TOPICAL REPORT
QUALITY ASSURANCE
PROGRAM

ISSUE	NRC APPROVAL DATE	PREPARED BY	REVIEWED BY	APPROVED BY
Original - 0	Nov. 12, 1974			
Amendment - 1 *	May 9, 1975			
Amendment - 2	June 22, 1976			
Amendment - 3	Nov. 10, 1976			
Amendment - 4	June 27, 1977			
Amendment - 5	March 21, 1978			
Amendment - 6				

* First full approval by the Nuclear Regulatory Commission.
NRC approval letter dated May 9, 1975.

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ABSTRACT

United Engineers & Constructors Inc. (UE&C) have established and implemented a Quality Assurance Program to provide assurance that the design, procurement and construction (including installation and pre-operational testing -- but not operation) of nuclear power plants, performed by UE&C, are in conformance with applicable regulatory requirements and with the design bases specified in the license application. The Quality Assurance Program described in this report is in compliance with the requirements of Appendix B to 10CFR Part 50. This report addresses and is responsive to the United States Nuclear Regulatory Commission Regulatory Guide 1.70.6, dated July 1974, which describes additional information required in the Quality Assurance Section of the Preliminary Safety Analysis Report for Nuclear Power Plants.

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Appendix I

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Figure I - List of Corporate QA Standards
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QUALITY ASSURANCE
PROGRAM

Amendment 6 Change Summary

The following pages were revised:

Amendment Sheet

Page ii - Table of Contents
Page v - Amendment 6 Change Summary
Pages 17.1-1 through 17.1-8
17.1-10 through 17.1-12, 17.1-14, 17.1-15
17.1-20 through 17.1-23
17.1-25 through 17.1-28
17.1-30 through 17.1-43

APPENDIX I - FIGURES I, II AND III
APPENDIX II - FIGURES II AND IV

Note: Numbered pages not listed above were renumbered to accomodate the revisions.

INTRODUCTION

The purpose of this Topical Report on Quality Assurance is to reflect the established Corporate commitment of United Engineers and Constructors, Incorporated. The report is intended to show responsibility assignment, and identify the means of implementation to assure that levels of product quality as specified in a contract and required by applicable laws are achieved.

The Quality Assurance Program described in this report is applicable in it's entire scope to services and product quality for work performed by United Engineers and Constructors, Incorporated during the design, procurement, and construction (including installation and pre-operational testing - but not operation) on nuclear power plant projects.

Consistent with present efforts toward greater standardization in commerical nuclear power plant programs, it is the intent of United Engineers and Constructors, Incorporated to apply this Quality Assurance Program to future projects, without additional review, once the Regulatory Staff has reviewed and accepted this report.

17.1 QUALITY ASSURANCE DURING DESIGN AND CONSTRUCTION

17.1.1 Organization

17.1.1.1 Authority, Responsibility, and Duties

The Reliability and Quality Assurance (R&QA) Department is responsible for establishing and executing or verifying the Quality Assurance (QA) Program for United Engineers & Constructors Inc. (UE&C).

The Vice President of Project Support Operations is the highest level of management responsible for establishing R&QA policies, goals and objectives, and he is involved in R&QA matters on a continuing basis approximately 25 percent of his time. The Manager of R&QA reports to the Vice President of Project Support Operations, and is delegated the full authority and responsibility for the QA Program of UE&C. Two Assistant Department Managers (Quality Engineering and Project Quality) of R&QA provide direct technical and administrative support to the Manager of R&QA for all aspects of the department's operation. The departmental organization chart (See Appendix I, Figure II) displays a dotted line between the President of UE&C and the Manager of R&QA indicating an open communication channel. The President of UE&C is routinely kept advised of R&QA activities by at least four distinct means: 1) monthly department status reports; 2) monthly audit summary reports; 3) verbal communication at planned meetings, including, as an example, audit exit interviews; and, 4) annual management review of R&QA activities. | 6

Major organizational functions within the R&QA Department are Project Quality Assurance, Quality Services, Materials Engineering, Codes and Standards, Operations Quality Assurance and Audits. Each of these major organizational functions is directed by a Manager who reports to an Assistant Department Manager of R&QA except for the Manager-Audits who reports directly to the Manager of R&QA. See Appendix I, Figure II. | 6 | 6

A description of the authority and duties of each functional organization is treated below.

a. Project Quality | 6

The Assistant Department Manager of Project Quality is responsible for providing direction to each of the Project Quality Assurance functions. He is supported by Managers, each of whom has been assigned responsibilities for specific project or corporate QA functions. | 6

1. Project Quality Assurance | 6

Each Project Quality Assurance Manager is responsible for maintaining a staff of Quality Assurance Engineers who in turn are individually responsible for the QA Program of a project. Duties of the Project Quality groups include: | 6

- Developing, implementing, and controlling Project QA Programs.

- Reviewing and approving applicable equipment, material, design and construction specifications, including revisions. This review and approval pertains to the quality assurance and control requirements; number and type of tests required, validity and feasibility of test methods incorporated in the specifications, and procedures and documentation as required by the Codes and contract.

- Reviewing and approving bidder lists prepared by Engineering and Procurement. | 6

- Reviewing and approving Inquiry Requisitions for the procurement of nuclear and safety-related items to assure that proper quality assurance and applicable Code and contract requirements are specified.

- Participating in pre-award meetings with suppliers to assure use of approved suppliers and adequate QA plans, and clarify questions concerning quality assurance requirements.

- Evaluating proposed suppliers, and scheduling and arranging for quality assurance surveys and audits of vendors. Review and approve suppliers' QA Programs, plans and procedures. | 6

- Preparation of Vendor Surveillance Check Plans to delineate requirements for surveillance points, documentation, and reports applicable to safety-related items.

- Coordination of the UE&C QA Program including liaison with other operating groups within UE&C and with the QA activities of the U.S. Nuclear Regulatory Commission, Client, NSSS Contractor, and Construction Manager and Constructor when that is not part of UE&C's scope of work for a project.

- Assuring established design controls are executed.

- Stop work authority, for cause.

The Project Quality Assurance Manager is responsible for quality activities at UE&C job sites when UE&C's scope of work includes Construction Management or Construction. He directly supervises the Field Superintendent Quality Assurance (FS-QA) assigned to specific project sites. | 6 | 6

(a) The Field Superintendent - QA is responsible for implementing the QA program at the site and his duties and authority include: | 6

- o Instructing Field QA personnel in the provisions of the Codes and NRC QA criteria, and in the requirements of the specifications and drawings pertinent to materials, parts, components, appurtenances, and installations. | 6
- o Reviewing and approving nuclear and safety-related purchase requisitions and associated bidders lists for field procured items. | 6
- o Reviewing subcontractor procedures and establishing vendor surveillance check lists for field procured items.
- o Coordinating with the Project QA Engineer for providing shop inspection services on field purchased items.
- o Providing and performing receiving and storage inspection.
- o Accumulating and maintaining QA & QC records required for the project at the job site.
- o Directing and supervising the activities of the QA Engineers and Technicians/Inspectors in the performance of inspections and surveillance, and providing documentation as required by Codes, Regulations, procedures, and specifications. | 6
- o Implementing the nonconformance control and corrective action control procedures, including stop work authority, for cause.

(b) Site QA/QC Engineers and Technicians/Inspectors are responsible for: | 6

- o Performing receiving and storage inspection.
- o Carrying out construction inspections identified on the travelers and check lists to assure that materials and operations conform to the requirements of Codes and contract. | 6

- o Documenting acceptance or rejection of materials, parts, components, and operations within the scope of Codes and contract.

- o Verifying calibration of measuring tools and test equipment used to assure accuracy of measurements and recorded data.

- o Receiving, reviewing, approving, and preparing documentation pertinent to quality of materials, and workmanship required by Codes and contract.

Where UE&C contract scope includes Construction Management, but not Construction, the activities described above are covered by surveillance of the Quality Control activities of construction contractors. However, the UE&C Field QA Group will perform receiving and storage inspection of prepurchased items, and will maintain the QA & QC Records. | 6

(c) The Quality Systems Supervising Engineer is responsible for planning, establishing and maintaining a staff of competent Quality Assurance Engineers who provide QA plans, programs, manuals, and procedures which delineate standard practices to be applied to each project. | 6

The Quality Systems Group, as a minimum, is responsible to: | 6

- o Plan, develop, and control, the ASME Section III Nuclear Quality Assurance Manuals, and the Quality Assurance Manual of Corporate Standards.

- o Provide for R&QA review and approval of Supplier Quality Assurance Plans, Power Engineering Department Procedures, Construction Standard Procedures, and Project Quality Assurance Procedures.

- o Provide Education and Training Programs for the UE&C personnel, and promote and propose educational services for the Client.

- o Assist in new vendor capability studies and surveys.

- o Investigate, analyze, and challenge, for cause, Standards and Codes to be integrated into UE&C's QA Program.

- o Anticipate needs of R&QA, and develop plans and recommendations for adequate provisions.

b. Quality Engineering

The Assistant Department Manager - Quality Engineering is responsible for directing the functions of Materials Engineering, Codes and Standards, Operations Quality Assurance, Quality Services (Vendor Surveillance, Welding and Nondestructive Examination). 6

1. Quality Services

The Manager of Quality Services is responsible for directing the functions of Vendor Surveillance, Welding Engineering and Nondestructive Examination. He is supported by a Supervising Engineer for each of these functions.

(a) The Vendor Surveillance Supervising Engineer is responsible for the implementation of the Vendor Surveillance Program, and the activities of the Vendor Surveillance Representatives.

This function includes, but is not limited to:

- o Developing pertinent purchase order files.

- o Assisting in the review of vendor drawings and procedures.

- o Performing surveillance actions at vendor facilities as identified on the Vendor Surveillance Check Plan.

- o Reviewing vendor techniques, fabrication processes and controls for conformance to requirements.

(b) The Welding Engineering Supervising Engineer is responsible for controlling the implementation of UE&C and supplier welding activities.

Duties of the Welding Engineering Group include:

- o Preparing and qualifying UE&C welding procedures.

- o Reviewing supplier and contractor welding procedures.

- o Assisting the Project Quality Engineer in review of specifications involving welding. | 6

- o Assisting Vendor Surveillance on matters involving welding.

- o Consulting, advising, and assisting, including technical direction of field welding and Field QA personnel on all matters involving welding. | 6

- o Related problem solving.

(c) The Nondestructive Examination (NDE) Supervising Engineer is responsible for controlling the implementation of UE&C and supplier NDE activities.

NDE Group duties include:

- o Administering UE&C's program for training, examining, and certifying NDE personnel.

- o Assisting the Project Quality Engineer in review of NDE specifications. | 6

- o Reviewing supplier and contractor NDE procedures.

- o Reviewing subcontracted NDE services when utilized by UE&C.

- o Acting as final UE&C authority on evaluation of NDE results where agreement cannot otherwise be reached.

2. Materials Engineering

The Manager of Materials Engineering is responsible for the functions of Materials Application and Corrosion Engineering. He is supported by two Supervising Engineers.

(a) The Materials Application Supervising Engineer is responsible for interfacing with engineers of other organizations on job requirements, and clarification of materials application.

Duties of this group include:

- o Assisting the Project Quality Engineer in reviewing portions of specifications and procedures dealing with materials and material processes. | 6

- o Assisting Vendor Surveillance and Audit personnel in the performance of their work.

- o Technical consulting services to other departments on problems relating to materials.

- o Performing failure analyses.

- o Reviewing material application in connection with design changes.

- o Reviewing major repair procedures.

(b) The Corrosion Engineering Supervising Engineer is responsible for consulting services to assure optimum materials and coating selection, and effective corrosion control measures.

Duties of the Corrosion Engineering group include:

- o Assisting the Project Quality Engineer in reviewing portions of specifications and procedures dealing with coatings and corrosion protection. | 6

- o Performing failure analyses.

- o Reviewing design changes and major repair procedures to assure the integrity of the component is maintained.

- o Assisting Vendor Surveillance and Audit personnel in the performance of their work.

3. Codes and Standards

The Manager of Codes and Standards is responsible for investigating, analyzing, and maintaining cognizance of Regulatory requirements, Codes and Standards for their application and affect on the QA Program.

Duties of this section include:

- o Disseminating information regarding corporate positions on QA matters responsive to requirements of Regulations, Codes, and Standards.

- o Providing consultation to appropriate levels of management on matters concerning Codes and Standards.

- o Assisting the Manager of R&QA in coordinating the activities of the Authorized Inspection Agency and QA consultants under contract to UE&C.

- o Providing consultation to project management for developing project positions responsive to Codes and Standards.

4. Operations Quality Assurance

The Manager-Operations Quality Assurance is responsible for directing activities pertaining to the establishment, preparation, and implementation of Quality Assurance Programs for operating power plants and during startup of new plants. 6

c. Audits

The Manager of Audits is responsible for establishing and executing an audit program to verify UE&C and their suppliers' and subcontractors' QA Program effectiveness. He directs the activities of the Audit function, and selects, trains, and assigns qualified Lead Auditors. 6

Duties of Lead Auditors include: 6

- o Coordinating and leading the audit team including selection of audit team members.

- o Establishing an audit agenda plan and check list.

- o Assuring communication between the audit team and responsible personnel for the activity being audited.

- o Identifying and reporting audit findings including recommendations for corrective action.

- o Evaluating corrective actions, and providing subsequent verification actions.

Documented job descriptions for the positions described in this report are established and in UE&C files. These job descriptions provide more specific and detailed information pertaining to the individuals authority, responsibility, and duties.

Organization charts included in the Appendix I provide further clarity and visiblity relative to lines of responsibility and authority within UE&C, and the R&QA organizational interface with other UE&C functional organizations. See Appendix I, all Figures.

The relationships, responsibilities, and functions of the R&QA Department remain unchanged, although the detailed organization may vary from project to project depending upon the extent of the services rendered by UE&C to a particular Owner on a specific project.

Figure III, in Appendix I, exhibits a typical project organization showing the interrelationships including clear and effective lines of communications among the major organizations working directly for the Applicant on the project when UE&C is Architect Engineer, Construction Manager, and Constructor.

17.1.1.2 Independent Operation

In order to assure that persons and organizations performing QA functions have authority and organizational freedom, to a) identify quality problems, b) initiate, recommend, or provide solutions, and c) verify implementation of solutions, job descriptions are documented with approval of executive management. Since the Manager of R&QA reports to the Vice President of Project Support Operations, further assurance is provided by having direct access to top management relative to activities at any location, independent from Engineering, Construction, and undue influences and responsibilities for schedules and costs. This reporting scheme provides for resolving disputes arising from various interpretations by QA or QC personnel, and other functional organizations such as Engineering, Construction, and Procurement. In addition, all R&QA personnel receive their technical direction and administrative control from the Manager of R&QA or his designee. This control includes employment, salary review, termination, as well as position assignment.

The R&QA organization is responsible and authorized, as delineated in writing, to stop work or control further processing, delivery, installation, or use of nonconforming items until proper dispositon of the nonconformance or deficiency is approved.

In order to assure proper direction of the subcontractor's QA Program and the resolution of subcontractor's QA problems, positive lines of communication are established and mutually agreed upon between UE&C and the subcontractors. These lines of communication consist of official correspondence from UE&C Project Management to UE&C's subcontractor's Management, as well as the day to day informal working communication between R&QA and the subcontractor's QA personnel. Although formal communication is between UE&C Project Manager and subcontractor's management, matters dealing with QA are initiated by UE&C R&QA.

Inherent characteristics of R&QA's independent operation include provisions for subcontractor review, selection, and control, as well as audits and management reviews; each are described later in various sections of this report.

17.1.1.3 Scope and Delegation of Work

Corporate QA responsibilities vary in accordance with UE&C's scope of work as defined in contractual documents. Delegation of QA work to other organizations will be done only as described in subtier procurement documents to suppliers and contractors. These documents will require that suppliers and contractors provide a QA and QC Program commensurate with the scope of work, and responsive to the applicable requirements of 10CFR50 Appendix B. The implementation of the programs of those organizations under contract to UE&C will be subject to surveillance and audit by UE&C R&QA in accordance with the provisions of Section 17.1.18 of this report. With the exception of QA and QC related to equipment suppliers, construction services, and environmental studies, the only QA and QC subcontracts anticipated are for concrete inspection and testing, and NDE services at the project site.

17.1.1.4 Other UE&C Organizations | 6

A brief description of other UE&C organizations performing tasks affecting quality is as follows:

a. UE&C Engineering

The UE&C Power Division, headed by the Vice President of the Power Division, is responsible for the design and engineering of nuclear power plants.

The Vice President of the Power Division assigns a project to a UE&C Project Manager to lead the UE&C effort for nuclear projects involving engineering or engineering and constructor/construction management. In these cases the Manager-Power Engineering assigns the engineering manpower required for the design. Constructor/construction management manpower is supplied, when applicable, by the UE&C Construction Division. | 6 | 6

The Project Manager is responsible for advanced planning for the control of management and technical interfaces, between other participants, during phases of design and construction and during preoperational testing and plant turnover. The Project Manager, in accordance with Project Milestone Charts, meets with the various other participants for the purpose of preplanning the control and technical interfaces required. The results of these meetings are documented.

The control of quality related activities affecting the design and engineering is performed in accordance with the Power Division procedures which are approved by the Vice President of the Power Division and the Manager of R&QA.

UE&C Power Division departments supplying services to a nuclear project are subject to compliance with the procedures of the | 6

Power Division. Work performed by the Project personnel is further controlled by a system of surveillance and audits performed by R&QA as described in other sections of this report. The organizational structure of the Power Division is depicted as part of the corporate organization chart, Figure I in Appendix I. | 6

b. UE&C Procurement | 6

The Manager of Procurement reports to the Vice President of Project Support Operations, and is responsible for the procurement of equipment to requirements specified by the Power Division. | 6

The procurement activity which includes buying and expediting is performed in accordance with the provisions of procedures prepared by the Procurement Department and approved by the Manager of Procurement and the Manager of R&QA. Work performed by the Procurement Department is controlled through a system of audits and approvals of procurement documents by R&QA. | 6

It is important to note that the Procurement Department cannot waive or change any engineering or QA requirement, or allow one to be changed without the prior approval of Power Engineering and R&QA. | 6

Further, the expediting group has no inspection responsibility or authority, and cannot waive inspections, witness points, or release safety-related equipment for shipment without R&QA approval.

c. UE&C Construction

The UE&C Construction Division, headed by the Vice President of Construction, is responsible for providing Construction manpower (Constructor), Construction Management, or a combination of both for construction of nuclear power plants.

The Vice President of Construction assigns a Construction Manager in the home office, and a Project Construction Superintendent, or Resident Construction Manager, at the site, to lead the UE&C Construction Management and Construction efforts for a particular nuclear project. Supervision of the work force on the project site is achieved through Area and Craft Supervisors.

The control of nuclear and safety-related construction activities is achieved in accordance with the Construction Division Standard Guideline Procedures which are prepared in the home office and reviewed and approved by the Vice President of Construction and the Manager of R&QA. Field adaptation and subsequent revision, as required, to these Standard Guideline Procedures will be by

the Resident Construction Manager and reviewed and approved by the Field Superintendent-QA. Field developed construction procedures or subcontractor procedures, or both, will be reviewed and approved by the Resident Construction Manager and the Field Superintendent-QA. | 6

Work performed by the Construction Division is controlled by a system of surveillance, audits, inspections, tests, and examinations by R&QA as described in the Project Quality Assurance Manual. | 6

The organization structure of the Construction Division is depicted as part of the corporate organization chart, Figure I in Appendix I.

17.1.2 Quality Assurance Program

17.1.2.1 Requirement Compliance

UE&C's QA Program complies with each of the criteria in Appendix B to 10CFR50, and applicable portions of specified Codes and Standards. Other sections of this report describe and reference documented practices to provide sufficient detail of how all the requirements of Appendix B are satisfied.

Accordingly, the QA Program conforms to the requirements and guidance of NRC Regulatory Guides and ANSI Standards listed in Figure V Appendix II. The R&QA organization is responsible for implementing or verifying these provisions. A Corporate commitment to these requirements and the basic corporate internal instructions for Quality Assurance are found in the Corporate Policy Statement signed and promulgated by the President of UE&C. This commitment is stated as follows: "The work performed by UE&C on the safety related and safeguards portions of nuclear power plant projects will be accomplished in accordance with the applicable requirements of 10CFR50 Appendix B; ANSI N45.2; and the appropriate ANSI daughter documents.

Further, such work will recognize the NRC Regulatory Guides and treat them as requirements or will provide a satisfactory alternate to certain Regulatory Guides that will satisfy the intent of the Regulatory Guides." Any exceptions, alternates, or clarifications to the Regulatory Guides and ANSI Standards will be documented in the Applicant's safety analysis report.

This Corporate commitment to quality is transmitted as a Policy Directive from the President of UE&C, and communicated down through the levels of management by Management Statements in Corporate R&QA Documents and ultimately into working procedures for personnel performing the quality affected tasks. This Topical Report, which UE&C will review annually and revise as necessary, is an example of how the policies are transmitted to various levels of management.

17.1.2.2 Safety-Related

All safety-related structures, systems, and components will be controlled by the QA Program, and identified in a Table in the Clients' Preliminary Safety Analysis Report.

17.1.2.3 Program Establishment

Establishment of the QA Program for a specific project is actually initiated with the Client's request for quotation. Since R&QA contributes to the proposal effort, the specific conditions of QA work are visible before the contract is awarded.

At the time a contract is awarded, a Project Quality Assurance Manager is assigned to be responsible for the Project QA Program. This appointment assures the establishment of the Project QA Program at the earliest practical time consistent with the schedule for accomplishing activities affecting quality for the project. In order to assure the QA Program is established correctly, the Project Quality Assurance Manager will immediately review the contract documents that specify the requirements, the specific conditions, and the scope of work. When the review is complete, the Project Quality Assurance Manager develops the plan for accomplishing and controlling the activities affecting quality. The development of this plan will precede the activity to be controlled, to assure coordination and implementation of the plan. | 6 | 6 | 6

Accordingly, the Project Quality Assurance Manager is responsible for the coordination and implementation of the UE&C QA Program with other operating groups within UE&C, as well as with the QA activities of the Client, and NSSS Contractors. Implementation of the QA Program is in accordance with a network of procedures which interface various organizations. On Construction Management or Construction projects, close coordination is maintained with the Planning and Scheduling Department which provides planning and monitoring techniques over the duration of the project by combining Critical Path Method techniques with computerized programs. The Project Quality Assurance Manager and the Field Superintendent QA are guided by this project management control tool to assure implementation and control of specific activities as they proceed. | 6 | 6

Activities affecting quality initiated prior to the submittal of the Preliminary Safety Analysis Report (PSAR), such as design, procurement, and safety-related site preparation activities, as applicable, will be controlled by the QA Program described in this report.

17.1.2.4 Program Documentation

The posture, philosophy, and practices of the R&QA Department for work on nuclear power plants are documented in the Corporate Standards Quality Assurance Manual. R&QA practices for work on components covered by the ASME Boiler and Pressure Vessel Code, Section III, are described in the Department's Nuclear QA Manual. Both of these Manuals have a controlled distribution to responsible personnel and organizations who are instructed by the management statement contained in the Manuals to implement and comply with the QA Manuals.

In addition, each project has a set of QA Procedures which make up the Project QA Manual. This Project QA Manual provides more specific detail relative to the scope of work contracted, and it complements the Corporate Standards Quality Assurance Manual and the Nuclear QA Manual. The Manager of R&QA is responsible for defining the content and changes, as well as for the final review and approval of each QA Manual. Changes to these three QA Manuals are coordinated for the Manager of R&QA by the Quality Systems group with each change, regardless of Manual type, utilizing a controlled distribution similar to the original issues of each Manual. | 6

Appendix II, of this report, identifies and lists by number, title, and description the Corporate QA Standards; Nuclear QA Manual Procedures; a typical set of Project QA Procedures; and, a Matrix of UE&C's QA Program. Each of these individual documents will be used to implement the QA Program. Accordingly, implementation will be assured and coordinated by the Project Quality **Assurance Manager with the endorsement of UE&C Management.** | 6

17.1.2.5 Program Training

Education and training courses, including indoctrination, are established by UE&C to provide instructions to UE&C personnel performing activities affecting quality. Instructions will be provided by Engineering, Construction, or Quality Assurance, and documented. Courses are presented to new employees shortly after their hire date, or date of transfer to duties affecting quality, to assure the employees are trained in the principles and techniques of the activity being performed. Personnel responsible for quality related activities are instructed as to the purpose, scope and method of implementing the Corporate Standards Quality Assurance Manual, the Nuclear QA Manual, and the Project QA Procedures.

Specialized QA training courses, and certification when applicable, for detailed studies in specific areas, such as nondestructive examination (NDE), and auditing, are developed and presented based on evidence of need as recognized by management or a requirement of the contract. Specialized training is provided to NDE, Vendor Surveillance, Audit, Site QC, and other personnel as applicable and as described in the Corporate Standards Quality Assurance Manual and Project QA Procedures.

Personnel performing specialized functions such as NDE, Audits, and examinations, inspections, and tests are experienced, trained, examined, and certified to appropriate levels of performance in accordance with approved procedures responsive to Regulations and Standards such as Regulatory Guide 1.58, ANSI 45.2.23, ASNT Recommended Practices, and ASME Section III, Division 2.

Records are maintained for all education and training courses presented. These records include, as a minimum, the date presented, the names of attendees, subject of the course material, and reason for the presentation.

In order to assure that suitable proficiency is achieved and maintained, the courses are updated and revised to accommodate advances in the state of the art and changes in governing specifications.

Indoctrination and training is further assured by formal scheduled classroom presentations. Specialized courses may be presented in the classroom, shop, or in the form of on the job training toward a specific discipline depending on the proficiency level desired.

A record of the educational status of each individual engaged in QA activities is maintained current and on file.

17.1.2.6 Management Qualification

All positions responsible for assuring effective implementation of the QA Program within the R&QA Department are established and documented in the form of Position Descriptions. Each description displays the position, education and experience prerequisites, the scope of performance and authority, and a listing of duties and accountable responsibilities for that position.

Based on the premise that the Manager of R&QA is the highest corporate manager involved on a continuing full time basis in QA matters, and is primarily authorized and responsible for effecting the QA Program, only this Manager's position qualification requirements are displayed in this report. They are:

Education - A graduate engineer with a professional registration or eligible and capable of being registered.

Experience - A minimum of ten (10) years of QA experience in the nuclear, heavy construction or heavy equipment industries. These requirements may be reduced to a minimum of five years direct QA experience by:

(a) One year for each year of direct experience within the UE&C R&QA Department.

(b) One year for each year of direct experience in QA and Control on a nuclear power project.

(c) One year for each year of direct experience in nuclear power plant design engineering.

(d) One half year for each year of direct experience in nuclear power plant construction supervision or job engineering.

17.1.2.7 Controlled Conditions

Activities affecting quality are accomplished under suitably controlled conditions including use of appropriate equipment, environment, and compliance with necessary prerequisites for the given activity.

Some measures assuring suitably controlled conditions are test equipment control, control of special processes, inspections, and audits. These and other measures are described in various sections of this report.

17.1.2.8 Management Review

Management reviews are conducted to assure an independent assessment of the adequacy in scope, implementation, and effectiveness of the QA Program. Utilization of management personnel outside the QA organization assures achieving an objective program assessment.

These reviews occur no less than once a year, and are executed by a UE&C team designated by the Vice President of Project Support Operations or an external, contracted organization. When accomplished internally by UE&C, members of the team typically will be from the Power Division, and the Construction Division. The team members are middle management and senior engineering level individuals, and may include Project Managers, Project Engineering Managers, Division Section Managers, and Chief Discipline Engineers. Each review is performed in accordance with a documented checklist, and all observations and findings are documented and reviewed by the Manager of R&QA and the Vice President of Project Support Operations. When and where weaknesses or deficiencies are identified in the QA Program, a reassessment of the program is exercised to determine, plan, and effect positive corrective measures.

UE&C subcontractors who perform work on nuclear or safety-related items are required to submit their QA Program Plan for R&QA review and formal concurrence. This provides for assuring a specific understanding of the requirements, and enables an agreement to be reached and documented relative to the QA Program which the subcontractor must implement. After the subcontractor's QA Program is in operation, R&QA will conduct planned audits of the QA activities. R&QA audit practices are described later in this report.

17.1.3 Design Control

17.1.3.1 Design Requirements

Applicable Regulatory requirements and design bases for safety-related structures, systems, and components are translated into specifications, drawings, procedures, and instructions. Measures which assure correct translation of the requirements are documented in QA Procedures and General Engineering and Design Procedures (GEDP's). The GEDP's establish provisions for the preparation, review, and approval of engineering documents including the Systems Design Description and Structural Design Criteria. QA Engineers provide an in-series review and approval of engineering documents to further assure that applicable Regulatory requirements are included and that other required reviews of the translation of design bases have been accomplished.

Verification for inclusion of appropriate quality standards in design documents by the QA Engineer is performed using a check list during the review of engineering documents. This verification provides assurance that design characteristics can be controlled, inspected, and tested;

and, it also assures the identification of inspection and test acceptance criteria in design documents.

Where an engineering document or a portion thereof is intended to be a replication of a previously approved engineering document employed on another project, it is the responsibility of the preparer and reviewer of the replicate document to assure that replication is technically appropriate and has been satisfactorily accomplished. Their signatures on the replicate document attest to this determination.

17.1.3.2 Materials Selection

A review and selection for application suitability is conducted for materials, parts, equipment, and processes essential to safety-related functions of the structures, systems, and components. Provisions which assure the review and selection are described in QA Procedures and GEDP's. A design verification record provides a guideline check list that assists the QA Engineer to assure this aspect of the design effort. The review and selection includes the use of valid industry standards and specifications, material and prototype testing, and design reviews.

Accordingly, this practice also applies to the application, review, and selection of standard commerical material, parts, and equipment.

17.1.3.3 Analyses, Compatibility, and Accessibility

During various stages of design effort, Project Engineering executes studies, calculations, and analyses such as reactor physics; stress, thermal, hydraulic, and accident analyses, to substantiate and prove the design related theories and hypotheses. Design control measures are incorporated in QA Procedures to assure studies, calculations, and analyses are performed in accordance with established techniques and methods. Measures include review and approval of design documents, as well as a QA audit of the design activities that result in completed studies, calculations, and analyses.

Compatibility of materials, parts, equipment, and processes is considered and satisfied during the materials review and selection as previously mentioned in 17.1.3.2.

Accessibility is specified in the System Design Description and the Structural Design Criteria which identifies space requirements for contact and remote maintenance, in-service inspection, and repair, along with shielding requirements and maximum allowable radiation levels in the various areas of concern.

Acceptance criteria for inspections and tests are derived from detailed information in both the System Design Description and the Structural Design Criteria. Review and approval authority by the QA Engineer provides assurance that the acceptance criteria are clearly delineated.

17.1.3.4 Design Verification

Adequacy and correctness of design is assured through design verifications performed at the project level, utilizing the alternate calculational method, design reviews, or qualification testing which provides for conservatism under adverse design conditions. Each project level design verification is performed by an independent design verifier (not the designer's supervisor) who is a technically competent individual not directly involved in the design task under verification review.

Early in the project, Project Management prepares a Design Review Master List of the structures, systems and components that are to be subjected to a Chief Discipline Engineer Management Level Design Review. When employed, these supplemental Design Reviews provide a selective overview of engineering practice to assure good technical quality, consistency with company and client policy and requirements, and compliance with applicable regulations.

When errors and deficiencies that adversely affect safety-related structures, systems and components are discovered in the review process, the errors and deficiencies are documented and corrective action initiated.

17.1.3.5 Interface Control

Internal and external design interfaces between participating design organizations are identified, coordinated, and controlled in accordance with established documented procedures. Early in the project definition phase, the Project Engineering Manager identifies organizational responsibilities, both internal and external, for all major structures, systems and subsystems, and their interfaces. Interface data and time constraints are used to develop a time frame of interfacing events which is included in critical path method logic diagrams. Provisions for coordination and control of interfaces are established by the preparation of the interface events lists. To some extent the activity at the external design interface will depend on the scope of work assigned to each of various major participants by the Applicant, and the extent of interface will be covered in the Applicants portion of the PSAR-Chapter 17.

The interface events list provides documentation of the interfaces, or means of scheduling the interfaces, communications within these interfaces and related information, and a monitoring technique of the predicted and actual interface event occurrence dates.

The measures in effect between participating design organizations for review, approval, release, distribution, collection, and storage of documents involving design interfaces and changes are controlled within the document control system described in 17.1.6.1.

To prevent inadvertent use of superseded design information, design documents are controlled in a timely manner by utilization of the Document Control Center, which functions in accordance with a documented procedure. The center is established to assure that all work is performed using the latest issue of a document. Accordingly, the center provides for the controlled distribution, recording and recall of documents, including retrieval of a document on request.

17.1.3.6 Design Change

All design changes, including field changes, are treated the same as the original design effort unless the originating organization specifically designates another responsible organization.

In order to assure design changes, including field changes, are subject to the same design controls applied to the original design, the QA Engineer is in the review and approval cycle for the design change or field change effort.

17.1.4 Procurement Document Control

17.1.4.1 Specifying Requirements

UE&C has established Quality Assurance Procedures, General Engineering Design Procedures, and Procurement Department Procedures which require that procurement documents, covering nuclear and safety-related material, equipment including spare parts, and services purchased by UE&C, UE&C contractors, or sub-contractors, correctly include or reference information necessary to achieve the required quality. These procedures also require that changes or revisions to procurement documents be subject to the same review, approval, and distribution requirements as the original documents. | 6

As described in Design Control 17.1.3, UE&C specifications and drawings receive detailed review and approval prior to issue. Procurement documents reference these specifications and drawings as the technical basis of procurement. Quality requirements that apply specifically to an item or system are included in the specifications and drawings. Applicable Regulatory, Code, and design requirements are contained in these documents.

General and specific technical requirements and QA Program requirements are specified in a series of Standards which are selectively included in the procurement documents by reference and attachment. Selection is made jointly by the Engineering Department and the R&QA Department. These Standards include requirements such as the supplier's preparation and submittal, for UE&C review or approval, QA Plans, specifications; drawings; procedures; instructions; inspection, test and QA records. Control, maintenance, and retention requirements for the QA records generated by the supplier are also specified.

UE&C's right of access to a supplier's facilities for in-process inspection, vendor surveillance, and QA audit of the purchased material is established by standard attachment to the purchase document.

Accordingly, standards require suppliers to establish procedures for the reporting and dispositioning of nonconformances from procurement document requirements. Suppliers must obtain UE&C approval of any deviations from procurement document requirements. Supplier deviation requests and major repair procedures are handled in accordance with the provisions of documented QA procedures and GEDP's.

17.1.4.2 Review and Approval

Control responsibilities are delineated in established procedures in accordance with QA Program requirements for the preparation, review, approval, and issuance of procurement documents; and, the sequence of actions to be taken by competent responsible personnel is defined. All required document reviews and approvals are documented and retained on file.

Suggested Bidder Lists and Buy Requisitions for Home Office Purchase Orders or Contracts are reviewed, approved, and signed by the Supervising Discipline Engineer, the Project Engineering Manager, and the QA Engineer. After Bids are obtained, Purchase Orders are then prepared, and placed, from the approved Buy Requisition.

It is important to note that the Procurement Department cannot waive or change any Engineering or QA requirement of a procurement document without prior written approval of Engineering and R&QA. | 6

As mentioned previously, the UE&C Procurement Procedures require that changes or revisions to procurement documents are subject to the same review and approval requirements as the original documents. As with original issues, all reviews and approvals are documented and retained.

17.1.4.3 Contractor and Subcontractor Survey

Qualified R&QA personnel review the procurement documents for adequacy of quality requirements stated. The review assures that the quality requirements are correctly stated, inspectable, and controllable, and that acceptance criteria are specified and identify beyond what point corrective action must be taken.

Evaluation of potential suppliers' capabilities of meeting the procurement requirements is initiated through the R&QA review of the Suggested Bidder List. Prior to contract award, potential bidders for whom UE&C does not have an adequate past history or current quality record to make a valid determination are evaluated through an audit of their facilities and QA Program. Engineering personnel may be involved in the survey to review technical capabilities as related to the procurement requirements. Bidders

evaluated as unacceptable to R&QA are deleted from the list, and the remaining list containing only potentially acceptable bidders is approved by R&QA.

Pre-award meetings are held with potentially acceptable bidders to, among other things, assure that the specified quality requirements are clearly defined and understood by the potential supplier, and to further assure that the supplier can meet the procurement requirements.

The same procedures and procurement documentation are used in the purchase of spare or replacement items. This includes the same reviews and approvals used when procuring the original equipment.

When UE&C is Construction Manager or Constructor, field purchases of safety-related items are executed utilizing procedures which parallel those outlined above. However, requisitions are initiated by UE&C craft supervision. Suggested Bidder Lists and requisitions must be reviewed and approved by the Field Superintendent QA and the Resident-Construction Manager. | 6

Evaluation and selection of suppliers is performed by the Field Purchasing Agent, Field Superintendent QA, Resident Construction Manager, and the UE&C Craft Supervisor. Each participate in a pre-award meeting, as appropriate, with the selected supplier to resolve all quality questions. The Field Purchasing Agent then issues the purchase order. | 6

Any changes or revisions to a purchase order initiated in the field are subject to the same review, approval, and distribution requirements as the original order.

17.1.5 Instructions, Procedures, and Drawings

17.1.5.1 Descriptive Documentation

UE&C controls quality related activities of design, procurement, and construction through a network of drawings, instructions, and procedures which define the methods for complying with each of the 18 Criteria of 10CFR50, Appendix B, and the authority and responsibilities of the personnel and organizations engaged in the activities. Accordingly, established procedures clearly delineate the sequence of actions in preparing, reviewing, and controlling instructions, procedures, and drawings.

The overall QA Program for UE&C, documented in the Corporate Standards Quality Assurance Manual, is transmitted to all departments by Memorandum from UE&C's President requiring that all employees adhere to the provisions of the Manual. This QA Manual translates the requirements of the 18 Criteria of 10CFR50 into specific duties for applicable UE&C employees. The Manual consists of eighteen Sections, each based on one of the eighteen criteria. Figure 1, Appendix II displays the Corporate Standards Quality Assurance Manual Table of Contents. The Manual identifies, for each

criteria as required, the specific documents to be generated and maintained as visible evidence of the control of quality.

The Corporate Standards Quality Assurance Manual serves as the basis for preparing the Project QA Procedures which respond to the conditions set by contract with each Client. These Project QA Procedures are expanded by Quality Control Procedures, as required, for use at the construction site by the Field Superintendent QA as his instructions and procedures for inspection, witnessing and surveillance of the procurement, manufacturing, construction, and installation. Project QA procedures also identify specific records required for permanent visible evidence of quality control. When UE&C is Construction Manager or Constructor, the Resident Construction Manager will issue Field Procedures subject to review and attachment of a QC check list by the Field Superintendent QA. These Procedures are issued to prescribe responsibilities and duties for quality work in specified areas. | 6 | 6 | 6

Design activities, as described earlier in this report in 17.1.3, are controlled in accordance with a series of General Engineering and Design Procedures (GEDP's). GEDP's are prepared by a staff of Chief Engineers, and cover the following categories:

(a) The Administration of Design Activities

(b) The Standard Engineering and Design of Systems and Subsystems

(c) Task Level Engineering and Design covering operations such as Analyses, Calculations, and Studies.

These procedures establish that acceptable Engineering and Design practices are routinely followed, and that deviations are controlled and documented.

A Construction Manual contains the Corporate Construction Division Standard Guideline Procedures describing administrative and installation activities for safety-related material, equipment, and services. These Corporate Procedures will be adapted, and augmented by Project Site Procedures developed for those activities unique to the individual project.

17.1.5.2 Tolerances and Acceptance Criteria

Quality Control Procedures state either specific quantitative and qualitative acceptance criteria, or reference the governing specification which prescribes the acceptance criteria for determining that important activities are satisfactorily accomplished.

17.1.6 Document Control

17.1.6.1 Issuance

Procedures are established to control the issuance of approved documents such as specifications, drawings, procedures, and instructions which

prescribe activities affecting quality. The issuance of changes and revisions to these documents is controlled in the same manner as the original issue.

As described previously under Design Control 17.1.3 and Instructions, Procedures, and Drawings 17.1.5, prior to release, specifications, drawings, procedures, and instructions are reviewed for accuracy and adequacy, and approved by qualified personnel not having direct responsibility for their preparation. Personnel authorized to perform the review and approval of the various documents are specified by procedure; and, all reviews and approvals are documented and retained. The cover page of specifications, procedures, and instructions, and the title block on drawings provide space for the approval signature of the authorized personnel.

Document distribution is established for each project by Project Management. Procedures specify the documents to be distributed, department of issue, and personnel or organization to whom distributed, including number of copies. Documents are promptly issued and distributed on a transmittal basis, with acknowledgement required from the Constructor. Copies are issued to recipients listed on the document distribution schedules to assure their availability at all locations where the prescribed activity will be performed, and before the start of that activity. A revision status of documents is issued periodically to recipients.

When it is determined that an activity requires a procedure describing the activities and personnel responsibilities, that activity is not permitted to start before the procedure is developed, approved, and distributed. Adherence to this requirement is checked through surveillance and audits by R&QA personnel.

Approved changes are promptly included in instructions, procedures, drawings, or other documents associated with the change. Approved revisions and changes to these documents are distributed in a timely manner to those listed on the Document Distribution Schedule. Master documents are distributed and updated by the Document Control Center in accordance with the need to provide the latest issue information to the recipients and users of the listed documents. Master lists are available for various documents including System Design Descriptions, quality procedures, foreign (vendor) prints, engineering and purchasing schedule (including specification and purchase order status), construction procedure lists (including test procedures), drawings, and specifications. A System Design Description master list, as an example, may be updated monthly in the early stages of a project and then annually toward project completion; and a drawing master list may be updated monthly continuously throughout the project.

Document holders are required to identify and destroy or segregate superseded documents upon receipt of the master document list or revision to documents. When superseded documents are not destroyed, they must be marked VOID. Voided documents, after proper identification and segregation, may be retained for record or reference purposes.

Document revisions and changes are reviewed and approved by the preparing organization or department which performed the original review and approval. Should another responsible organization be delegated to perform this function for the document originator, controls equivalent to those described above will be performed by the other responsible organization. Reviewers are given full access to the background information utilized in the development of the documents under review.

17.1.6.2 Type Identity

Documents which prescribe the activities affecting quality will be controlled. The procedures which describe the preparation and use of documents list the type or name of each, the individuals responsible for review, or review and approval, and the department responsible for their issue. Documents that are controlled under this subsection are identified in 17.1.17.

17.1.7 Control of Purchased Material, Equipment, and Services

17.1.7.1 Subcontractor Selection and Control

Items and services used in the design and construction of nuclear power plants, by UE&C, are purchased from vendors authorized by a UE&C Approved Vendors List. The list is reviewed and maintained current by R&QA. Vendors not on the list may be used based on either their presence on the current ASME Authorized Manufacturers Listing, or through a Facility Survey initiated by the QA Engineer, and performed under the direction of the Audit Group.

Purchases are initiated as a result of Purchase Specifications written by the Responsible Engineer, and approved by the QA Engineer. The QA Engineer's approval establishes assurance that applicable quality requirements are stated in the purchase documents. Purchase Inquiries are placed with various Bidders chosen from the Approved Vendor List; and, subsequently, Purchase Orders are awarded after mutual agreement is reached by Procurement, the Responsible Engineer, and the QA Engineer. | 6

Approved vendors are required to submit applicable Quality Assurance Procedures for review and approval by the QA Engineer. Approval is withheld from vendors not exercising suitable controls over their major subtier vendors.

After placement of Purchase Orders, surveillance by the Vendor Surveillance Group at the vendors' facility is performed to an extent commensurate with the items' functional importance to the safe operation of the power plant system, the complexity or uniqueness of the item, and the degree to which inspection or test of the item will demonstrate functional operation. The Vendor Surveillance Check Plan, originated by the QA Engineer and approved by the Responsible Engineer, identifies fabrication, inspection, test or process check points to be observed by Vendor Surveillance and the Authorized Code Inspector to verify compliance with the quality requirements. Vendors must not proceed beyond these points without clearance from Engineering and R&QA. Before shipment to the construction site, purchased items are identified with a UE&C Quality Shipment Release. | 6

The Vendor Surveillance Check Plan also lists the documentation required to be submitted by the vendor to evidence the acceptability of the material and its conformance to specification requirements. As this documentation is generated, it is submitted for approval of UE&C and such approval is noted on the Vendor Surveillance Check Plan. The review and approval may be made at any point by R&QA personnel authorized by the procedure. This review and approval may be performed by the QA Engineer at the Home Office, by the Vendor Surveillance Representative at the vendor's facility, or by the Site QA Group at the Project Site. When UE&C does not have Construction or Construction Management responsibilities, these documents are reviewed and approved prior to shipment to the site. | 6

When UE&C is Construction Manager or Constructor, materials upon arrival at the site are subjected to Quality Control Receiving Inspection in accordance with a Receiving Inspection Check Plan which is prepared jointly by the Project QA Engineer and the Field QC Engineer for Receiving and Storage. This Check Plan in all cases includes a Data Review which requires a responsible Quality Control Engineer to attest on the record that required documentation is in the record and meets specified requirements.

Receiving inspection is performed in accordance with the following:

(a) The material, component, or equipment is properly identified and corresponds with the receiving documentation.

(b) Inspection of the material, component or equipment, and acceptance records is performed and judged acceptable in accordance with predetermined inspection instructions, prior to installation or use.

(c) Inspection records or certificates of conformance attesting to the acceptance of material, components, and equipment shall be available at the nuclear power plant prior to installation or use.

(d) Items accepted and released are identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work.

(e) Nonconforming items are segregated (where physically practical), controlled, and clearly identified until proper disposition is made.

The responsible QA Engineer checks the documentation to verify that the vendor has furnished at least the following records: | 6

(a) Certifications that specifically identify (e.g., by the purchase order number) the purchased material or equipment and the specific procurement requirements (codes, standards, and specifications) met by the items.

(b) Certifications that identify any procurement requirements which have not been met together with a description of those nonconformances dispositioned ACCEPT AS IS, or REPAIR.

Purchase documents require the vendor to maintain records of Certifications to provide visible evidence that Codes, Standards, and specification requirements are met. Accordingly, requirements that are not met must be documented by the vendor in accordance with 17.1.15. Specified non-permanent records are required to be submitted to the purchaser for retention at the construction site. The permanent records will be turned over to the Plant Owner.

17.1.7.2 Subcontractor Effectiveness Review

Quality requirements stated in the purchase documents are translated into check points on the Vendor Surveillance Check Plan. The extent, frequency, and detail of these check points is determined by the QA Engineer based on the criticality of the item, importance to safety, complexity and quantity of the item, and past history of the Vendor on current or previous orders. This activity is carried out by the Vendor Surveillance Group.

Periodic audits performed as described in 17.1.18 of this report provide assurance that this review is accomplished internally and that the Vendor is implementing his QA Program and Procedures at this facility.

17.1.8 Identification and Control of Materials, Parts, and Components

17.1.8.1 Prevent Defective Usage

The need for strict controls of material, parts, and components, and the related importance of material identification is recognized by UE&C as indispensable in the conduct of nuclear plant construction. To accomplish this, UE&C control begins with the purchase specifications which state applicable requirements for appropriate markings which will withstand

weathering and provide sufficient identification so that items, such as partially fabricated subassemblies, can be traced to their associated documentation, including drawings, specifications, purchase orders, manufacturing and inspection records, and mill test reports. Permanent markings are required to be of the low stress type that do not affect the function or quality of the item. When items are cut or otherwise separated, the identification is required to be transferred so all pieces are correctly and properly identified.

The QA Engineer, in his review of purchase documents and vendors QA Programs, assures that these requirements are imposed and implemented. These established provisions are then identified in the Vendor Surveillance Check Plan, and in the Receiving Inspection Check Plan. This ensures that items are identified as required, when received, and that the location and method of identification does not affect the function or quality of the items identified.

17.1.8.2 Maintenance, Traceability, and Verification

Materials, and equipment, are identified on site during Receiving Inspection, Storage, and Installation by tags which permit status identification of acceptability for installation or further processing. These identification tags are maintained throughout construction, in addition to the manufacturers traceability method required by purchase documents. The construction status tag system is controlled to preclude the use of incorrect or defective material in power plant systems. The tags are attached and removed by Quality Assurance personnel only, and the procedure is described in Section 17.1.14 of this report. | 6

17.1.9 Control of Special Processes

17.1.9.1 Qualified Personnel and Procedures

UE&C specifications require that special processes such as heat treating, welding, and nondestructive examinations are performed in accordance with established procedures and by appropriately qualified personnel.

Where required by Code or Regulation, the procedures and personnel are required to be previously qualified and certified. These procedures and certifications are required to be submitted to UE&C prior to initiating the covered activity for review and approval by Engineering and R&QA; except, site generated procedures, including special process procedures and operator qualifications will be reviewed by the Field Superintendent QA, and reviewed and approved by the Resident Construction Manager or Welding Supervisor at the site. | 6

Copies of approved procedures and certifications are maintained as part of the QA Record by UE&C and at the project site when such records are designated as permanent. UE&C site records are maintained as detailed in 17.1.9.3 and 17.1.17 of this report.

R&QA assures compliance with Codes, Standards, and specification requirements at subcontractors facilities, the UE&C home offices, and at the construction site through audits, surveillance, and inspections.

17.1.9.2 Current Qualification

Personnel qualifications and procedural qualifications are kept current in accordance with the established procedures mentioned in paragraph 17.1.9.1.

Qualifications of welders and welding procedures are in accordance with Section IX, as required by Section III, of the ASME Code. Personnel and procedures for performing or evaluating nondestructive examination are qualified to the appropriate level in accordance with the Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, Supplements and Appendices for the NDE method utilized. Qualifications or certifications may be extended or terminated based on the individual's performance capabilities. Extension or termination of qualification or certification will be in accordance with documented procedures.

Equipment qualifications are treated in this report under Control of Measuring and Test Equipment, 17.1.12.

17.1.9.3 Maintenance of Record Files

Records of welding procedures and welder performance qualification tests are documented and maintained at the construction site. The UE&C Test Examiner, NDE, who is a qualified Level III Examiner, maintains a file on each UE&C certified individual performing or evaluating NDE. These individual files for NDE include a certification form; resume of individuals' education and experience; results and grades of examinations, including general, specific, and practical, and a copy of written examinations; copy of results of eye examinations; and, a record of training programs attended.

Records are available for examination at the R&QA office or the construction site.

Measures which assure proper record maintenance are documented in procedures, and described in this report under QA Records 17.1.17.

17.1.10 Inspection

17.1.10.1 Establishment and Implementation

UE&C specifications require that suppliers, subcontractors, and constructor perform inspections, of the work accomplished, in accordance with instructions, procedures, and drawings approved prior to performing the inspection. These documents are handled as described in 17.1.5 of this report.

When UE&C acts as Constructor on a project, the inspection at the project site is conducted by the UE&C Field QA Group as described in 17.1.1 of this report. | 6

Field QA personnel are experienced, trained, tested, and certified for the function they perform in accordance with approved procedures responsive to the requirements of Regulatory Guide 1.58, and ASME Section III, Div. 2, as applicable. Qualifications and certifications of personnel are kept current. The organizational independence of this group from the groups performing the activities being inspected is described in 17.1.1 and depicted in Figure III of Appendix I of this report. | 6

A Fabrication Traveler and Process Check List is used to identify the step by step sequence of operations, and status records of operations, primarily for the control of UE&C fabrication welding at the job site. This check list is prepared jointly by the Welding Supervisor, Site QC Engineer Welding and NDE, and the Piping Craft Supervisor. The Site QC Engineer directs the verification activities of QC technicians/inspectors, affixes his signature to indicate his review and acceptance of all data (with final accept and reject authority), and coordinates all inspection points selected to be witnessed by the Authorized Inspector.

R&QA assures that inspection procedures, instructions, and check lists are available with necessary drawings and specifications for use prior to performing inspection operations by use of the Document Distribution Schedule and updated master document lists previously described in Section 17.1.6.1 of this report.

Further assurance is provided through surveillance and audits by R&QA.

Inspection and surveillance check lists are developed by the Field QA Group, and detail the inspections and surveillance points to be accomplished. These check lists are prepared for each construction procedure prepared and approved, and may include mandatory points beyond which the work may not proceed. Inspection and surveillance of continuous project activities such as concrete work, welding, and cable pulling, are detailed along with witness and hold points in project Quality Control Procedures. When direct inspection is not possible, indirect control will be practiced by monitoring processing methods, equipment, and personnel. Provisions for indirect control are established and described in 17.1.3, 17.1.7, 17.1.9, 17.1.11 and 17.1.12. | 6

Construction Procedures, check lists, drawings, and specifications are controlled documents, and control and distribution measures for these are described in 17.1.6 of this report.

Items that require rework or replacement are identified on nonconformance reports as described in 17.1.15 of this report. The replacement or rework is subject to at least the same inspection or surveillance originally performed.

When UE&C is the Architect-Engineer, similar requirements for inspection are a part of the specifications as described throughout this report. Assurance of implementation of these requirements is provided by the vendors and contractors Vendor Surveillance as described in 17.1.7. Audits of external activities of vendors and contractors under contract to UE&C are performed by the Audit Group as described in 17.1.18 of this report.

When UE&C is the Construction Manager, but not Constructor, the UE&C Field QA Group provides surveillance of site contractor inspection activity. The extent of surveillance is described in QA check lists and Field QC Procedures based on specification requirements, approved contractor QC Procedures, and the criticality and complexity of the activity. | 6

17.1.10.2 Hold Points

In cases where UE&C is involved directly in an area, mandatory inspection or surveillance points are designated specifically by the Applicant or his designated representative. These points will be noted on the appropriate check plan or list. In those instances when it is not feasible to perform the planned inspection, test, or surveillance, the hold point may be bypassed when authorized by the Field Superintendent QA only where the intended verification can be performed at a designated future time or where a permanent waiver is approved by the originator of the required hold point. Accordingly, a hold point that is bypassed will be controlled and treated as a nonconformance for the purposes of follow-up as described in 17.1.15 of this report. | 6

17.1.11 Test Control

17.1.11.1 Program Establishment

Required tests are identified, for safety-related systems designed and constructed by UE&C, by the Power Engineering Division. The test requirements are identified and documented in the System Design Description (SDD).

The SDD identifies the level of quality assurance and the Codes and Standards applied to the system and components from design through construction; as well as the testing needed to demonstrate that structures, systems, and components will perform satisfactorily in service.

Specifications require testing to be conducted by trained or appropriately qualified personnel using written test procedures which incorporate or reference the requirements and acceptance limits contained in the SDD. The acceptance limits define beyond or outside of what points corrective action must be taken.

Tests identified in the SDD include testing that is performed during construction.

Detailed requirements for the testing of each system are prepared by Engineering, using as a basis the technical data contained in the applicable SDD. These requirements are the basis for Start-Up Procedures for the performance and evaluation of individual tests. These specialized test requirements establish the details for prerequisite requirements, verifying instrumentation and test equipment, environmental conditions, and test methods. They also, either by direct statement or by reference to applicable Codes or Standards, establish that properly qualified personnel will conduct and evaluate the test.

17.1.11.2 Program Review

Preoperational testing performed on the construction site is governed by Start-Up Procedures prepared by the Construction Division Start-Up and Test Engineering Group. The Start-Up Procedures provide for the smooth transition from installation to preoperational testing by establishing a program for organizing, performing, witnessing, documenting, evaluating, identifying and resolving nonconformances, and controlling equipment, for the test program. It also establishes the general requirements for training and qualifications of personnel engaged in the test program. The Start-Up Procedures are approved by Engineering and R&QA, and transmitted and controlled as described in 17.1.6.

The UE&C construction test program is subject to surveillance and inspection by the Field QA Group as follows: | 6

(a) Assure that construction work has been satisfactorily completed and documented.

(b) Test procedures are reviewed and approved based on the following: test objectives, method of test (including test equipment and instrumentation), limits of acceptability, Regulatory requirements, data recording forms, identification of witness or hold points, and environmental conditions.

(c) Surveillance of test preparations to assure instruments are calibrated, and that approved procedures and Data Recording Forms are being used.

(d) Participating in tests as required to witness at pre-established hold points, (and as described in 17.1.10.2 of this report), and to monitor at random.

17.1.11.3 Evaluation of Test Results

The testing procedures specify and identify the test results that must be documented. To assure that test requirements are satisfied, Field QA personnel: | 6

(a) Monitor the recording of data, review and approve completed Data Sheets, and distribute and maintain the file of Test Reports and Data Sheets.

(b) Monitor the recording of test deficiencies, approve their disposition, monitor their repair or rework, and sign off the completed report.

(c) Evaluate, along with Project Engineering, the final test result by review of Test Reports and Data Sheets.

Where UE&C is not the Constructor and does not have responsibility for Start-Up and Test, the UE&C contract specifications will require the responsible organization to prepare and conduct a program similar to that described above, including stated reviews and approvals. The implementation of the program is subject to planned surveillance by the UE&C Field QA Group when UE&C is Construction Manager.

17.1.12 Control of Measuring and Test Equipment

17.1.12.1 Identification and Control

As a Constructor UE&C maintains a calibration system using documented procedures to assure that tools, gages, instruments, and other measuring and test devices, used for the purposes of acceptance measurement in activities affecting quality, are properly identified, controlled, adjusted, and calibrated at specified periods to maintain accuracy within necessary limits. These specified periods or calibration intervals are determined after considering the required accuracy, purpose, degree of usage, stability characteristics, as well as other conditions and variables affecting measurement capabilities.

Provisions are established in procedures to assure only tools, gages, instruments, or other measuring devices permitted for use in measuring for acceptability to drawing and specification requirements are those included in the calibration system. Tools, gages, instruments, and other measuring devices used for the purpose of acceptance measurements, are visibly identified by a label attached showing the assigned serial number which is traceable to a Calibration Record Card, the date of the last calibration, and the due date for the next calibration.

A Gage Facility is maintained by the Construction Division, at the site, and subject to surveillance and inspection by the Field QA Group to assure the proper control of measuring and test equipment in accordance with the QA Program. | 6

17.1.12.2 Traceability of Standards

Schedules are issued and distributed with recall procedure for each device showing the span of time permitted to elapse between calibrations. For each device the Calibration Record Card, maintained current at the Gage Facility, shows the serial number, tool description, person or department who maintains custody, location where used, and the complete record of calibrations including the name or initials of the calibrator.

Tools, gages, instruments, and other measuring devices are calibrated at the site Gage Facility in accordance with the QA Program, QA Project Procedures, and the Manufacturers instructions. Calibrations are performed when possible using Primary or Secondary Standards maintained at the Gage Facility. Certification data to support the Standards are also on file at the facility. Calibrations may also be performed against Standards other than Primary or Secondary using certified equipment, or reference or transfer standards having known relationship to nationally recognized Standards. In situations where no National Standards exist, the basis for calibration is recorded on the Calibration Record Card. Except when limited by the state of the art, calibration standards have an uncertainty requirement of no more than 1/4th of the tolerance of electrical equipment being calibrated and 1/10th of the tolerance for all other equipment.

17.1.12.3 Out of Calibration Conditions

A device found to be out of adjustment beyond its certified accuracy is adjusted or returned to the manufacturer for repair or replacement. The Field Superintendent QA is notified of these cases, and he conducts an investigation to determine the applications of the device during the last calibration cycle and evaluates the validity of related previous inspection or test results. | 6

The Field Superintendent QA decides whether there is need for corrective action; and when necessary, arranges to repeat original inspections or tests of the suspected operations using calibrated equipment. If this is not possible, Nonconformance Reports are written for apparent nonconformances, and they are resolved by the Nonconformance Review Board in accordance with approved procedures as described later in 17.1.15 of this report. | 6

17.1.12.4 Maintenance of Records

The Calibration Record Card identified in 17.1.12.1 is maintained in accordance with established procedures. Provisions for maintenance of records are described in Section 17.1.17 of this report.

Where UE&C is the Architect Engineer, contract and purchase specifications require suppliers to provide and implement a similar program subject to review and approval by Engineering and R&QA.

17.1.13 Handling, Storage, and Shipping

17.1.13.1 Requirements

UE&C, as Architect Engineer, specifies special provisions to be employed in the handling, storage, and shipping of materials and equipment. These provisions are basically those recommended by the manufacturer in addition to any extraordinary requ rements needed for maintenance of quality due to unusual site environmental conditions, such as extended storage time or criticality of the item.

Accordingly, UE&C suppliers and contractors are required by specification to provide procedures for approval by UE&C describing their methods of satisfying these requirements. Implementation of these procedures is subjected to surveillance by the Vendor Surveillance Group, the Audit Group, or the Field QA Group. | 6

17.1.13.2 Control

When UE&C is Construction Manager or Constructor, Construction Procedures and Field QC Procedures are developed and implemented responsive to specification requirements and manufacturers' recommendations for storage and handling of materials and equipment at the project site.

Four general storage conditions will be available; (1) Inside with full environmental control, (2) Inside with temperature control, (3) Inside without environmental control, (4) Outside.

Each item received is assigned to a general storage area. The Field QA Group periodically monitors the storage areas to assure that storage conditions are maintained, and special logs are kept for items under special storage such as those under inert gas atmosphere, moisture protection, and special temperature conditions. Where storage maintenance is required such as rotating shafts, meggering electrical equipment, and changing desiccants; this maintenance is performed in accordance with instructions or procedures by the construction personnel, and subject to surveillance by the Field QA Group. | 6 | 6

Site transportation of major equipment is performed in accordance with previously prepared and approved construction procedures; and, implementation of those procedures is assured by the Field QA Group in accordance with QC Procedures using predetermined surveillances and inspections. Where site contractors and subcontractors other than UE&C perform this work, it is in accordance with approved procedures requiring | 6

inspection and surveillance, and subject to surveillance by the UE&C Field QA Group. | 6

17.1.14 Inspection, Test, and Operating Status

17.1.14.1 Continuous Status

As Constructor, UE&C employs a tagging system to denote the inspection and test status of equipment. Throughout the entire construction phase, equipment is required to have a tag or construction traveler type of identification. Lack of a tag or traveler requires Field QA approval prior to starting or continuing work. Absence of a tag or other required status identification is the same as a HOLD on the item. | 6

Several basic tags are used during receipt, storage, and construction.

(1) Hold Tag - do not work on or use

(2) Release for Construction - satisfactory to proceed

(3) Limited Work Authorization - satisfactory to proceed only to a predetermined point

(4) Reject -

Other tags or variations to those listed above may be employed to further denote and define status during construction.

These tags are applied and removed only by the Field QA Group. | 6

Where construction traveler type of status identification is employed, fabrication steps and inspection and test points are sequential, and bypassing of steps is not permitted.

At the completion of construction activity including construction testing, a review of the previously required activity and documentation is conducted by the Field QA Group. If satisfactory, the item or items are released from construction for preoperational and operational testing, and appropriately tagged. | 6

During preoperational and operational testing, a tagging system is employed as described in the start-up program and procedures. These tags denote the boundaries of tests and the status of the start-up program. Status identification is subject to surveillance and witnessing by the Field QA Group as described in 17.1.11 of this report. | 6

Use of the tagging and identification system precludes the bypassing of tests and inspections, and the inadvertent use of uninspected or unacceptable items.

17.1.14.2 Requirements

When UE&C is the Architect Engineer, requirements for a program responsive to Regulatory requirements are contained in specifications prepared by UE&C. These requirements are imposed on contractors and suppliers. Implementation is assured by surveillance and auditing conducted by appropriate R&QA groups of UE&C contractors and suppliers.

Procedures responsive to these requirements are required to be submitted to UE&C for review and approval by Engineering and R&QA.

17.1.15 Nonconforming Materials, Parts, or Components

17.1.15.1 Control

As Constructor, UE&C establishes measures in documented procedures to provide for control of nonconforming materials, parts, and components in order to prevent their inadvertent use or installation. When nonconformances are observed during inspection, surveillance, and test, and when reported by other sources, Field Quality Assurance personnel initiate Nonconformance Reports (NCR) including notification to affected organizations. An NCR will display pertinent information including identification of the nonconforming item; description of the nonconformance; the disposition of the nonconformance; the inspection requirements; and the signature approval covering the disposition and corrective action assigned. | 6

Accordingly, the Field QA Group applies appropriate tags identifying the nonconforming items to enable status identification and traceability to applicable documentation. | 6

17.1.15.2 Verification

NCR's are reviewed and verified by the Field Superintendent QA or his designee before issue, and are then distributed to the Responsible Engineer, the QA Engineer, the Applicants QA Representative, the Applicants Project Manager, the Resident Construction Manager, the Authorized Code Inspector, if applicable and the Nonconformance Review Board (NRB). Procurement is included in the distribution if the nonconformance discovered is a result of a vendor deficiency. | 6 | 6

The NRB provides for independent review and disposition of NCR's. The make up of the NRB is subject to the approval of participating organizations, but in all cases includes a representative of the Field QA Group. The disposition requires unanimous decision of all NRB members. | 6

When repair or rework is required, the repair or rework is performed using written instructions. These operations are monitored, reinspected, and approved or rejected for cause by the Field QA Group. | 6

17.1.15.3 Segregation

When NCR's are initiated, HOLD tags are applied to the nonconforming units, and when practical the unit is moved to a segregated area. When impractical to move the unit, the HOLD tag is sufficient to indicate segregation. Work does not proceed on nonconforming items while they are in HOLD status. Changes in status during the resolution of the NCR require a corresponding change in the applied tag. When the disposition is REJECT, the item is appropriately tagged, and removed from the work area.

17.1.15.4 Requirements

As Architect Engineer, UE&C procurement and contract documents require suppliers and contractors provide and implement a program similar to that described above, and responsive to Regulatory and Code requirements. Procedures are required to be developed and submitted to UE&C for review and approval by Engineering and R&QA.

Surveillance of the implementation of these activities at vendor facilities is conducted by the Vendor Surveillance Group as described in 17.1.7 of this report.

When UE&C is Construction Manager, but not Constructor, surveillance of the implementation of these activities at the project site is conducted by the UE&C Field QA Group.

17.1.15.5 Documented Reports

UE&C procurement documents require that nonconformances which are dispositioned USE AS IS or REPAIR, and deviations when discovered in the vendor's plant, are reported to UE&C. Copies of these NCR's, including Certificates of Conformance noting the completed NCR, are forwarded to the construction site to be included as part of the permanent QA record for the purchase order. | 6

Each site NCR is reviewed by QA to assure that it has been properly dispositioned. When applicable, the corrective action is described on the NCR, and implemented as described in Section 17.1.16 of this report. Periodically, NCR's are reviewed to seek out trends that may indicate the need for further corrective action. Reports of these reviews are transmitted to the Project Manager, the Resident Construction Manager and the Manager of R&QA. | 6 | 6

A monthly report of open site NCR's is prepared by Field QA, and distributed to appropriate management. The report lists the NCR, a brief description of the deficiency, the responsible parties, the estimated date of closing the NCR, and the disposition. | 6

17.1.16 Corrective Action

17.1.16.1 Identification and Correction

Documented procedures and practices have been established which assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified, documented, and corrected.

Procedures for identifying and documenting for corrections, conditions adverse to quality in the design, procurement, and construction phases of a project, are outlined under Section 17.1.15 of this report.

UE&C's specifications require suppliers and contractors to provide for the timely identification, documentation and correction of conditions adverse to quality in their QA Program. The supplier's corrective action sequence is reviewed for adequacy during supplier evaluation and selection. Compliance and effectiveness of these programs of UE&C suppliers' are checked throughout the life of the contract by R&QA Surveillance and Audit activities.

17.1.16.2 Prevention of Recurrences

Records of the Nonconformance Reports issued are maintained by the Suppliers, Site Contractors, Project QA Engineers, and Field Superintendents QA. These records are reviewed by their preparers to assess the significance and repetitiveness of the conditions adverse to quality. Trends are analyzed, and causes of significant quality problems are diagnosed. | 6

Corrective Action Requests (CAR's) are issued by R&QA personnel covering the recurring or significant quality problems determined from the above reviews and diagnoses. A detailed analysis of the underlying causes of the problem is performed by the CAR originator, and the recommended corrective action to preclude repetition is included in the CAR sent to the supervision of the activity which has responsibility assignment for the problem identified. The activity supervisor makes a further analysis of the causes of the problem, and as a result, accepts or modifies the recommendation made by the CAR originator. The activity supervisor then indicates when the corrective action will be implemented. The CAR originator verifies that implementation has been accomplished and evaluates its effectiveness. Copies of the CARs' are sent to appropriate levels of management of the reporting and affected organizations. Internal CAR distribution includes the Project Manager, Manager of R&QA, Project Engineering Manager, Project Construction Manager and the Resident Construction Manager, Project QA Engineer, Field Superintendent QA, and Supervisor of the affected activity. External CAR distribution includes the Client Project Manager, Client QA Manager, Client Site QA Representative, and as applicable Contractors, Suppliers, and Management of affected activity. | 6

If Corrective Action Requests receive no response, or results are ineffective the Project QA Engineer or the Field Superintendent QA will initiate and provide a Stop Work Order to the Resident Construction Manager, when the Project QA Engineer or the Field Superintendent QA determines the activity must be stopped until effective corrective action is implemented. | 6

17.1.17 Quality Assurance Records

17.1.17.1 Objective Evidence

Provisions are established by the R&QA Record Management Program (RMP) to assure that sufficient records are maintained to furnish evidence of activities affecting quality. The RMP provides for accumulation, maintenance, and timely retrieval of QA records consistent with Regulatory requirements, Codes, and Standards.

QA records include:

(a) Test logs; reports of reviews, inspections, tests, audits, and monitoring work performance; and, material analyses

(b) Records for qualification of personnel, procedures, and equipment

(c) Drawings

(d) Specifications

(e) Procurement Documents

(f) Calibration Procedures and Reports

(g) Nonconformance and Corrective Action Reports

(h) Calculations

(i) Design Records (including design reviews and design changes)

(j) Vendor Pre-Manufacturing Records

(k) Vendor Manufacturing Records

(l) Construction Records (including as-built documents) | 6

(m) Preoperational and Startup Test Records

Initially available and follow-on QA documents are filed in accordance with the Project Filing System. The UE&C organization which approves a document is responsible for sending it to the appropriate file location.

The QA Engineer utilizes the RMP to monitor the status of UE&C design and procurement documents, and supplier QA document submittals. Field Quality Assurance personnel use the RMP to verify the availability and completeness of required documentation. | 6

Test log, inspection, monitoring of work performance, surveillance, and audit records contain, as a minimum, the following: | 6

(a) A description of the operation or method of inspection including identification of the characteristics to be inspected

(b) Evidence of completion or verification, or both, including certification of the operation or inspection

(c) An indication or record of acceptable or unacceptable results, as well as the criteria for acceptance and rejection

(d) The identity of the individual performing the operation and date performed

(e) Information related to conditions adverse to quality | 6

(f) Signature of person initiating the action

(g) Action to resolve any discrepancies noted | 6

R&QA receives and processes those quality assurance documents that are used to determine, record, and establishes compliance of deliverable items furnished by equipment suppliers.

QA records are stamped, initialed, signed or otherwise authenticated and dated by authorized personnel.

17.1.17.2 Identifiable and Retrievable

Lifetime records are identified, retrievable, and available to the Owner, Regulatory Agency Representatives, and to the Authorized Code Inspector as appropriate. Non-permanent records are available at their source for the retention period. | 6 | 6

Lifetime QA records are accumulated by the organization having the responsibility for receiving the records. Each organizational unit responsible for receiving and accumulating QA records utilizes the plant identifying number system developed for the project. Processing of records, including accounting for records, handling, microfilming and making copies as required are the responsibility of the same organization that receives and accumulates the records. | 6

Several fields of retrieval may be utilized, as follows:

(a) System Code

(b) Identity Number or Tag Number

(c) Purchase Order Number

(d) Specification Number

(e) Serial Number of Heat Number

(f) Vendor Identity Number

(g) Document Type Number

Hard copy and microfilm files are employed and RMP file location numbers are assigned to each document received.

QA records are legible, complete and identifiable to the item involved.

17.1.17.3 Retention

Documented procedures establish the requirements for retention of records consistent with Regulatory requirements, Codes, and Standards, and Applicant's requirements.

QA records are classified as Lifetime or Non-permanent by the Owner and R&QA. | 6

Lifetime records are those which would be of significant value in:

(a) Demonstrating capability for proper function of a safety-related item.

(b) Maintaining, reworking, repairing, replacing or modifying the item.

(c) Determining the cause of an accident or malfunction of the item.

(d) Providing the required baseline data for in-service inspection.

Lifetime records are maintained for the life of the item while it is installed in the plant or stored for future use until turnover is realized with the Owner.

Non-permanent records are those having no significant value in the area noted above. Non-permanent records provide evidence that an activity was performed in accordance with applicable requirements and are retained for periods consistent with Regulatory requirements, Codes, and Standards.

QA records are transferred to the Owner on a compcnent, structure, and system basis in advance of project completion whenever it is contractually established. Details of transfer of QA records to the Owner are described in UE&C procedures. | 6

QA Records at the site are maintained, stored and protected in accordance with the provisions of Regulatory Guide 1.88. | 6

Home Office QA records are maintained, stored and protected in the project Document Control Center and duplicate files. The project Document Control Center is located on the sixth floor of the UE&C Home Office building which is of structural steel construction with three hour fire proofing and a concrete floor over steel decking. A sprinkler system is provided for the entire building (except for the Record Retention Room). Records are stored in metal file cabinets. 6

Duplicate microfilms of correspondance are stored in the Record Retention Room located on the fourth floor and opposite end of the building. Features of this room are:

- Two hour fire rated room
- Fire alarm on fourth floor and at Wells Fargo security organization
- Halon fire extinguishing system with Fenwal detection system
- No water penetration
- Independent HVAC to maintain temperature and humidity on a 24 hour basis
- Key locked security door

Duplicate files for other records, such as drawings, calculations, and procurement documents are maintained at the Boston Office.

17.1.18 Audits

17.1.18.1 Planned Verification

A comprehensive system of planned, periodically performed, documented audits is established by documented procedures to verify compliance with all aspects of the QA Program including policy directives, and to determine the effectiveness of the QA Program.

The Manager of Audits accomplishes this aspect of the QA Program by developing a plan or schedule for External and Internal Audits which identifies the QA Program elements or activities to be audited, initial and subsequent audit dates. Based on this schedule the audit section performs

audits and issues reports covering both internal and external audits. Documented evidence of such audit actions including follow-up and verifications is maintained as well as recorded in an audit log, schedule and status report. Information recorded includes: identified QA Program elements or activities audited or to be audited, audit team leader, audit report number and date, response dates--both requested and received, subsequent verification audit date, auditor, verification audit report number and date, and schedule date for the next audit, if required.

The planning and execution of the above assures that audits are conducted in those areas where requirements of Appendix B to 10CFR50 are being implemented. Within UE&C's defined work scope, the activities associated with the following areas are also included as a minimum:

(a) The determination of site features which affect plant safety (e.g., core sampling, site preparation, and meteorology).

(b) The preparation, review, approval and control of the PSAR, designs, specifications, procurement documents, instructions, procedures, and drawings.

(c) Request for proposals and evaluations of bids.

(d) Indoctrination and training programs.

(e) The remaining criteria in Appendix B to 10CFR Part 50.

A further check and balance to assure the activities shown are performed, is provided through Management Reviews. (See Section 17.1.2.8)

Where quality affecting activities are in progress on a project, the design of which is a "replicate" of the base project, combined internal audits which will cover both projects will be performed to evaluate common practices and documentation. Separate internal audits will be performed on each project where the timing or work does not warrant a combined evaluation and in activity areas where there is no replication. External audits or evaluations of suppliers, except for facility surveys, shall be performed on a scheduled basis after release for fabrication. Conduct of audits, when accomplished, will cover all UE&C orders at a particular supplier's facility and will be credited to all projects for which similar equipment is being manufactured under comparable Quality Systems.

The frequency of External and Internal Audits is determined by the status and safety importance of activities being performed. As a minimum, implementation of applicable elements of the internal QA Program will be audited during the anniversary month following an initial audit, or at least once during the life of the activity, whichever is shorter. After an initial external audit is conducted to determine acceptability of each supplier's or contractor's quality assurance program, acceptable Vendors shall be placed on an approved list as stated in Section 17.1.7.1. In lieu

of routinely conducting annual re-audits of suppliers, a formal evaluation of each supplier will be performed each year to determine if a re-audit is required during the upcoming year. Results of this evaluation will be documented, and recommended action concurred with, and approved by, responsible R&QA management. The evaluation will consider complexity of the component concerned, degree of quality and process control required by the manufacturing effort, results of other audits, history of performance of the product or service purchased and effectiveness of implementation of the supplier's QA Program. As a result of this evaluation, suppliers requiring a formal re-audit will be identified. Regardless of the results of the evaluation, suppliers will be re-audited every three years. With the written approval of the Manager of R&QA, scheduled internal and external audits may be delayed for sufficient reason e.g. strike delays, work stoppage, schedule delays, low level of activity, etc.

17.1.18.2 Functional Performance

External audits performed to documented checklists or procedures by the R&QA Audit Section, cover the activities of consultants, contractors, and suppliers of UE&C. In turn, these vendors are required by UE&C specification to establish an audit program to verify implementation and effectiveness of their UE&C approved QA Program, and the QA Programs of their major Subvendors.

Internal audits of the UE&C QA Program are performed to documented checklists or procedures during Management Reviews and by the R&QA Audit Section. Management Reviews are described in Section 17.1.2.8 of this report. Departments audited by the R&QA Audit Section during internal audits include Project Engineering (Power Division), Procurement, Construction (site), and other sections of the R&QA organization.

Audits of UE&C Home Office Quality Assurance activities and Field Quality Assurance activities are performed by the R&QA Audit Section.

External and Internal Auditing is initiated early in the life of the activity, and is consistent with the schedule for accomplishing the activity to assure timely implementation of QA requirements. This assures that Quality Program requirements are met during design, procurement, manufacturing, fabrication, construction, installation, inspection, and test.

External and Internal Audits are conducted in accordance with specific audit plans which identify the audit scope; requirements; work areas, activities, processes, and items to be audited; departments or organizations to be notified; applicable documents; the schedule; and, written procedures or checklists. The R&QA Auditors and other QA personnel performing audits are appropriately selected, trained, and qualified to conduct audits. Audit team members are familiar with the activity being audited, but have no direct responsibility for the work under evaluation.

The Audit Team Leader prepares the Audit Report which includes the audit scope, audit team, persons contacted, summary of audit results including an evaluation statement regarding the effectiveness of the QA Program elements audited, findings, and recommendations for correcting nonconformances.

Audit Reports are reviewed and responded to by the management responsible for the area audited. The written response delineates corrective action which has been, or will be taken, to prevent repetition of a nonconformance or program deficiency.

The Audit Team Leader makes a written evaluation of the response to the Audit Report, and schedules the necessary follow up action which includes the performance of a verification audit of any deficient areas indicated.

A QA monthly Audit Summary Report is provided to UE&C Executive Management. This Report provides for indicating quality trends and the effectiveness of the QA Program.

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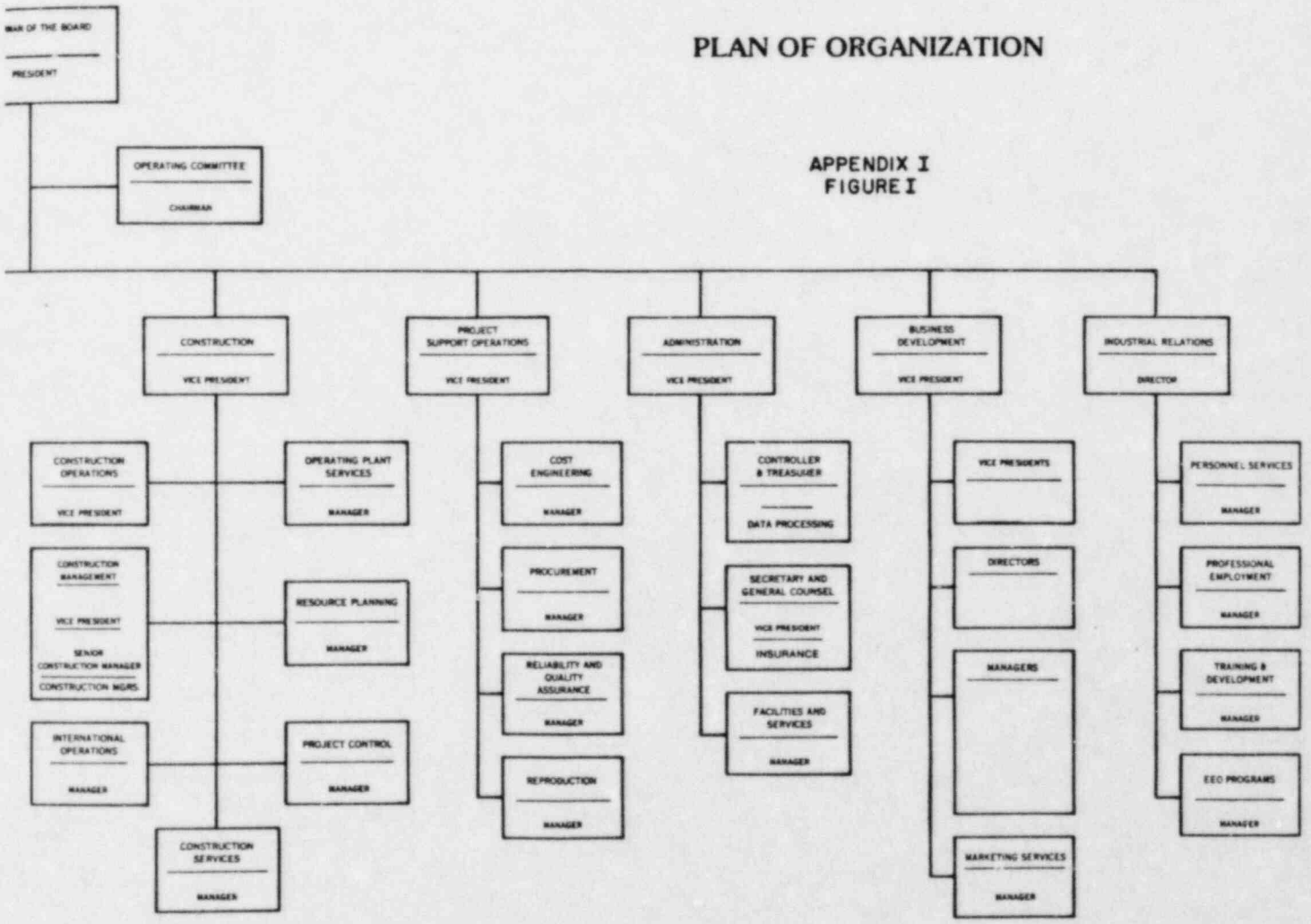
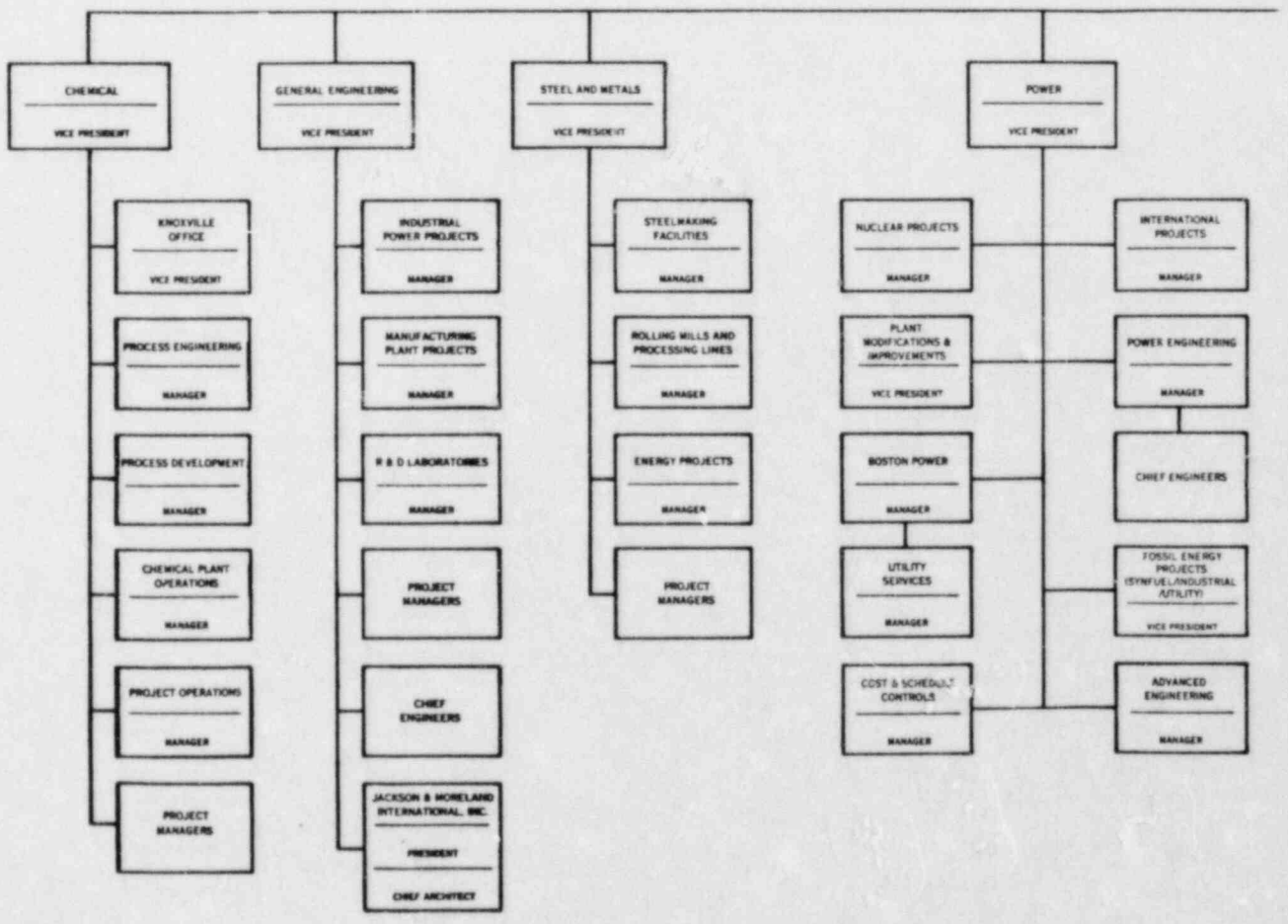
PLAN OF ORGANIZATION

APPENDIX I
FIGURE I



APPROVED BY: Thomas M. Dahl

EFFECTIVE DATE: DECEMBER 17, 1981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KNOXVILLE OFFICE
VICE PRESIDENT
PROCESS ENGINEERING
MANAGER
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MANAGER
CHEMICAL PLANT OPERATIONS
MANAGER
PROJECT OPERATIONS
MANAGER
PROJECT MANAGERS
GENERAL ENGINEERING
VICE PRESIDENT
INDUSTRIAL POWER PROJECTS
MANAGER
MANUFACTURING PLANT PROJECTS
MANAGER
R & D LABORATORIES
MANAGER
PROJECT MANAGERS
CHIEF ENGINEERS
JACKSON & MORELAND INTERNATIONAL, INC.
PRESIDENT
CHIEF ARCHITECT
STEEL AND METALS
VICE PRESIDENT
STEELMAKING FACILITIES
MANAGER
ROLLING MILLS AND PROCESSING LINES
MANAGER
ENERGY PROJECTS
MANAGER
PROJECT MANAGERS
POWER
VICE PRESIDENT
NUCLEAR PROJECTS
MANAGER
PLANT MODIFICATIONS & IMPROVEMENTS
VICE PRESIDENT
BOSTON POWER
MANAGER
UTILITY SERVICES
MANAGER
COST & SCHEDULE CONTROLS
MANAGER
INTERNATIONAL PROJECTS
MANAGER
POWER ENGINEERING
MANAGER
CHIEF ENGINEERS
FOSSIL ENERGY PROJECTS (SYNFUEL/INDUSTRIAL /UTILITY)
VICE PRESIDENT
ADVANCED ENGINEERING
MANAGER

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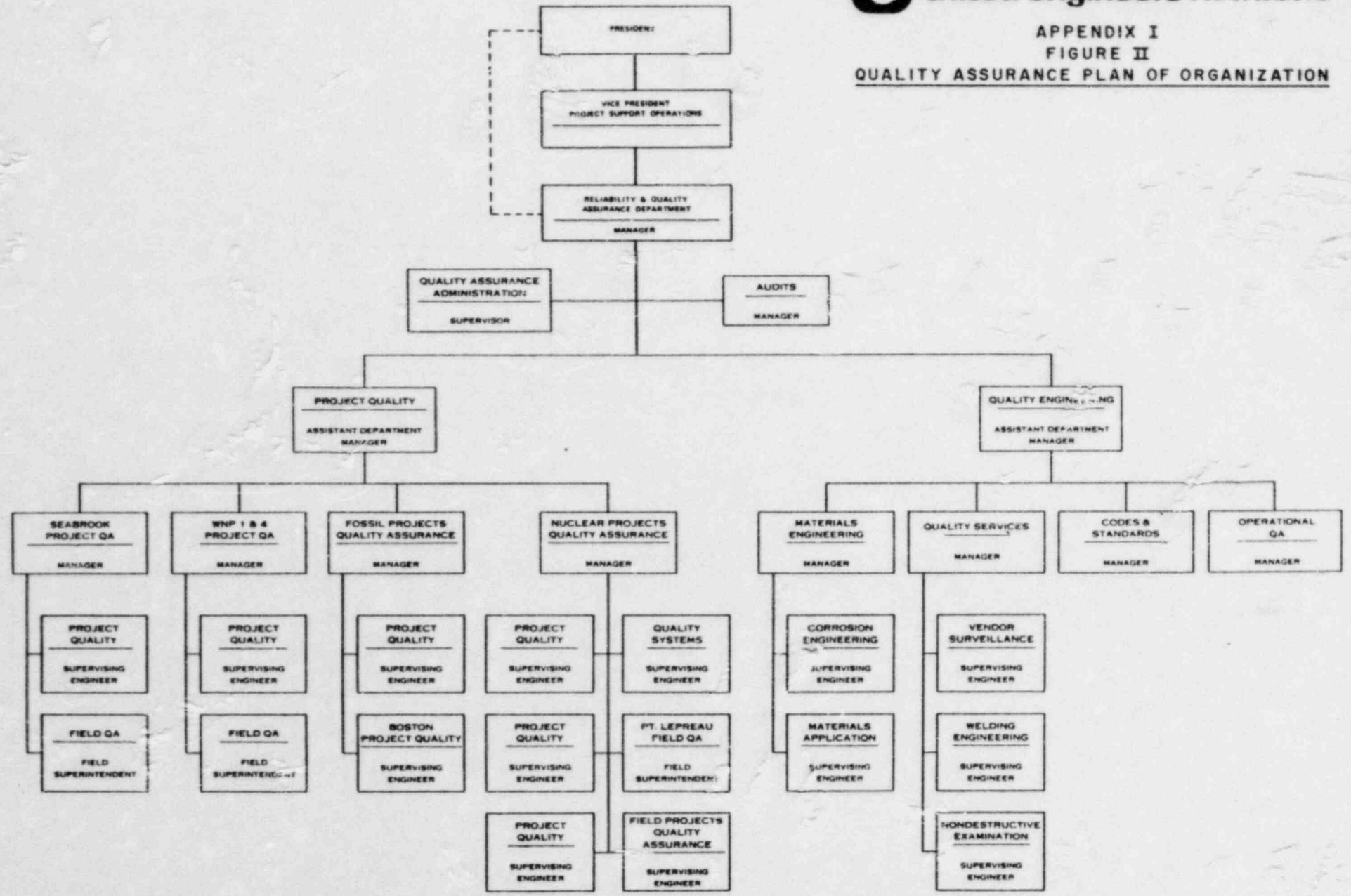
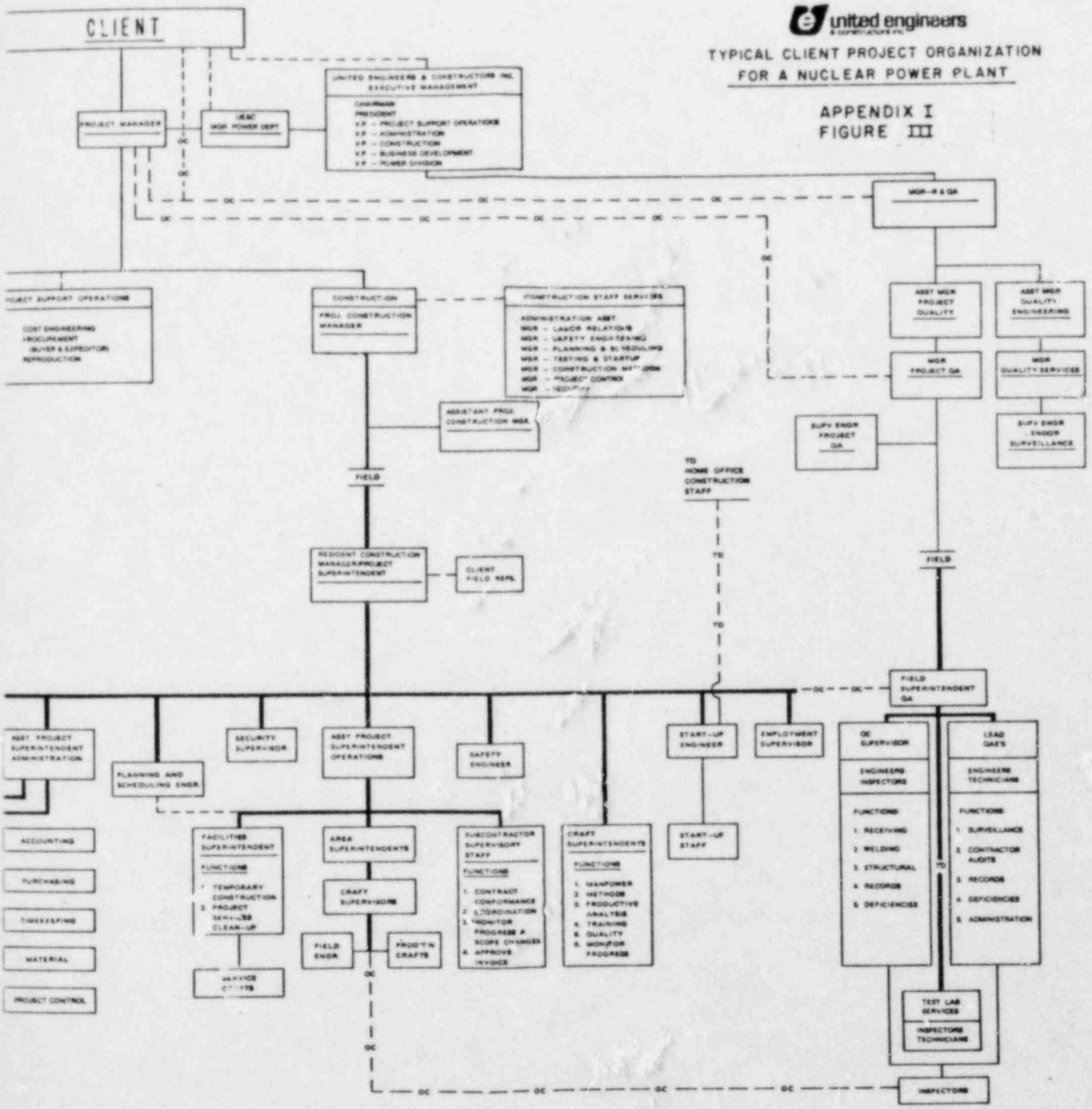
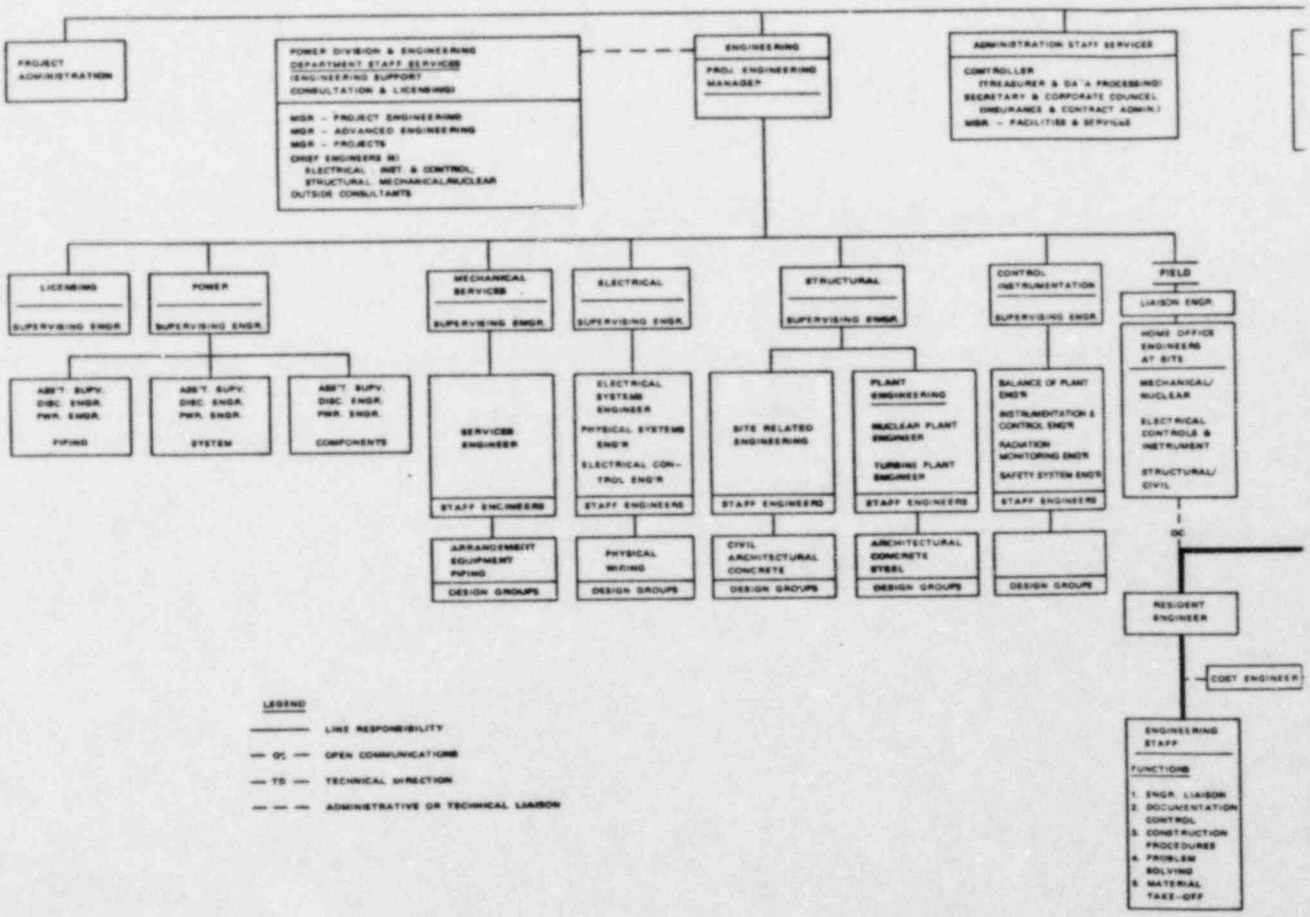
APPENDIX I
FIGURE II
QUALITY ASSURANCE PLAN OF ORGANIZATION



APPROVED BY J. B. SILVERWOOD NQR R&QA
EFFECTIVE DATE MAY 1, 1981


CLIENT
united engineers
TYPICAL CLIENT PROJECT ORGANIZATION
FOR A NUCLEAR POWER PLANT
APPENDIX I
FIGURE III
PROJECT MANAGER
UEAC
MGR. POWER DEPT.
UNITED ENGINEERS & CONSTRUCTORS INC.
EXECUTIVE MANAGEMENT
CHAIRMAN
PRESIDENT
V.P. – PROJECT SUPPORT OPERATIONS
V.P. – ADMINISTRATION
V.P. – CONSTRUCTION
V.P. – BUSINESS DEVELOPMENT
V.P. – POWER DIVISION
MGR.–R & QA
PROJECT SUPPORT OPERATIONS
COST ENGINEERING
PROCUREMENT
(BUYER & EXPEDITOR)
REPRODUCTION
CONSTRUCTION
PROJ. CONSTRUCTION MANAGER
CONSTRUCTION STAFF SERVICES
ADMINISTRATION ASST.
MGR. – LABOR RELATIONS
MGR. – SAFETY ENGINEERING
MGR. – PLANNING & SCHEDULING
MGR. – TESTING & STARTUP
MGR. – CONSTRUCTION METHODS
MGR. – PROJECT CONTROL
MGR. – SECURITY
ASST MGR PROJECT QUALITY
ASST MGR QUALITY ENGINEERING
MGR PROJECT QA
MGR QUALITY SERVICES
ASSISTANT PROJ. CONSTRUCTION MGR.
SUPV ENGR PROJECT QA
SUPV ENGR - ENDOR SURVEILLANCE
FIELD
TO HOME OFFICE CONSTRUCTION STAFF
TO
RESIDENT CONSTRUCTION MANAGER/PROJECT SUPERINTENDENT
CLIENT FIELD REPS.
FIELD SUPERINTENDENT QA
ASST PROJECT SUPERINTENDENT ADMINISTRATION
PLANNING AND SCHEDULING ENGR.
SECURITY SUPERVISOR
ASST PROJECT SUPERINTENDENT OPERATIONS
SAFETY ENGINEER
START-UP ENGINEER
EMPLOYMENT SUPERVISOR
QC SUPERVISOR
ENGINEERS-INSPECTORS
FUNCTIONS
1. RECEIVING
2. WELDING
3. STRUCTURAL
4. RECORDS
5. DEFICIENCIES
LEAD QA'S
ENGINEERS-TECHNICIANS
FUNCTIONS
1. SURVEILLANCE
2. CONTRACTOR AUDITS
3. RECORDS
4. DEFICIENCIES
5. ADMINISTRATION
ACCOUNTING
PURCHASING
TIMEKEEPING
MATERIAL
PROJECT CONTROL
FACILITIES SUPERINTENDENT
FUNCTIONS
1. TEMPORARY CONSTRUCTION
2. PROJECT SERVICES
3. CLEAN-UP
SERVICE CRAFTS
AREA SUPERINTENDENTS
CRAFT SUPERVISORS
FIELD ENGR.
PRODUCTION CRAFTS
SUBCONTRACTOR SUPERVISORY STAFF
FUNCTIONS
1. CONTRACT CONFORMANCE
2. COORDINATION
3. MONITOR PROGRESS & SCOPE CHANGES
4. APPROVE INVOICE
CRAFT SUPERINTENDENTS
FUNCTIONS
1. MANPOWER
2. METHODS
3. PRODUCTIVE ANALYSIS
4. TRAINING
5. QUALITY
6. MONITOR PROGRESS
START-UP STAFF
TEST LAB SERVICES
INSPECTORS-TECHNICIANS
INSPECTORS
QC
TO


PROJECT ADMINISTRATION
POWER DIVISION & ENGINEERING DEPARTMENT STAFF SERVICES (ENGINEERING SUPPORT CONSULTATION & LICENSING)
MGR. – PROJECT ENGINEERING
MGR. – ADVANCED ENGINEERING
MGR. – PROJECTS
CHIEF ENGINEERS (4) ELECTRICAL, INST. & CONTROL, STRUCTURAL, MECHANICAL/NUCLEAR
OUTSIDE CONSULTANTS
ENGINEERING
PROJ. ENGINEERING MANAGER
ADMINISTRATION STAFF SERVICES
CONTROLLER (TREASURER & DATA PROCESSING)
SECRETARY & CORPORATE COUNCEL (INSURANCE & CONTRACT ADMIN.)
MGR. – FACILITIES & SERVICES
LICENSING
SUPERVISING ENGR.
POWER
SUPERVISING ENGR.
MECHANICAL SERVICES
SUPERVISING ENGR.
ELECTRICAL
SUPERVISING ENGR.
STRUCTURAL
SUPERVISING ENGR.
CONTROL INSTRUMENTATION
SUPERVISING ENGR.
FIELD
LIAISON ENGR.
ASST. SUPV. DISC. ENGR. PWR. ENGR. PIPING
ASST. SUPV. DISC. ENGR. PWR. ENGR. SYSTEM
ASST. SUPV. DISC. ENGR. PWR. ENGR. COMPONENTS
SERVICES ENGINEER
STAFF ENGINEERS
ELECTRICAL SYSTEMS ENGINEER
PHYSICAL SYSTEMS ENG'R
ELECTRICAL CONTROL ENG'R
STAFF ENGINEERS
SITE RELATED ENGINEERING
STAFF ENGINEERS
PLANT ENGINEERING
NUCLEAR PLANT ENGINEER
TURBINE PLANT ENGINEER
STAFF ENGINEERS
BALANCE OF PLANT ENG'R
INSTRUMENTATION & CONTROL ENG'R
RADIATION MONITORING ENG'R
SAFETY SYSTEM ENG'R
STAFF ENGINEERS
HOME OFFICE ENGINEERS AT SITE
MECHANICAL/ NUCLEAR
ELECTRICAL CONTROLS & INSTRUMENT
STRUCTURAL/ CIVIL
OC
ARRANGEMENT EQUIPMENT PIPING
DESIGN GROUPS
PHYSICAL MIXING
DESIGN GROUPS
CIVIL ARCHITECTURAL CONCRETE
DESIGN GROUPS
ARCHITECTURAL CONCRETE STEEL
DESIGN GROUPS
DESIGN GROUPS
RESIDENT ENGINEER
COST ENGINEER
ENGINEERING STAFF
FUNCTIONS
1. ENGR. LIAISON
2. DOCUMENTATION CONTROL
3. CONSTRUCTION PROCEDURES
4. PROBLEM SOLVING
5. MATERIAL TAKE-OFF
LEGEND
LINE RESPONSIBILITY
OC OPEN COMMUNICATIONS
TD TECHNICAL DIRECTION
ADMINISTRATIVE OR TECHNICAL LIAISON

APPENDIX II

Figure II

LIST OF ASME NUCLEAR QA MANUAL PROCEDURES

PROCEDURE TITLES		PROCEDURE DISCRIPTION	
SECTION 1.	GENERAL		
1-A	Organization, Authority and Responsibility of the Reliability and Quality Assurance Department	Describes organization, duties and responsibilities of the Reliability and Quality Assurance Department in its activities associated with design, procurement and construction.	6
1-B	Quality Assurance Program	Describes UE&C implementation of the Manual when acting as ASME Certificate Holder.	6
1-C	General Indoctrination and Training	Describes UE&C program for the education and training of personnel performing quality related activities.	6
SECTION 2.	ENGINEERING		6
2-A	Design Control	Describes measures established to control the design efforts on items engineered, procured, and installed by UE&C or sub-contractors in compliance with provisions of the Code and Contract.	6
2-B	Engineering Document Control	Describes measures taken to assure that only current and approved documents are in use.	
2-C	Interface with Fabricators and Installers	Describes control for implementing interfaces with NPT and NA Certificate Holders for construction of nuclear piping systems.	6
SECTION 3.	PROCUREMENT CONTROL		
3-A	Home Office Procurement Procedure	Defines actions taken to assure Home Office Procurement of Nuclear materials, equipment and services conform to Code and Contract.	6

APPENDIX II

Figure II

LIST OF ASME NUCLEAR QA MANUAL PROCEDURES (Continued)

PROCEDURE TITLES		PROCEDURE DESCRIPTION	
3-B	Field Purchase Procedure	Defines requirements for construction site personnel to assure Field Purchases conform to ASME Code Section III.	
3-C	Vendor Surveillance	Describes procedures for vendor evaluation and selection and for surveillance during fabrication in his shop.	
3-D	Receiving Inspection	Established inspection procedures to assure that material and equipment received on construction sites conform to Code and Contract requirements.	
SECTION 4.	DOCUMENT CONTROL		|€
4-A	Instructions, Procedures and Drawings	Describes program for the development and use of written procedures, instructions, and drawings required for performance of quality related activities.	|€
4-B	Construction Document Control	Describes the method for receipt, distribution and recall of approve documents at the site.	|€
SECTION 5.	PROCESS CONTROL		|€
5-A	Welding Material Control	Describes system to assure identification and traceability of welding materials during receiving, storage and distribution.	
5-B	Qualification of Welders and Procedures	Describes procedure for the qualification of welders and welding procedures to assure their conformance with Contract and applicable codes and standards.	
5-C	Identification and Control of Material, Parts, and Components	Describes measures which assure that materials, parts and components are identified by appropriate means.	|6

APPENDIX II

Figure II

LIST OF ASME NUCLEAR QA MANUAL PROCEDURES (Continued)

PROCEDURE TITLES		PROCEDURE DESCRIPTION	
5-D	Heat Treatment	Describes actions taken to assure that all heat treatment, including preheat, inter-pass, and post-weld stress relieving conforms to Code and Contract.	6
5-E	Training and Certification of NDE Personnel	Describes training and certification of UE&C personnel performing or interpreting NDE.	6
SECTION 6.	EXAMINATION, TEST & INSPECTION CONTROLS		6
6-A	Fabrication Process Control	Describes system for checking fabrication processes performed by UE&C personnel, to assure conformance to Code and Contract.	6
6-B	Pressure Tests	Describes measures taken to control pressure tests of UE&C installed piping systems.	6
6-C	Control of Component Supports Fabrication and Installation	Describes system for control of site fabrication and site installation of component supports for UE&C.	6
SECTION 7.	CONTROL OF SUBCONTRACTED SERVICES		6
7-A	Control of Subcontracted NDE Services	Describes measures taken to control NDE when sublet outside of UE&C.	6
SECTION 8.	MEASURING AND TEST EQUIPMENT		6
8-A	Control of Measuring and Test Equipment	Describes measures taken to assure that tools, gages, instruments and other measuring and test devices are controlled and calibrated.	6

APPENDIX II

Figure II

LIST OF ASME NUCLEAR QA MANUAL PROCEDURES (Continued)

PROCEDURE TITLES		PROCEDURE DESCRIPTION	
SECTION 9.	HANDLING, STORAGE, SHIPPING AND PRESERVATION		6
9-A	Handling, Storage, Shipping and Preservation	Describes measures used for controlling handling, storage and preservation of material and equipment to prevent damage and deterioration.	6
SECTION 10.	NONCONFORMING CONDITIONS		6
10-A	Nonconforming Materials, Parts and Components	Describes measures required to assure that nonconforming items are identified, documented, segregated and dispositioned in accordance with documented procedures.	6
10-B	Corrective Action	Establishes methods used to assure that conditions adverse to quality are identified and documented, and that the implementation of timely corrective action is verified.	6
SECTION 11.	RECORDS		6
11-A	Quality Assurance Records	Identifies records and documents required to substantiate quality and describes measures required for their maintenance, retention and retrieval.	6
11-B	ASME Code Marking & Data Reports	Describes markings required to identify ASME Code conformance and the reports required for certification.	6
SECTION 12.	AUDITS		
12-A	Audits	Describes measures established for conducting audits to verify the correct implementation of the UE&C Quality Assurance Program.	6

APPENDIX II

Figure II

LIST OF ASME NUCLEAR QA MANUAL PROCEDURES (Continued)

PROCEDURE TITLES		PROCEDURE DESCRIPTION	
12-B	Selection, Qualification and Certification of Auditing Personnel	Describes the program for selection, qualification and certification of UE&C auditing personnel.	6
SECTION 13.	AUTHORIZED NUCLEAR INSPECTOR		6
13-A	Authorized Nuclear Inspector	Describes the general framework within which the ASME Nuclear Inspector operates.	6

APPENDIX II

Figure IV

MATRIX OF UNITED ENGINEERS & CONSTRUCTORS INC.
QUALITY ASSURANCE PROGRAM

Quality Criteria (10CFR50, Appendix B)	IMPLEMENTING DOCUMENTS				
	Topical Report	QAM C.S.	ASME QAM	Project QAM (Typical)	
I	17.1.1	Section I	Procedure 1-A	QA-1	
II	17.1.2	Section II	All Procedures	All Procedures	
III	17.1.3	Section III	Section 2	QA-3	
IV	17.1.4	Section IV	Procedure 3-A Procedure 3-B	QA-4	6
V	17.1.5	Section V	Procedure 4-A	QA-5	6
VI	17.1.6	Section VI	Procedure 1-B Procedure 2-B Procedure 4-B	QA-6-1	6
VII	17.1.7	Section VII	Section 3	QA-7-1 QA-7-2	
VIII	17.1.8	Section VIII	Procedure 5-A Procedure 5-C	QA-8	6
IX	17.1.9	Section IX	Section 5 Section 7	QA-9-1	6
X	17.1.10	Section X	Procedure 3-D Procedure 6-A	QA-10	6
XI	17.1.11	Section XI	Procedure 6-A Procedure 6-B	QA-11	6
XII	17.1.12	Section XII	Section 8	QA-12	6
XIII	17.1.13	Section XIII	Section 9	QA-13	6
XIV	17.1.14	Section XIV	Procedure 6-A Procedure 6-C Procedure 11-B Section 13	QA-14	6

APPENDIX II

Figure IV

MATRIX OF UNITED ENGINEERS & CONSTRUCTORS INC.
QUALITY ASSURANCE PROGRAM
(Continued)

Quality Criteria (10CFR50, Appendix B)	IMPLEMENTING DOCUMENTS				
	Topical Report	QAM C.S.	ASME QAM	Project QAM (Typical)	
XV	17.1.15	Section XV	Procedure 10-A	QA-15	6
XVI	17.1.16	Section XVI	Procedure 10-B	QA-16-1 QA-16-2	6
XVII	17.1.17	Section XVII	Procedure 11-A	QA-17	6
XVIII	17.1.18	Section XVIII	Section 12	QA-18	