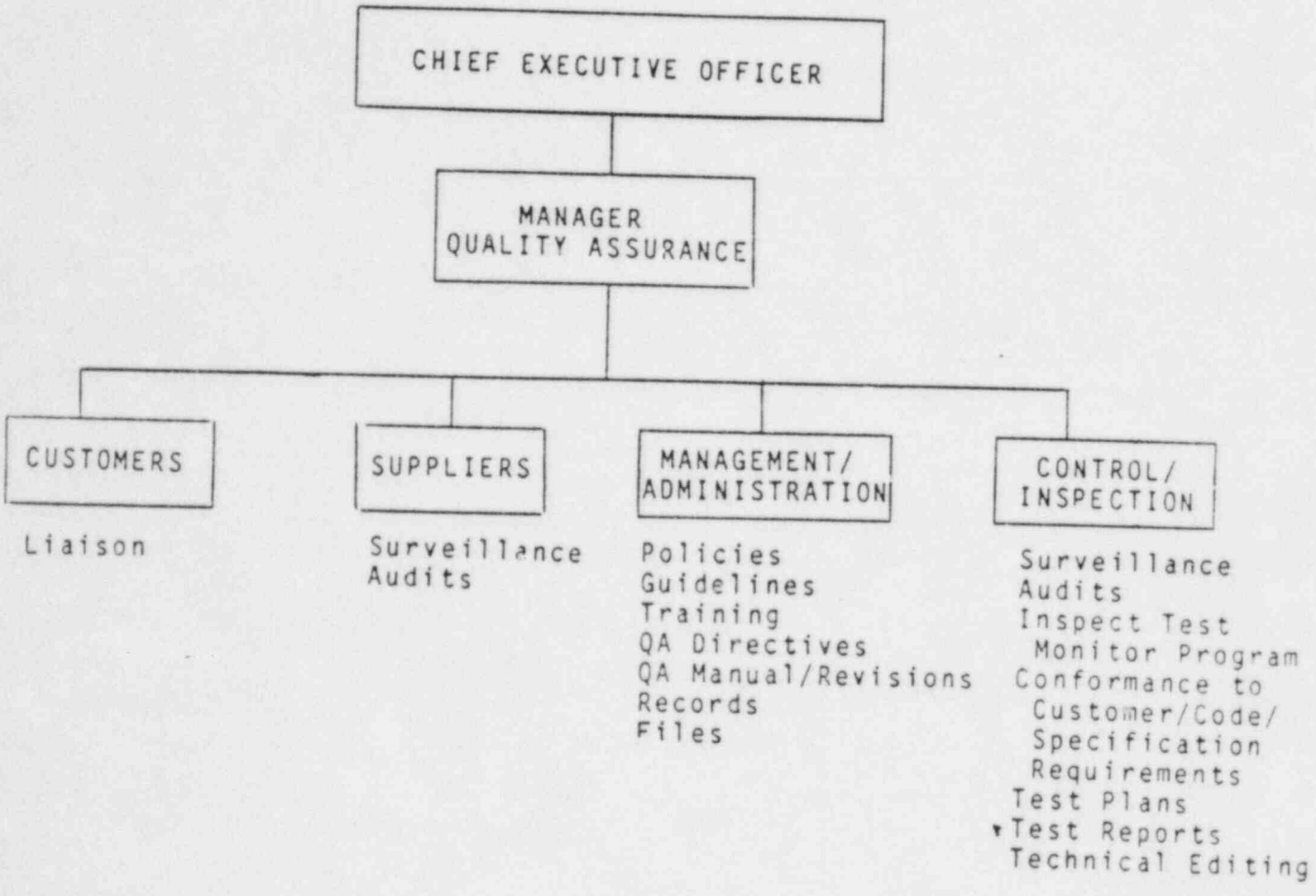


Figure 1.2

Quality Assurance Functions

2. QUALITY ASSURANCE PROGRAM

The Farwell & Hendricks QA Program as it relates to management, analysis, and testing activities is described in the following sections. This program is designed to ensure that Farwell & Hendricks activities are properly executed in accordance with the requirements of client contracts.

2.1 Scope

This section identifies the QA Program requirements which shall be applied, as necessary, to the control of quality of management, and analytical and testing projects.

2.2 Responsibilities

The QA Manager is responsible for maintaining, enhancing, and documenting the Farwell & Hendricks QA Program as it relates to all projects. The QA Manager is responsible for assuring that the established training and indoctrination programs are implemented by affected managers and certified personnel who perform quality related functions. He shall be responsible for keeping corporate officers informed of the status of the quality program and of quality trends. Audit reports, internal and external, shall be distributed to the Chief Executive Officer and the President.

The QA Manager shall prepare a summary report of the status and adequacy of the quality assurance program. Such reports shall be distributed to the Chief Executive Officer, President and other Managers deemed appropriate at a minimum on a yearly basis.

The Department Manager shall be responsible for assigning quality requirements to projects, based on interpretation, guidance and approval from the QA Manager. All managers of personnel who perform quality related work shall be responsible for implementing quality training and indoctrination programs based on guidelines established by the QA Manager. Corporate Officers monitor the quality program periodically to stay informed of quality status and trends, and shall establish management programs to correct or prevent conditions adverse to quality.

2.3 Program Organization

All QA activities and documentation are organized and classified according to ANSI N45.2-1977. These classifications are listed in Table 2.1. This manual describes the overall QA program and forms the governing program document. Internal Technical Procedures are developed by Department Managers and

Table 2.1
Categories by which Quality Assurance Activities are Organized

ANSI N-45.2 Category	QA Manual Section	Subject
3	1	Organization
2	2	Quality Assurance Program
4	3	Design Control
5	4	Procurement Document Control
6	5	Instructions, Procedures, and Drawings
7	6	Document Control
8	7	Control of Purchase Material, Equipment and Services
9	8	Identification and Control of Materials, Parts and Components
10	9	Control of Special Processes
11	10	Inspection
12	11	Test Control
13	12	Control of Measuring and Test Equipment
14	13	Handling, Storage and Shipping
15	14	Inspection, Test and Operating Status
16	15	Nonconforming Materials, Parts and Components
17	16	Corrective Action
18	17	Quality Assurance Records
19	18	Audits

QA personnel to aid in the implementation of the QA requirements. The QA Manager will audit these procedures to ensure their compliance with quality assurance requirements. Farwell & Hendricks' Technical Procedures are proprietary. These procedures may be audited at Farwell & Hendricks' facilities. The purpose of the Technical Procedures Manual is to provide refinements and clarification of the Quality Assurance Manual, guidelines of implementation, and generally acceptable good engineering practices, as they relate to quality projects. As an example, Technical Procedure 1-001 provides additional detailed descriptions of the QA Managers responsibilities.

The Farwell & Hendricks QA program is also in accordance with ANSI/ASME NQA-1-1979 "Quality Assurance Program Requirements for Nuclear Power Plants" basic requirements and supplement requirements. This QA program shall apply for (1) dynamic vibration testing and analysis, and (2) environmental simulation with respect to technical aspects of activities affecting quality.

2.4 Program Requirements

The following program requirements shall apply in some degree to all projects, as required by contract, applicable codes and standards, and regulatory requirements. This program assures that quality related activities are conducted under controlled conditions.

Organizational responsibilities and lines of authority shall be established, and personnel who perform quality related work shall be qualified and certified by training and indoctrination programs.

Design control measures are established to assure that applicable regulatory requirements, codes, and standards are properly observed, design verification is performed and information flow across interfaces is documented and controlled.

The review, approval, issue and revision of quality related documents shall be controlled by the QA Manager.

Methods shall be established to assure identification and control of customer test items in testing programs. Special processes (i.e., welding), when applied to fabrication of products whose final use is subject to QA requirements, shall be controlled as required by applicable codes, standards and specifications. An

inspection system shall be established to control receipt, storage and testing of test items. Tests shall be performed in accordance with documented test programs. Control of measuring and test equipment is established to assure that equipment used to verify conformance of an item to specified requirements and to demonstrate that items will perform properly in service shall be properly calibrated and maintained.

An audit system is established to measure status, adequacy, and compliance with the QA Program. The QA Program(s) will be reviewed no less than once a year by the QA Manager. Additionally, top management will conduct an annual review and assessment of the Quality Assurance Program.

2.5 Training of Personnel on Quality Program Requirements

The QA Manager is responsible for ensuring that all personnel performing activities directly affecting quality shall receive indoctrination and training as necessary to ensure that suitable proficiency is achieved and maintained.

Each Department Manager is responsible for ensuring that personnel within his department do not perform work for which they have not received sufficient training.

As required, the QA Department will conduct training sessions for affected personnel to update them on changes to the QA requirements. These training sessions are required predicated on the significance of the changes issued.

2.6 Personnel Qualification/Certification Program

The Managers/Supervisors are responsible to ensure that only those personnel within their department who meet the QA requirements stated herein are permitted to perform analysis, inspection, experimentation, and testing activities that result in or assure the items being evaluated meet applicable requirements.

Each Department Manager is responsible for ensuring that his assigned personnel are certified to the appropriate level when they have successfully met the QA requirements. All personnel will be considered in training until they meet these requirements.

The Department Manager, with the approval of the QA Department, shall provide indoctrination and training regarding unique project technical requirements outside of the scope of job classifications contained herein. Likewise, the QA Department will provide quality training for those appropriate programs outside the scope of this document.

The QA Manager is responsible for:

a. Auditing all pertinent documents regarding an individual's qualification

b. Reviewing and approving of Personnel Certification Records for individuals meeting the QA requirements

c. Performing Periodic Audits of the Personnel Qualification/Certification program to ensure compliance with QA requirements.

2.6.1 Requirements for Certification

The Department Manager and/or Supervisor shall review the individual's background and qualification against the minimum requirement specified for the category the individual is to be certified to. The requirements and functional category descriptions are in Table 2.2.

If the review of the individuals background displays sufficient knowledge and experience to perform a given category, the Department Manager and/or Supervisor shall prepare a Certification Evaluation Form QA-026 for that category. This form will be submitted to the Vice President of Engineering and the QA Manager for review and approval. After the Certification Evaluation Form has been approved, the individual shall be allowed to function in the category and level of the category approval. If the individual does not show evidence of competency for the particular category or level, he shall be informed of the training necessary to meet the Qualification/Certification requirements. Training may include formal training internally or externally to Farwell & Hendricks, on-the-job training, or self study. Upon completion of the training, the Department Manager and/or Supervisor shall review the individual's competency to determine if certification can be granted.

Table 2.2

Minimum Levels of Capability for Project Functions

	L-1	L-11	L-11
a. Pretest planning		x	x
b. Preparation of test procedure		x	x
c. Implement inspection and test programs	x	x	x
d. Evaluate inspection and test results		x	x
e. Report inspection and test results		x	x
f. Plan, conduct and obtain data and supervise inspections and tests		x	x
g. Approve inspection and test procedures		x	x
h. Approve inspection and test reports		x	x
i. Post test task such as disconnect instrumentation disassemble	x	x	x

Upon full compliance with the requirements established for the pertinent functional category the Department Manager shall submit Farwell & Hendricks Form QA-026 Certification Evaluation. The Department Manager, QA Manager and Vice President of Engineering shall review the requirements, personnel records, and Certification Evaluation Form. Upon approval, Farwell & Hendricks Form QA-027 Personnel Certification Record will be issued.

The period of certification for all levels shall be two years. Certification may be revoked at any time the employee does not demonstrate satisfactory performance of assigned tasks as they relate to the requirements of this directive. It is the responsibility of the manager who recommended certification to continually evaluate the employee's performance to ensure compliance with this directive. Should it be determined that performance is not in accordance with the certification requirements, the employee's certificate shall be downgraded to the next lower level of certification, and the individual shall be given additional training until such time as he has acquired the needed skills to meet the requirements for certification to the higher level.

When a person does not work in his certified technical area for a year, his certification shall be reviewed and he shall be reevaluated before he can perform technical activities.

2.6.2 Quality Assurance Evaluation and Certification Records

The Document Control Specialist shall establish and maintain a file for each candidate for certification. This file shall contain a copy of each Certification Evaluation, Personnel Certification Record, and related documentation.

A sample of the Qualification Evaluation Form No. QA-026 and the Personnel Certification Record Form No. QA-027 are included in this section.

2.7 Training of Personnel on Quality Program Requirements

2.7.1 Training and Qualification

2.7.1.1 The QA Manager shall assure by audits that each individual, including all new employees, has undergone sufficient indoctrination and training to satisfactorily perform his assigned task, as requested by the new employee's immediate supervisor.

2.7.1.2 The individuals shall be instructed in the intent and application of QA.

2.7.1.3 Training may consist of classroom instructions or on-the-job training, or both.

2.7.1.4 At the completion of training, the QA Manager shall certify the capabilities and qualifications of the individual per Paragraph 2.7.2.

2.7.1.5 As required, the QA Department will conduct training sessions for affected personnel to update them on changes of QA Requirements. These training sessions are required only if significant changes were issued. Once a year all personnel will attend a review session. The QA Manager will determine the need and develop a schedule for training.

2.7.2 Certification

2.7.2.1 The qualification of personnel shall be documented on the "Quality Assurance Personnel Qualification Summary" Form QA-028.

2.7.2.2 The Personnel Qualification Summary shall be completed and signed by the QA Manager after each revision.

2.7.2.3 A copy of the summary shall be kept in the QA file.

FARWELL & HENDRICKS INCORPORATED

QUALIFICATION EVALUATION FORM		Date:			
Department Manager:		Supervisor:			
Employee:		Functional Category:			
		Level I ☐ II ☐ III ☐			
Basis of Certification	Requirement	Evaluation (appropriate blocks)			
		Immediate Supervisor		Director Engineering	
		Employee Qualifies		Employee Qualifies	
		Yes	No	Yes	No
A. General Education and Experience	1 2 3				
B. Formal/On-The-Job Training (OJT)	1 2 3 4 5				
C. Proficiency	1 2 3 4 5 6				
D. Recommendation	1 2 3				
E. Approval	1 2 3				
F. Recertification	1				

OVERALL EVALUATION: The above named employee has been evaluated per Quality Assurance Manual 1, Section 2, Personnel Qualification Requirement Results are as follows:

Position	Recommend Certification Yes	Recommend Certification No	Signature	Date
Immediate Supervisor	____	____	_____	_____
Department Manager	____	____	_____	_____
Immediate Supervisor Statement of OJT (over)	____	____	_____	_____
Department Manager Statement of OJT (over)	____	____	_____	_____

FARWELL & HENDRICKS INCORPORATED

PERSONNEL CERTIFICATION RECORD

NAME: _____	DEPARTMENT: _____
FUNCTIONAL CATEGORY: LEVEL: 1 ☐ 2 ☐ 3 ☐	
EFFECTIVE DATE OF CERTIFICATION: _____ CERTIFICATION PERIOD: _____ RECERTIFICATION DUE DATE: _____	

This certifies that the above named employee of Farwell & Hendricks is qualified to perform assigned duties in the Functional Category and at the Level indicated above.

Reference Qualify Assurance Manual, Section 2, Personnel Qualification/ Certification Requirements.

Approved By/Date: _____
Vice President of Engineering

Approved By/Date: _____
Manager, Quality Assurance

QUALITY ASSURANCE

PERSONNEL QUALIFICATION SUMMARY

This is to certify that _____ was trained in the use and application of Farwell and Hendricks, Incorporated Quality Assurance Program. This training consisted of initial updates and periodic reviews.

QA Program Sections	Description	Date Trained	Instructor	QA Manager

3. DESIGN CONTROL

The normal design function of Farwell & Hendricks is to provide qualification services, analysis, suggest modifications, and adequacy documentation. This section describes the QA Program developed by Farwell & Hendricks for controlling the design of nuclear power generating station structures, systems, and components in conformance with ANSI N45.2-1977. Design projects which are non-nuclear are handled in the same manner, where applicable.

3.1 Scope

The requirements of this section are applicable to all activities of Farwell & Hendricks which affect the design of Nuclear Power Generating structures, systems and components.

3.2 Responsibilities

The QA Manager is responsible for developing appropriate general quality related procedures for control of design activities. The Department Manager is responsible for developing specific technical procedures for control of specific design activities on specific projects, as applicable. Designated Project Engineers shall be responsible for following these procedures for each project. The Department Manager is responsible for assuring that these procedures are followed. These procedures are audited by the QA staff for compliance to the QA program.

3.3 Definitions

The following definitions, excerpted from ANSI N45.2.11, are provided to assure a uniform understanding of selected terms as they are used in this QA Manual.

Design - Technical and management processes which commence with identification of design input and which lead to and include the issuance of design output documents.

Design Input - Those criteria, parameters, bases or other design requirements upon which detailed final design is based.

Design Output - Documents such as drawings, specifications and other documents defining technical requirements of structures, systems and components.

Final Design - Approved design output documents and approved changes thereto.

Internal Design Interface - Relationship between design groups or organizations within Farwell & Hendricks.

Procedures - A document that specifies or describes how an activity is to be performed. It may include methods to be employed, equipment or materials to be used and sequence of operations.

3.4 Program Procedures

The QA Manager is responsible for assuring technical procedures are developed by the appropriate department as necessary to cover typical items listed below which may not be all inclusive:

a. Assignment of responsibility for design activities
b. Control of technical information exchanges across internal and external interfaces
c. Control of documents including review, approval, release, distribution and revision
d. Maintenance and retention of design documents
e. Classification and training of personnel performing design activities
f. Management review of status and adequacy of program
g. Necessary training of personnel performing design
h. Identification of appropriate design input
i. Preparation of design documents
j. Specification of quality levels, acceptance standards, and record requirements
k. Performance of design verification
l. Conduct of audits of design activities, their reporting and follow up
m. Implementation of corrective action
n. Availability of experience reports to cognizant design personnel
o. Control of design changes.

3.5 Design Input Requirements

Technical Procedures are instituted to assure that applicable design inputs, such as design bases, regulatory requirements, codes and standards are identified, documented and their selection reviewed and approved. These procedures are internally developed documents by Department Managers to aid in insuring that the intent of the QA requirements are met. The procedures shall insure that changes from specified design inputs including the reasons for the changes are identified, approved, documented and controlled.

3.6 Design Process

The Project Engineer has the primary responsibility to follow the documented Technical Procedures in a manner such that all applicable design inputs are correctly translated into specifications, drawings, procedures, instructions, or reports. The Project Engineer shall use the work plan developed in the project initiation phase and the Technical Procedures as guides to proper work flow. Good engineering practices will be observed at all times. The Project Engineer shall consult with necessary persons or firms involved and keep Farwell & Hendricks management and/or clients informed of progress or complications in a timely fashion. In some cases periodic progress reports may be required.

3.7 Interface Control

Interfaces, both internal and external, will be required on some projects. All projects shall have a Project Engineer and, depending on the scope and nature of the project, a Project Manager. Technical Procedures are established to assure that interfaces are identified in writing, responsibilities are defined in sufficient detail to cover the preparation, review and approval of documents involving interface, systematic approval of documents involving interface, systematic methods are established for communication across interface, and the flow of information between organizations is documented and controlled.

Farwell & Hendricks' internal interfaces utilize memoranda, notes and personal communication. Internal correspondence and design information are normally documented in the form of original notes or calculations which become a part of the Project File maintained by the Project Engineer. When communication of design input or design output occurs across internal interfaces, the communications shall be in writing and a copy of the communication shall be filed in the Master File and the Project File.

The Department Manager and Project Engineer in each department shall be responsible for preparation, review, approval, distribution and revision of documents involving design interfaces.

External interface information may take the form of correspondence, telephone conversations, verbal communications or project meetings. All external interface information shall be documented and filed in the Master File.

The specification governing the design activities performed for any project shall be filed and maintained as a controlled document. All drawings directly related to design information used in the project as judged by the Project Engineer shall be filed and maintained. All control documents must be officially transmitted and receipt verified by the appropriate Farwell & Hendricks' personnel and customer with the required control traceability.

3.8 Design Verification

Technical Procedures are established to assure that one of several methods for design verification is used. The primary method is an independent check (review) of the design calculations and results. This check shall be made by an individual whose technical competence level is at least equal to that of the originator. This checking shall be indicated on the final report. Other acceptable methods for design verification are by alternate calculation and qualification. If appropriate, the Project Engineer shall designate the method to be used and shall assure that procedures are available to document and control the verification process used.

For reference only, the following questions are reprinted as typical considerations for the design review and verification.

1. Were the inputs correctly selected and incorporated into design?
2. Are the assumptions necessary to perform the design activity?
3. Are the appropriate quality and quality assurance requirements specified?
4. Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified, and are their requirements for design met?
5. Have applicable construction and operating experience been considered?
6. Have the design interface requirements been satisfied?
7. Was an appropriate design method used?
8. Is the output reasonable compared to inputs?
9. Are the specified parts, equipment and processes suitable for the required application?
10. Are the specified materials compatible with each other and with the design environmental conditions to which the material will be exposed?
11. Have adequate maintenance features and requirements been specified?

12. Are accessibility and other design provisions adequate for performance of necessary maintenance and repair?
13. Had adequate accessibility been provided to perform the in-service inspection expected to be required during the station life?
14. Has the design properly considered radiation exposure to the public and station personnel?
15. Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?
16. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?
17. Are adequate handling, storage, cleaning and shipping requirements specified?
18. Are adequate identification requirements specified?
19. Are requirements for record preparation, review, approval, and retention adequately specified?

Procedures shall be established to assure that the results of design verification are clearly documented with the identification of the verifier clearly indicated thereon and filed.

3.9 Design Change Control

Design changes occur either during the design process or after completion of the design. Design changes occurring during the process of the design are expected and shall be documented as part of the normal design process and design verification. Changes after completion of the design will be controlled by the client. The Department Managers develop and maintain the appropriate Technical Procedures to control design changes. The QA Manager reviews, approves and audits the Technical Procedures to insure design change control.

3.10 Corrective Action

In the event of significant or recurring deficiencies, the Project Engineer, with the assistance of the QA Manager and/or the Project Manager, will determine the cause for deficiency and institute appropriate changes in the operating procedures and the QA Program to prevent the recurrence of similar deficiencies.

3.11 Design Control and Customer Approved Qualification Plans

The majority of Farwell & Hendricks' qualification efforts are performed under a customer approved qualification plan that lists all appropriate assumptions and methods to be employed. Farwell & Hendricks is required by the terms and conditions of the customers purchase order to implement that program. These programs generally are a go no go qualification. If an item is not qualified, the customer controls all documents, technical requirements, equipment drawing numbers and revisions, wherein Farwell & Hendricks lists these variables in the final report as provided to Farwell & Hendricks by the customer.

If this program incurs events that deviate from federal and customer requirements, ANSI 45.2, etc., Farwell & Hendricks notifies the customer by a Record of Anomaly (Nonconformance) that his program is in violation of federal requirements etc., as interpreted by Farwell & Hendricks.

4. PROCUREMENT DOCUMENT CONTROL

Farwell & Hendricks occasionally employs subcontractors to provide equipment or services for work on a particular project. The purpose of procurement document control shall be to establish a requirement that applicable criteria, which are necessary to assure adequate quality, shall be included or referenced in procurement documents.

4.1 Scope

This requirement shall apply to requests for purchase orders, including changes, and other procurement documents initiated at Farwell & Hendricks for procurement of equipment, materials and services subject to quality related standards.

4.2 Responsibilities

The QA Manager shall be responsible for procurement document control programs which assure that applicable requirements are included or referenced in such documents. He shall be responsible for review and approval of quality related procurement documents to assure that applicable quality standards are specified. The Project Engineer and/or Project Manager shall be responsible for specifying the basic technical requirements to the supplier, e.g. specifications, codes, standards, drawings, and instructions, required for the desired quality. The QA Manager is responsible for specifying the subcontractor documentation requirements necessary to establish objective evidence of quality, e.g. personnel and procedure qualification, inspection and test records, and report requirements.

The Purchasing Department is responsible for processing purchase authorizations in accordance with this directive. The Purchasing Department will obtain quality related services only from the approved subcontractor list developed and controlled by the QA Department.

The Department Managers and Vice President of Engineering are responsible for ensuring that personnel within their respective departments comply with this requirement and contact the QA Manager for quality direction.

4.3 Procurement Document

Procurement documents shall include provisions for the following items, depending upon the importance and complexity of the procurement:

a. Requirements for supplier quality assurance program which assure the level of quality required

b. Basic technical requirements such as specifications, codes, standards, drawings, instructions, procedures, and other applicable engineering requirements

c. Source inspection and audit requirements by Farwell & Hendricks or customer representatives

d. Requirements for type of records to be retained and periods of retention by the subcontractor

e. Requirements for reporting, control, and approval of subcontractor nonconformances

f. Documentation requirements such as inspection and test records, personnel and procedure qualifications, material, chemical, and physical test results, and other applicable subcontractor records

g. Requirements for extending applicable procurement requirements to the subcontractor's lower tier suppliers

4.4 Procurement Document Change Control

Procurement document changes shall be subject to the same review and approval as the original procurement document.

5. INSTRUCTIONS, PROCEDURES AND DRAWINGS

Activities affecting quality are prescribed by documented instructions, procedures, or drawings. This section describes responsibilities and requirements for the development of these documents.

5.1 Scope

This requirement shall apply to all instructions, procedures or drawings for the performance of design, analysis, development, inspection and test, and procurement activities at Farwell & Hendricks.

5.2 Responsibilities

The QA Manager is responsible for assuring that requirements are established to assure that activities affecting quality at Farwell & Hendricks are specified in instructions, procedures or drawings. The Department Managers assure that activities affecting quality are documented and performed to appropriate instructions, procedures, or drawings. The Department Managers utilize existing procedures or other procedures developed for particular projects, or develop and issue procedures as required.

5.3 Requirements for Instructions, Procedures and Drawings

Programs are established which require that instructions, procedures, or drawings of an appropriate type are provided to control activities affecting quality.

Activities affecting quality include, but are not limited to; design, development, inspection and test. Activities associated with the manufacture, assembly, fabrication, installation and construction are documented if they occur under the direct responsibility of Farwell & Hendricks. Instructions, procedures or drawings include appropriate measuring criteria for determining satisfactory compliance to codes and specifications, work instructions, engineering design drawings, technical procedures, qualification procedures, test procedures, or any other type of written form.

6. DOCUMENT CONTROL

Document control activities are established to assure that the review, approval, issue or publication, and distribution of documents are controlled so that the latest issues, revisions and addenda are used by all affected Farwell & Hendricks organizations.

6.1 Scope

This requirement is applicable to all technical reports, instructions, technical procedures, drawings, specifications, and revisions thereto, issued by or to Farwell & Hendricks, which prescribe activities affecting the quality of design, development, or other phases of activities for which Farwell & Hendricks is responsible.

6.2 Responsibilities

The QA Manager is responsible for assuring the establishment of a document control file, administering the document control procedures, and maintaining the document control records for Farwell & Hendricks' projects. The QA Manager is responsible for the evaluation of client requirements, regulatory requirements, and Farwell & Hendricks internal requirements to establish the criteria used by the functional organization in implementing and maintaining document controls.

The Department Managers are responsible for establishing and implementing a document control program for related technical procedures and forms required for the performance of work in their area. The QA Manager has the overall responsibility for insuring that these technical procedures are in accordance with QA requirements. The Technical Procedures are reviewed and signed by the QA Manager as verification and endorsement of the quality standard.

The Project Manager and/or Project Engineer is responsible for using the appropriate existing document controls. He is responsible for developing and implementing a document control system in accordance with the appropriate criteria when the existing system is not sufficient for each job. All document control systems will be organized in writing by the QA Manager.

Individuals and departments which originate or receive controlled documents shall be responsible for maintaining internal records of receipt and transmittal as necessary; storage and safeguarding, and retrievability of documents in their possession and

transmitting any documents requiring formal document control to the document control file for issuance and control.

6.3 Document Control Program Requirements

A program is established which requires that documented procedures and methods are prepared and implemented to assure appropriate control of documents to preclude the possibility of using outdated or inappropriate documents.

6.3.1 Control of Documents Received by Farwell & Hendricks

A list of documents received by Farwell & Hendricks, which will be subject to document control, are established on a general or project specific basis. Specific file locations are established for all controlled documents. Procedures are in effect to assure that all controlled documents, revisions and addenda thereto are distributed to all affected personnel. Superseded material shall be destroyed or sufficiently marked such that document status is clearly indicated. A list of all document distribution is maintained with the original file of controlled documents.

This control of incoming officially transmitted documents assures that correct and applicable documents are utilized for project activities. Transmittal sheets and/or log sheets must be used for issuance and receipts. Signatures on these sheets shall be required from the recipients for internally and externally distributed documents.

6.3.2 Control of Documents Issued by Farwell & Hendricks

A distribution list for issued documents is established and a record of distribution kept. Transmittal sheets and/or log sheets are used for issuance, and receipts shall be required from the recipients. If transmittal sheets are not returned within 60 days and the issuance of the document was a controlled copy; the issued document shall be downgraded to uncontrolled status. Revisions or addenda to issued documents shall require the same review, comment and/or approval issue cycle as the original documents. Superseded documents shall be

returned to the originator for recording and disposal, or the originator shall be notified that superseded documents have been identified as such and removed from active project files. All quality related instructions, drawings, specifications, and procedures are routed to the apropriate QA organization for review, comment and approval, unless specifically exempted by the QA Manager. Master files of quality related documents are established and maintained in accordance with Section 17 of this manual.

Audits of office and laboratory are performed as described in Section 18 of this manual by the cognizant QA organization to confirm that documents being used, including subcontractor drawings and specifications, are the latest available. The use of nonconforming documents or conditions are subject to immediate corrective action as required by Section 16 of this manual.

All final reports prepared for customers will be reviewed and approved by the QA Department before being transmitted to the customer.

All technical proposals will be reviewed and approved for quality related contractual requirements.

6.3.3 Internal Control of Documents

The Master File provides the distribution center for controlled documents on project related activities. The initial creation of Revision 0 of a project is by the cognizant Department Manager or designee for the appropriate related activity. A Document Control Distribution List or internal Letter of Transmittal or equivalent tabulates all related issued documents to the project engineer. Thus, all received or created controlled documents have traceability through the Master File.

For any new project control documents, the cognizant originator is responsible for maintaining the Document Control Distribution list.

6.3.4 Document Revision

Revisions to documents shall be prepared, checked, approved and released in the same manner as the original document.

Superseded documents shall be recalled from distribution and destroyed or physically marked void or superseded as applicable.

Revisions on projects are processed through the master file which contains the control logs of those issued previous revisions of the related document.

7. CONTROL OF PURCHASED MATERIALS, EQUIPMENT AND SERVICES

Measures shall be established to assure that the requirement for activities be specified for assuring that purchased equipment, materials and services conform to procurement documents.

7.1 Scope

This requirement shall apply to all equipment, materials and services procured by Farwell & Hendricks, whether purchased directly or through subcontractors, which are related to the quality of work performed by Farwell & Hendricks.

7.2 Responsibilities

The QA Manager is responsible for the control of the procurement of equipment, materials and services that are quality related. He is responsible for providing surveys of subcontractor facilities and evaluating subcontractors to determine their quality capabilities, maintaining the Approved Subcontractors List, and assuring that procurements are placed with qualified subcontractors. He shall also be responsible for implementing the procedures and instructions for control of purchased items and services. He is responsible for assuring that the inspection of purchased equipment and services is performed to assure procurement requirements are met and that the quality of stored equipment is upheld.

The Purchasing Manager is responsible for placing procurements only with qualified subcontractors. The cognizant Department Manager shall be responsible for assisting in the evaluation of subcontractors to ascertain their technical and quality performance; and the QA Department for their quality performance and support of the above on quality related issues.

7.3 Purchased Item Control Requirements

A program is established to assure that the purchase of material, equipment, and services is controlled to assure compliance with procurement requirements. Evaluation of new and potential subcontractors shall be performed to determine if the subcontractors are qualified to provide equipment or services in accordance with documented procurement requirements.

Periodic evaluation, at a minimum on a yearly basis, of approved subcontractors shall be performed to determine their continued ability to meet procurement requirements. Evaluation of subcontractors shall be performed by methods consistent with the importance, complexity, and quality requirements of the item or service. These methods shall include source surveys, review of historical quality performance data, review of test and inspection reports, performance of inspection upon receipt, source surveillance and audit and review of the subcontractor's quality program manual, procedures and instructions.

An Approved Subcontractor List shall be established and maintained which shall contain the names of subcontractors who have been evaluated and approved as sources of equipment and services. The Purchasing Department shall assure that procurements with QA requirements are placed with approved subcontractors. This list is an internal control document and has an effective date of usage of 3 months, wherein, every three months an update is provided. The usage dates are provided on the list, i.e. do not use past this date, etc.

8. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS AND COMPONENTS

The purpose of this section is to establish the requirements for a system of identification and controls of items received from Farwell & Hendricks' clients for the performance of work on a project are identified and controlled.

8.1 Scope

This requirement shall be applicable to Farwell & Hendricks projects requiring test of client equipment.

8.2 Responsibilities

8.2.1 Shipping and Receiving Department

This group is responsible for all incoming and outgoing shipments. The acceptance of incoming items and initiating shipment rests with the Department Manager or his designate utilizing the material or test item.

8.2.2 Department Manager

The Department Manager is responsible for assuring that all test items are controlled in accordance with the QA Program.

8.2.3 Quality Assurance Department

The QA Manager is responsible for auditing the program. The QA Department conducts periodic audits to determine the adequacy and effectiveness of the system. This audit is to review methods being employed and the data processing and tracking form being employed. The QA Department assures that the Department Managers are identifying and controlling items that they process.

8.3 Requirements

8.3.1 Any item received shall be visually inspected and logged into Farwell & Hendricks. Condition upon arrival and verification and disposition that the correct item has been received is the responsibility of the Department Manager or his Responsible Engineer.

8.3.2 A sample tracking number shall be assigned to every customer item (project) received which effects quality. These markings will be clear, unambiguous and indelible and will be applied as not to affect the function of the item. This unique number is thereafter referred to throughout the program usage.

8.3.3 Code, contract, specification, etc., requirements for traceability of materials, parts, etc., shall be provided for the program.

9. CONTROL OF PROCESSES

9.1 Control of Non-Special Processes

Process parameters will be controlled and appropriate environmental conditions will be maintained. These parameters shall be defined in operation manuals, specifications, drawings, etc.

9.2 Control of Special Processes

The purpose of this section is to establish a requirement that special processes shall be accomplished under controlled conditions.

9.2.1 Scope

Farwell & Hendricks does not normally engage in manufacturing or fabrication activities which require special processes be followed. However, project or client requirements may dictate the development of processes which require special controls and special equipment and personnel qualification in order to obtain the required product quality. In such instances, the requirements of this section shall apply.

9.2.2 Responsibilities

The Project Engineer and/or Department Manager shall be responsible for determining the products and services that require special process controls, and translating these requirements into engineering documentation.

The QA Manager shall be responsible for establishing the criteria for special process control programs. He shall be responsible for subcontractor evaluation to assure the subcontractor's capability to provide proper special process controls.

9.2.3 Requirements for Control of Special Processes

A program shall be developed to assure that special processes shall be accomplished under controlled conditions. Documented procedures shall be provided to establish the program. Processes requiring special controls shall include cleaning, welding, brazing, soldering, heat treating, radiography, magnetic particle, ultrasonic, and liquid penetrant testing when

these processes are necessary to obtain the requisite quality. Other processes may require the development of special controls when contractually specified.

Control of special processes shall comply with the requirements of applicable codes, standards, specifications, criteria, customer requirements, and other special requirements which shall be translated into engineering requirements (e.g. design drawings, specifications, procedures, and instructions) to govern the procurement, manufacture, or installation of items requiring special process controls.

Qualification of personnel, procedures, and equipment shall comply with the requirements of contractually required codes and standards. Documentation shall be maintained for currently qualified personnel, processes and equipment in accordance with the requirements of those pertinent codes and standards.

Vendors and subcontractors shall be required to perform special processes under controlled conditions by qualified personnel when these requirements are specified on procurement documents for materials or services. Special process procedures, personnel qualification procedures, and records of process and personnel qualification shall be subject to review and approval by Farwell & Hendricks QA prior to award of the contract.

10. INSPECTION

The purpose of this section is to establish the requirement for an inspection program for activities affecting quality in order to verify conformance to applicable specifications, codes, standards, and other criteria.

10.1 Scope

This requirement applies to all test, analysis and activities where necessary to assure the quality of the results of these activities.

10.2 Responsibilities

10.2.1 Quality Assurance Manager

The QA Manager is responsible for assisting Department Managers, Engineers, etc., in the determination of project quality requirements while maintaining final approval on all quality subjects. The QA Department is responsible for conducting surveillance checks to insure the adequacy of the Test Monitor program. The QA Department is responsible for ensuring that only qualified personnel are appointed as Test Monitors. These Test Monitors, QA Specialist/Inspectors, are assigned to the QA Department They follow written QA test monitor procedures.

10.2.2 Department Manager

The Department Manager is responsible for the definition, work scope, and data requirements of the technical program.

10.2.3 The Department Manager, Test Engineer or Technician

This person is responsible for notifying the test monitor of each phase of the test and its technical content prior to initiation of each test program.

10.2.4 Test Monitor/QA Specialist

The Test Monitor is responsible for all quality functions of the test as outlined by this QA Program, customer purchase order, governing specification and procedures. The Test Monitor is responsible for completion of all witness/verification points and forms/records required for each test. The Test Monitor shall work

for the QA Department and seek advice on all quality related matters.

The QA Test Monitor will witness and verify appropriate required checkpoints on tests of any level of complexity as well as on a routine basis of all test programs. The control function of this review will be the QA Department review of Department Manager's project, such as Test Monitor's log, etc.

10.3 Requirements for Inspection Program

Programs are developed and implemented to require inspection or checking of activities and responsibilities of inspection or checking by personnel. Inspection or checking activities to verify the quality of work are performed by persons other than those who performed the work. Inspection or checking personnel shall report results directly to supervisors who are immediately responsible for the work being inspected per the above job definitions and authorities. Unsatisfactory results will be directly reported to the QA Department for corrective action. Inspections or checking are performed in accordance with documented procedures, instructions, specifications, and applicable drawings to verify quality. Inspections or checking are appropriately documented to provide objective evidence of quality, and to assure that only proper processes and procedures are utilized. Measuring and test equipment used to acquire quality related data during inspections is of the proper range, type, and accuracy, and is properly calibrated. The inspection activity is also reviewed by the QA Specialist routinely and the QA Department on interval audits of Department Manager's activities, as described above by the Responsibility section.

11. TEST CONTROL

This section establishes and defines requirements to assure control of test operations. Further, it assures that these operations are properly executed in accordance with this document and contract/customer requirements and written procedures, using appropriate calibrated instruments and qualified personnel.

11.1 Scope

This section shall apply to all test programs conducted by Farwell & Hendricks at their facilities or subcontractors' facilities.

11.2 Responsibilities

The Vice President of Engineering or Department Manager and/or his designee is responsible for review of contract documents to determine the required testing. The Department Manager is responsible for establishing written procedures and methods for testing in accordance with drawings and specifications. The Department Manager is responsible for the interpretation and scheduling of all testing requirements outlined on drawings and specifications. He shall determine from the specifications and drawings all tolerances, ranges and absolute values to be obtained in the testing.

The QA Manager shall provide appropriate QA surveillance and witness of test activities when required by the client, contract or internal Farwell & Hendricks procedures. He shall also assure that evidence of properly calibrated instrumentation is documented. The Department Manager shall provide the qualified personnel and proper instrumentation resources for the inspection, witnessing and performance of required testing in accordance with testing procedures.

The QA Manager is responsible for review and approval of required test procedures and instructions for inclusion of applicable QA requirements. He shall coordinate arrangements with the Department Manager for accommodating client witnessing of testing when so required by the client.

11.3 Requirements for Test Control Program

A test program is established to assure that any special tests required as a part of the design process will be described and documented by written test procedures which incorporate or reference the

requirements and acceptance limits contained in applicable design documents. The criteria for acceptance or rejection shall be included.

Testing is performed in accordance with written procedures which incorporate or reference the requirements and acceptance limits contained in applicable design documents. Instrumentation used in conducting tests and acquiring quality related test data shall be of the proper range, type and accuracy, and proper calibration. Test data is recorded as specified in test procedures and evaluated by responsible authority to assure that test criteria have been met.

Personnel conducting testing are qualified and have appropriate experience in test technology. Tests shall be witnessed, as required, by customer representatives and/or Farwell & Hendricks personnel. Reporting of the test and evaluation of the test results is in accordance with document submittal requirements of the contract, or by governing Farwell & Hendricks QA requirements.

All final qualification reports are reviewed, approved, and certified by a cognizant Professional Engineer. All final qualification reports are also reviewed and approved for quality matters by a cognizant QA representative from the QA Department.

The test records will, as a minimum, identify the following:

a. Item tested

b. Date of test

c. Tester or data recorder

d. Type of observation

e. Results and acceptability

f. Action taken in correction with any deviations noted.

Since programs are conducted to customer approved Farwell & Hendricks test plan, the ultimate responsibility rests with the customer (organization issuing purchase order) as to test requirements and acceptance requirements. Farwell & Hendricks' responsibility is to document those findings and report on observations per the pre-approved test plan, etc.

12. CONTROL OF MEASURING AND TEST EQUIPMENT

The purpose of this section is to establish the requirement that tools, gauges, instruments, other measuring and testing devices, and reference standards used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.

12.1 Scope

The requirements of this section apply to the measuring and test equipment used to verify conformance of an item to specified requirements and to demonstrate that such items will perform satisfactorily in service.

12.2 Responsibilities

The QA Manager is responsible for establishing the basic requirements for calibration control programs and assuring conformance to their requirements. The Vice President of Engineering is responsible for establishing and maintaining a calibration control program for measuring instrumentation used by the Department Managers. He is responsible for developing the control procedures and establishing an inspection and surveillance program to assure that test and measuring equipment used in test operations is properly used and is within the calibration interval.

12.3 Calibration Control Program Requirements

Programs are developed to assure the control and use of calibrated inspection, test, and measuring equipment. Procedural controls are established to assure that measuring and test equipment are calibrated at prescribed intervals to verify the required accuracy.

A list of measuring and test equipment and reference standards is prepared to specifically identify those items within the calibration program. Calibration intervals are established based on calendar time or usage, if appropriate. Interval selection shall consider experience, inherent stability, purpose of usage, and accuracy required. All equipment used as the basis for final quality acceptance is controlled under this program.

Written procedures for calibrating measuring and test equipment with reference standards is provided when such calibration is performed by Farwell & Hendricks personnel. These procedures may be manufacturer's

recommendations, published standard practices, or procedures prepared by the Farwell & Hendricks organization performing the calibration. Calibration procedures contain the following minimum information:

a. Identity of the item to be calibrated

b. Calibration equipment and reference standards to be used

c. Checks, test measurements, and acceptance tolerances

d. Sequence of operations

e. Special instructions, when necessary

f. Laboratory, equipment and environmental conditions, and etc.

Records of each controlled item of measuring and test equipment shall be maintained to include:

a. Item nomenclature and identification number

b. Calibration interval

c. Date of calibration

d. Identity of person performing calibration and/or repairs

e. Instrument readings before and after adjustments (nontransferrable equipment)

f. History of repairs needed and accomplished, maintenance report file

g. Storage location

h. Due date

i. Calibration procedures

Standards are used in the calibration of measuring and test equipment. The calibration of these standards are traceable to the Natural Bureau of Standards (NBS) or accepted values of natural physical constants. Standards used for calibrating measuring and test equipment have accuracy levels, acceptable calibration ranges, and precisions that are equal to or better than those required of the equipment being calibrated.

Calibrated items, including reference standards, are labeled to indicate their control status. The label shall indicate calibration date, next calibration due date, and name of person performing the calibration. If labeling is impractical, other coding methods are used, for example color coding with paint. Calibrated items and reference standards which have not been properly maintained, are overdue for recalibration, or have been subjected to possible damage, are considered nonconforming and are removed from service action as soon as possible. All equipment which has been tested or calibrated with these items prior to discovery of the nonconforming condition are considered nonconforming and treated accordingly.

Measuring and test equipment and reference standards are handled and transported with sufficient care to avoid damage or invalidation of calibration. These items are stored and calibrated in environments which shall not adversely affect their accuracy. Calibration may be performed by the user organization or may be subcontracted to other companies which provide similar services. If calibration services are subcontracted to another company, the subcontractor shall meet the requirements established by Farwell & Hendricks for calibration control programs.

Equipment found out of calibration will have an evaluation performed and documented of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested. Equipment constantly found out of calibration will be destroyed.

13. HANDLING, STORAGE, AND SHIPPING

The purpose of this section is to establish a requirement such that the preparation for shipment, and the handling, storage and shipment of material and equipment shall be controlled to prevent damage, deterioration, contamination and loss.

13.1 Scope

This requirement shall apply to the movement and protection of test items, materials, parts and components used in test programs.

13.2 Responsibilities

The QA Manager is responsible for establishing the governing requirements for programs to control handling, storage, and shipping of test items, equipment and materials.

The Department Manager or his representative are responsible for handling, storage, loading, and shipping activities at the laboratory for all items that require special consideration because of weight, size, or susceptibility to shock damage, in order to prevent or minimize damage in transit. He is also responsible for packaging to assure adequate protection of the items during handling, storage, loading, and shipping. He is responsible for the inspection and surveillance of preparation, handling, storage, loading and shipping activities to assure adherence to applicable procedures and instructions. He is responsible for providing storage facilities and methods of storage that are commensurate with the level of protection required.

13.3 Requirements for Handling, Storage, and Shipping Controls

Programs are developed, documented by procedural controls, and implemented to assure that handling, shipping, and storage activities are properly controlled. Client requirements shall determine the level of protection provided during preparation, handling, packaging, storage, loading, and shipping to prevent damage, deterioration, contamination, and loss. Instructions are provided to control the handling, storage, and shipping of equipment and material, as required to assure the desired level of protection.

Handling methods take into consideration precautions and requirements for weight, lifting points, center of gravity, rigging, methods of attachment, hoisting, stacking, and special handling tools and equipment. Shipping methods shall take into consideration environmental protection during transit as recommended by the equipment manufacturer. Storage methods take into consideration environmental protection.

14. INSPECTION, TEST, AND OPERATING STATUS

The purpose of this section is to establish the requirement for identifying, marking, and monitoring test items while in Farwell & Hendricks possession for the performance of work on a project.

14.1 Scope

This requirement is applicable to all test items from test programs for which Farwell & Hendricks has responsibility.

14.2 Responsibilities

The QA Manager is responsible for developing the criteria to be used in establishing programs which assure that required inspection and testing, as defined by the Department Managers, is performed and that the status of items with regard to inspections and tests performed shall be documented throughout all phases of processing.

The Department Manager is responsible for developing and implementing a documented program in accordance with criteria established by the QA Manager to assure that all test samples are clearly marked in a manner such that any testing activity will not degrade the legibility of said marking and that the test sample can be identified throughout all phases of testing, storage, or transition between facilities, etc.

14.3 Requirements for Identification of Inspection, Test, and Operating Status

Programs are established to require that procedural controls are developed to assure the identification of test samples. In accordance with contract requirements, records shall be maintained for all inspections and tests performed. These records shall indicate the acceptance status of inspection verifying evidence of conformance. Records shall include the forms necessary to identify the sample tested, the test involved, test instrumentation and equipment used, description of any anomalies and the disposition of same.

Test results shall be recorded, giving the actual test results and correction factors, as necessary. The test personnel assigned shall complete the necessary forms to document the test results.

Evidence of acceptance is indicted by the test personnel on the appropriate forms or records. Test personnel supervision is responsible for seeing that all test documents are filled out completely and uniformly, and filed in the applicable job folder along with any other required records.

The status of test items which do not meet specifications shall receive special emphasis. Items which have been tested and found to be acceptable shall be withdrawn from further testing. They shall be marked as nonconforming, documented, and disposition made in accordance with the criteria established in Section 15 of this manual.

Farwell & Hendricks test programs as defined by the customers purchase order and governing specification provide the major source of non-routine inspection, etc., functions.

15. NONCONFORMING MATERIALS, PARTS AND COMPONENTS

The purpose of this section is to establish the requirement for identification, control documentation and disposition of nonconformance.

15.1 Scope

This section describes the requirements and assigns responsibility for the identification, documentation, control, evaluation, segregation when practical, and disposition of nonconforming items and notification to affected organizations.

15.2 General

Items received by Farwell & Hendricks will normally be for specific project needs. Nonconformance is in two general categories: (1) project related, and (2) operational related.

Segregation areas shall be identified and marked for use as project needs and the organization require.

Deficiencies during performance of contractual projects shall be reported or resolved per contractual requirements. Such deficiencies will be considered "nonconformances".

15.3 Responsibilities

The QA Manager is responsible for developing the governing requirements for the nonconformance control program at Farwell & Hendricks. He is responsible for: (1) the audit of nonconformance control programs to assure adherence to the governing requirements, (2) for review and coordination of all actions relative to control of nonconforming material, (3) assuring reports of nonconformance are complete and provide sufficient detailed information to identify the item and the nonconformance, (4) review of Record of Anomalies to assure they are timely, complete, and contain all required information relative to the nonconformance, and (5) contacting appropriate engineering personnel and determining the disposition of the nonconforming item.

The Department Manager is responsible for taking necessary corrective action to resolve the nonconformances in accordance with established procedures. He is responsible for developing preventive action plans.

The Project Personnel for a project in which nonconformances are identified is responsible for documenting, processing, and evaluating the nonconformances and providing engineering justification for their disposition as necessary. He is responsible for notifying the customers of the nonconforming item or situation and recommending a course of action to correct the nonconformance when appropriate. He is responsible for assuring that the disposition is accomplished and corrective action is complete.

Whenever a nonconformance is discovered, the individual discovering the nonconformance shall be responsible for promptly notifying the Project Personnel and the Quality Assurance Manager.

15.4 Requirements

Items which do not conform to the purchase order or customer requirements shall be tagged (identified) as nonconforming items and placed in a segregated area.

Nonconforming purchased items shall be documented.

Nonconforming items provided by the customer shall be noted. A Record of Anomaly form shall be completed.

Verbal notification of the customer or supplier of the nonconformance will be within forty-eight (48) hours or not later than close of business the second scheduled work day.

Written notification shall be made to the customer or supplier via "Record of Anomaly" within five (5) working days if verbal notification did not occur. All Project Record of Anomalies are presented in the final report to provide customer traceability. Nonconforming characteristics shall be reviewed and recommended dispositions of nonconforming items shall be proposed by Farwell & Hendricks personnel and approved by Farwell & Hendricks Quality Assurance personnel per documented Record of Anomaly forms. The Record of Anomaly will state final disposition as Use-As-Is, Reject, Repair, Rework. Technical justification will be provided for Use-As-Is, Repair, etc.

Repair or reworked items will be re-examined in accordance with applicable procedures and with the original acceptance criteria unless the nonconforming item disposition has established alternative acceptance criteria.

15.5 Requirements for Control of Nonconformance Programs

A program for the control of nonconformances is developed. Procedures are established for the identification, documentation, disposition, notification to affected organizations, correction and prevention of nonconformances. Nonconformances identified at any time during testing shall be documented on forms designed for that purpose.

Resolution of nonconformances are determined by the Project Engineer and/or Department Manager. The resolution is documented. Nonconformances may include:

1. Any deviation of the test sample performance from established requirements

2. Any deviation of the test methods from those established by the Farwell & Hendricks test procedure, governing project specifications, or the client, regardless of the reason

3. Any test equipment or instrumentation malfunction

4. Any condition which may influence the integrity of the test data

5. Any errors discovered as a result of independent checking activities

6. Any abnormality which requires engineering judgement to rationalize, such as unusual computer output

These six (6) items are not all inclusive and are only a representative sample.

Preventive action to preclude recurrence, where applicable, is established for repetitive or important nonconformances of test equipment.

The final disposition, such as Use-As-Is, Reject, Repair, or Rework, of nonconforming items will be identified and documented.

Technical Justification for the acceptability of nonconforming items, such as Use-As-Is, will be documented.

15.6 Records

The Quality Assurance Manager shall maintain the record copy of reports of nonconformance and Record of Anomalies.

The Project Personnel shall maintain a copy of the Record of Anomalies in the Project File and Master File.

16. CORRECTIVE ACTION

The purpose of this section is to establish a requirement that conditions adverse to quality are identified and corrected promptly and that measures are taken to prevent recurrence of significant adverse conditions.

16.1 Scope

This section describes the requirements and assigns responsibility for assuring that positive corrective action is taken on identified conditions adverse to quality.

16.2 General

Conditions adverse to quality, such as deficiencies, deviations, failures, malfunctions, defective material and equipment, and other nonconformances shall be promptly and clearly identified and corrected as soon as practical.

Conditions adverse to quality may be originated by:

a. Client audits

b. Internal audits

c. Audits of subcontractors (external audits)

d. Reports by employees.

16.3 Responsibilities

The QA Manager is responsible for establishing the requirements for programs of corrective action for conditions adverse to quality. The QA Manager is responsible for keeping appropriate levels of management appraised of significant conditions adverse to quality and of progress toward resolution of these problems. The QA Manager is responsible for developing and implementing procedures which meet the requirements of the corrective action program. He is responsible for review of all corrective actions to determine the acceptability of corrective action taken. He shall perform audits to periodically review corrective actions taken to determine their effectiveness.

The Department Manager, or his designee, is responsible for identifying nonconformances during a test program and for taking corrective action to resolve the nonconformances.

All managers who receive corrective action requests initiated by QA are responsible for timely and proper responses to these requests.

All personnel who observe conditions adverse to quality are responsible for informing their managers of the conditions. The managers, in turn, are responsible for notifying the QA Manager of the conditions.

16.4 Requirements

Programs are required to assure that documented procedures are developed to establish and implement corrective action programs which correct and/or prevent conditions adverse to quality.

Conditions adverse to quality include (but shall not be limited to) failures, malfunctions, deficiencies, deviations, defective test equipment, nonconformances (anomalies) during testing, and violations of document control practices.

Conditions adverse to quality are promptly identified and corrected as soon as possible. In the case of significant conditions adverse to quality, as determined by the degree of seriousness, the cause is determined and corrective action implemented to prevent recurrence. The identification of significant conditions adverse to quality, cause of the condition, and the corrective action are documented and reported to appropriate levels of management.

Conditions adverse to quality are documented, investigated, and resolved as described for the control of nonconforming items in Section 15 of this manual.

Any individual identifying a condition adverse to quality shall promptly prepare a Non-Conformance Report and Corrective Action Request (NR/CAR) or report the condition to the Quality Assurance Manager, who will prepare the report.

The NR/CAR shall be sent to the individual responsible for the corrective action.

The individual responsible for corrective action shall document the proposed corrective action on the NR/CAR and send it to the Quality Assurance Manager.

The Quality Assurance Manager shall evaluate the proposed corrective action. The results of the evaluation shall be documented on the NR/CAR and a copy returned to the individual responsible for the corrective action.

When a significant condition adverse to quality is detected, the corrective action shall include the cause of the condition and the method to be used to correct the cause to preclude repetition of the condition.

16.5 Records

The Quality Assurance Manager shall maintain a log of NR/CAR's and the official record copy of such reports.

A copy of NR/CAR's that are project related shall be retained in the project files.

Copies of NR/CAR's shall be provided to appropriate supervisors and managers.

17. QUALITY ASSURANCE RECORDS

The purpose is applicable to all records and documents which are required to ascertain the quality of services during design, procurement and testing, as well as records of qualification or personnel and test equipment.

17.1 Scope

This requirement is applicable to all records and documents which are required to ascertain the quality of services during design, procurement and testing, as well as records of qualification or personnel and test equipment.

17.2 Responsibilities

The QA Manager is responsible for establishing the criteria and procedures for the collection, storage, and maintenance of quality assurance records. He is also responsible for implementing the procedures for a quality assurance records system. The QA Manager is responsible for establishing and maintaining a quality assurance records collection, storage and maintenance program for nuclear project activities. He is responsible for providing audit and surveillance activities to assure compliance with these requirements The Department Manager and/or Project Engineer is responsible for determining from contract specifications, corporte policy, codes and standards, and regulatory requirements the documents to be included in the quality assurance records program, and is responsible for informing other organizations.

The managers of all organizations which prepare and/or use quality assurance records are responsible for observing the requirements established in applicable procedures for the quality assurance records system.

17.3 Quality Assurance Records Program Requirements

A program is established to assure that documented procedures are developed to control the distribution, identification, classification, receipt, retention, status, storage, preservation, safekeeping, retrieval, maintenance, and disposition of quality assurance records. Two categories of QA Records are established - lifetime and nonpermanent. Examples of Lifetime Records are those which meet one or more of the following criteria:

a. Documents which would be of significant value in demonstrating capability for safe operation

b. Documents which would be of significant value in retracing analytical activities directly affecting the final design of equipment

c. Documents which would be of significant value in determining the cause of an accident or malfunction of an item

d. Documents which provide required data for auditability of test programs.

Nonpermanent records are those which would be of no significant value in complying with the requirements for lifetime records. These records are required to show evidence that an activity was performed in accordance with the applicable requirements, but shall not require retention for the life of the item.

The QA Records (permanent and nonpermanent) are stored in a manner compatible with normal Farwell & Hendricks filing practices. This system applies to the receipt of records into a temporary working file and the permanent storage file. A receipt control system includes:

a. A records checklist designating the required QA records

b. A record of QA records received

c. Distribution of records to appropriate personnel.

The following table summarizes the storage time for various records.

Record Types	Number of Years	
	Lifetime	Nonpermanent
A.1 Design and QA Records		
Applicable Codes and Standards Used in Design	X	
As-Constructed Drawings	X	
Design Calculations and Record of Checks	X	
Design Change Requests		1
Design Deviations	X	
Design Procedures and Manuals		2
Design Reports	X	
Design Review Reports		1

Record Types	Number of Years Lifetime	Nonpermanent
Drawing Control Procedures		2
Purchase and Design Specifications and Amendments	X	
QA Audit reports, internal, customers, and corrective action		6
Technical Analysis, Evaluation and Reports	X	
Personnel Qualification		1
Records of Calibration	X	

A.2 Procurement Records

Audit Reports		6
Procurement Specification	X	
Purchase Order (Unpriced Including Amendments)		2
Subcontractor's Quality Assurance Survey		2
Receiving Records		0
Supplier's Quality Assurance Program Manual		2

The QA record files shall be stored in predetermined facilities and locations as necessary to meet the applicable codes and standards, contract requirements, and requirements of regulatory agencies. Records are stored in a suitable environment to minimize deterioration or damage, prevent loss, preclude unauthorized entry. These records are stored so as to minimize the risk of damage or destruction from adverse environmental conditions such as high and low temperature, extreme humidity, dust, and infestation of insects, mold or rodents.

Records are stored in two different locations to prevent loss of records from natural disasters such as winds, tornadoes, fire or floods. Storage systems shall provide for the accurate retrieval of information without undue delay, and for the ease of adding supplements to existing records. These records are indexed which includes the retention time, locations, etc.

Changes or corrections to QA Records identify the date of the change, the name of the authorized person making the change, and the justification for making the change.

18. AUDITS

The purpose of this section is to establish the requirement for an audit which verifies compliance with the QA Program.

18.1 Scope

This requirement applies to all activities which affect the quality of Farwell & Hendricks activities and services. The QA Programs of subcontractors are also subject to this requirement.

18.2 Responsibilities

The QA Manager is responsible for developing and implementing an audit program which measures the compliance to Farwell & Hendricks procedures for the performance of audits. Other top line managers shall be responsible for performing and/or assisting in the performance of audits to provide support to the QA Manager in the implementation of the audit program.

Managers of the organizations which are audited are responsible for providing access of auditors to areas requiring audit, providing representative(s) to guide and assist the auditor, replying to any audit correspondence requiring answer, and performing any corrective and preventive action required as a result of deficiencies found during the audit.

18.3 Audit Program Requirements

Audit programs are developed and implemented in accordance with documented procedures for the planning, assignment of auditors, performance, documentation, reporting to management, establishing corrective and preventive action, and re-auditing. Audits are conducted periodically on either a scheduled or a random basis, as required, to verify by examination and evaluation of objective evidence that a documented QA Program has been implemented. Audits may be scheduled or unannounced as determined by circumstances and management decision.

Scheduled audits are performed in accordance with written plans and checklists. Audit personnel are appropriately qualified by orientation and training programs which provide working knowledge and understanding of applicable standards which govern audits, and practical experience, guidance, and counseling under the direct supervision of qualified auditors. Audit personnel shall not have direct responsibility in the areas being audited. Audit results are documented, and these audit results are

reviewed by management having responsibility in the area being audited.

Responsible management shall take necessary action to correct deficiencies revealed by the audit. Deficient areas are re-audited until corrective action has been accomplished. The results of audits and the response by the affected managers are reported to the responsible management.

The audit report will be signed by the audit team leader and issued and shall include the following information, as appropriate:

a. Description of the audit scope

b. Identification of the auditors

c. Identification of persons contacted during audit activities

d. Summary of audit results, including a statement on the effectiveness of the QA Program elements which were audited

e. Description and when scheduled of each reported adverse audit finding in sufficient detail to enable corrective action to be taken by the audited organization

f. Recommendations for correcting program deficiencies

g. Audit report cover sheet.

Audit records shall include audit plans, audit reports, written replies and the record of completion of corrective action.

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List of Customers

Project #	Supplier	A/E	Utility	Product
10003		Bechtel	SCS	R & D Cabinet
10004	SSCI	Stone & Webster Quadrex	LILCO	5 KVA Inverter System
10005.1 ✓		Nutech	Consumer Power - Midland	Zener Barrier Safe Pak
10005.2		Nutech	Consumer Power - Midland	Gould 225 Amp - Circuit Breaker
10020	Automation	Nutech	Consumer Power - Midland	Engineered Safety Isolation System
10022	Beloit		WPPSS Unit 3	Generator Control Panel
10025 ✓	COMSIP ← EPRI Leeds & Northrup			Hydrogen Sulfide & Chlorine Monitors
10026	Consolidated Controls Corp.		B & W - Generic	Trip Interface Equip. Cabinet
10029.1	CCL	Power Systems Division - Morrison Knudsen	Davis-Besse	Panel
10029.2	CCL	Power Systems Division - Morrison Knudsen	St. Lucie FP&L	Panel

Project #	Supplier	A/E	Utility	Product
10034	RDI - Barksdale	S&L	CG&E	Static-O-Ring Pressure Switch
10036	Westinghouse/ Canada	Ontario Hydro		Metal Clad Switchgear
10040	ECL	MCC Powers		18 HVAC Electrical Devices
10043	Ellison Watts	Bechtel	Consumer Power - Palisades	7500 lb Air Handling Unit
10046	SSCI		Colorado Public Service Fort St. Vrain	25 KVA Inverter System
10048	Nemco	Patel	E.P.&L. Crystal River	Remote Shutdown Panel
10049	Eaton	Patel	C.E.I	AC/DC Motor Control Center
10051	Bailey - Generic			QNS Cabinet
10053	Nutherm	WBNP	IVA	Manual Transfer Switch D.C. Magnetic Starter
10065.1	Diamond Power	— Generic		Min-K

Project #	Supplier	A/E	Utility	Product
10065.2	Diamond Power	— Generic		Reflective Pipe Insulation
10066	AAF		Consumer Power - Midland	Air Handling Unit
10067	✓ Webb Electric	Bechtel	Consumer-Power-Palisades	Cabinet
10081	BoW	Patel - Generic		Valve Flow Monitor Equip
0087	Webb	Bechtel	C.P. - Palisades	Two Panels
0091	Ionex In-Process		TVA	Air Filter
0093	Automation (Victaulic)	Nutech	C.P. Midland	Engineered Safety Isolation System Analog Cabinet
10001	CVI	Bechtel KOC	SCS	Containment Cooler
20003	A/P - Generic			Valve
0006	Reliance	Bechtel	SCS	Panel
0007	"	"	"	"
0008	"	"	"	"