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AMENDMENT 11

GENERAL ATOMICS

QUALITY ASSURANCE PROGRAM

DECEMBER 1990

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ABSTRACT

This report has been prepared using 10CFR50 Appendix B and NRC Regulatory Guides and regulations as documented in accordance with Regulatory Guide 1.70, Revision 3. It is in compliance with the requirements specified in 10CFR50 Appendix B, NQA-1-1983 and NQA-1a-1983 addenda, and the United States Nuclear Regulatory Commission's Regulatory Guides applicable to the design, procurement, and construction phases of Nuclear Power Plants as noted in Table 17-3. 11

It includes provisions responsive to the requirements specified in 10CFR71 Subpart H for Shipping Packages for Radioactive Materials applicable during the design, fabrication, assembly, testing, licensing, use, and maintenance of such packages.

This report describes the General Atomics (GA) Quality Assurance Program under which the GA Quality Assurance Manual has been prepared and implemented at General Atomics for the design, procurement, manufacture, construction, testing, repair, and maintenance of United States Nuclear Regulatory Commission licensed shipping packages and reactor systems.

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INTRODUCTION

General Atomics is a California corporation owned by General Atomic Technologies Corporation. The shareholder of General Atomic Technologies Corporation elects the Board of Directors of General Atomics. The Board of Directors elects the Chairman of the Board and Chief Executive Officer. The Chairman of General Atomics has the full authority to establish and implement all Quality Assurance policies for the company. The General Atomics Company Policy Manual, which is prepared under the direction of the Chairman, establishes the basic policy concerning the Quality Assurance Program and the quality of General Atomics' products and services. The Chairman of General Atomics is the highest level from which this Quality Assurance policy emanates.

When changes in the General Atomics Quality Assurance Program are made, they are incorporated in revisions and amendments to the Quality Assurance Manual. Changes that affect this Topical Report are forwarded to the Nuclear Regulatory Commission for review in the form of an amended Topical Report. Notification of General Atomics organizational changes that affect the Quality Assurance Program are provided to the Nuclear Regulatory Commission within 30 days of their effectivity, either through the amended Topical Report or by separate communication.

17.0 QUALITY ASSURANCE DURING DESIGN AND CONSTRUCTION

17.1 ORGANIZATION

17.1.1 Quality Assurance Program Responsibility

The Chairman of General Atomics (GA), through the General Atomics Company Policy Manual, documents the following policy statement concerning Quality Assurance:

> "The quality of General Atomics' products and services shall be of acceptable workmanship and performance consistent with GA and customer requirements. The quality of a GA product or service shall be defined in applicable instructions, procedures, drawings, and specifications. The fulfillment of the requirements contained in these documents is demonstrated by documented objective evidence of compliance with the requirements." 11

To implement this policy, the Chairman of General Atomics has reporting to him, through Vice Chairmen and Sr. Vice Presidents, the organizations responsible for (1) design, fabrication, and construction of nuclear steam supply systems (NSSS) and nuclear heat sources (NHS); and (2) design, fabrication, and use of shipping packages for radioactive materials. These organizations are shown in Fig. 17-1. Project management for each project reports through a Sr. Vice President to the Chairman of General Atomics. This topical report applies to those activities affecting the quality of safety related structures, systems, components, and fuel associated with reactors, and with shipping packages for radioactive materials.

The Director of the Quality Assurance organization, reporting to the Sr. Vice President of the Reactor Division has been assigned the responsibility for establishing and enforcing the provisions of the Quality Assurance (QA) Program for the reactor programs and for packaging and handling of radioactive materials. He derives his authority from the Chairman of GA through the Sr. Vice President. This authority includes the right to stop unsatisfactory work

or to stop further processing of unsatisfactory material. The authority is delegated down through all levels of quality assurance, including shop and field quality representatives of each QA/QC organization and QA/QC personnel. The QA organization is separate from, and independent of, other organizations of GA, as shown in Fig. 17-1.

17.1.2 Organizational Relationships

General Atomics' lines of authority and responsibilities of all organizations involved in the implementation of the QA Program are shown in Figs. 17-1 and 17-2. Direct interface relationships are required and necessary between the QA organization of GA, the owner, and architects and engineers for coordination of the QA Program, for investigation of quality problems, and for implementation of any required remedial actions. Similar direct interfaces with the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) organizations are maintained for reactor systems and packaging items. The Quality Assurance Director or the cognizant quality engineer, shall maintain direct interface with the QA managers of the owner and of the architects and engineers. During the construction phase, the QA organization of GA maintains a direct working relationship and interface on quality problems and solutions with the QA organizations of the owner, architects and engineers, and constructor(s), as applicable to GA-supplied items. The scope of activities by GA at a construction site is further defined by a Site QA Manual which will be issued for each reactor construction project which comes under the jurisdiction of the NRC.

Licensing, Safety and Nuclear Compliance is responsible for obtaining licenses for shipping packages for radioactive materials, where GA is the organization shipping the materials, and for compliance with licensing requirements regarding GA facilities and radioactive materials in GA custody. Quality Assurance is responsible for verifying implementation of an adequate QA Program for all such licensed activities.

All departments indicated in Fig. 17-2 are located in San Diego, California.

It is GA's policy that all personnel whose activities affect the quality of deliverable or NRC licensed items will have authority, access to work areas, and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions to quality problems through designated channels; to verify implementation of solutions; and to assure that further processing, delivery, installation or use of an item is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred. This delegation of authority and responsibility is implemented in the GA Quality Assurance Manual. During all phases of the project, problems between personnel of the QA organization or Fuels Quality Control, and other organizations, not resolved at lower levels, are elevated to successively higher levels of management until resolved, culminating in resolution by the Chairman of GA if necessary. The QA organization has been assigned the responsibility and the authority to assure implementation of the QA Program as described herein. 11

17.1.3 Organizational Responsibilities for Implementation of GA Quality Assurance Program on the Reactor Group Projects and Shipping Packages 11

17.1.3.1 Reactor Group. Reactor Group organizations are responsible for (a) controlling contacts with the owner, (b) project planning and scheduling, (c) work authorization, (d) budget allocations, (e) control of external design interfaces between the reactor system and the balance of plant with the owner, architects and engineers, and constructor(s), and preparation and control of Safety Analysis Reports (SAR) for reactor systems. Ongoing program controls are provided by the program directors and their project managers. Quality assurance activities are performed by program management organizations, engineering organizations, and manufacturing organizations. The project quality engineer working with the manager and/or director provides quality assurance program management for the project. 11

17.1.3.1.1 Power Reactor Programs. The GA Power Reactor Programs organization has the responsibility for engineering design of power reactor systems including design verification and interface control internally at GA.

17.1.3.1.2 Nuclear Fuel Fabrication. The GA Nuclear Fuel Fabrication organization is responsible for the manufacturing of nuclear fuel and shipment of radioactive materials in accordance with the fuel design requirements specified by Power Reactor Programs. The Manager, Fuels Quality Control is responsible to the Director of Nuclear Fuel Fabrication for quality engineering, inspection, and fuel laboratory operations conducted to verify fuel quality.

17.1.3.1.3 Nuclear Waste Management. The Nuclear Waste Management organization is responsible for the engineering design of shipping containers for radioactive materials including design verification and interface control.

17.1.3.1.4 Quality Assurance Organization. The GA Quality Assurance organization is responsible for establishing and documenting the GA QA Program in accordance with Corporate policies, this report, 10CFR50 Appendix B, NQA-1-1983 and NQA-1a-1983 addenda and 10CFR21 Subpart H, and for enforcing the requirements of the QA Program during the design, procurement, fabrication, and construction phases of the reactor systems. Detailed responsibilities of the Quality Assurance organization are given in Fig. 17-2, pages 17-55 thru 17-59. The technical and administrative (hire/fire/salary review) authority of the Quality Assurance organization personnel is indicated by the solid lines of this figure. The dashed line represents communication of QA policy, practices, and problems. 11 11

This section describes the functional responsibilities of the GA organizations involved in implementing the QA Program. These responsibilities are implemented as described in the QA manual. The results of activities that affect product quality are subject to review for adequacy by QA/QC. Examples of such QA/QC action are the review and/or approval of design documents, procurement documents, and manufacturing documents and audit of these activities by QA personnel.

The minimum qualifications for the position of Director of the Quality Assurance organization are:

1. Bachelor's degree in engineering, mathematics, a physical science,

management, or business.

2. Ten years experience in work directly related to quality assurance.

3. Demonstrated management and administrative ability in progressively responsible positions.

4. Either knowledge of a complete QA system, such as those required to implement 10CFR50 Appendix B, NQA-1, ASME Code Section III NCA-4000, or MIL-Q-9858A, or one of the following: 11

   a. Certification in the quality engineering discipline by the American Society for Quality Control.

   b. Registration as a Professional Engineer in the quality engineering discipline.

The minimum qualifications for the positions of Quality Assurance managers and senior cognizant Quality Engineers are:

1. Bachelor's degree in engineering, mathematics, a physical science, management, or business.

2. Five years experience in work directly related to quality assurance.

3. Demonstrated management and administrative ability in progressively responsible positions.

4. Either knowledge of a complete QA system, such as those required to implement 10CFR50 Appendix B, NQA-1, ASME Code Section III NCA-4000, or MIL-Q-9858A, or one of the following: 11

   a. Certification in the quality engineering discipline by the American Society for Quality Control.

b. Registration as a Professional Engineer in the quality engineering discipline.

NOTE: Substitution of an additional eight years of directly related quality assurance experience may be made in lieu of a college degree.

17.1.3.1.5 International Services Corporation (ISC). The ISC organization provides engineering services and products to the nuclear industry. 11

17.1.3.2 Licensing, Safety and Nuclear Compliance. Licensing, Safety and Nuclear Compliance reports to the Vice President of Human Resources and has the overall responsibility for control of radioactive material in GA custody, the licensed GA-operated facilities, and the licensing and controlled use of shipping packages for radioactive material.

17.1.3.3 Facilities. Facilities reports to the Senior Vice President of Finance and provides calibration of electrical/electronic measuring and test equipment, and welders and machinists, as necessary. Publications and Records Management reports to the Director of Facilities and provides storage and maintenance services for GA design document originals, and formal GA reports. 11

17.1.3.4 Purchasing. Purchasing reports to the Senior Vice President of Finance and provides procurement of materials, components, and services.

17.1.3.5 Information Resources Division (IRD). IRD reports to the Senior Vice President of Finance and provides storage and maintenance services for computer programs. 11

17.1.3.6 Materials and Engineering. Materials and Engineering reports to the Senior Vice President of the Advanced Technologies Group and provides mechanical and chemical testing services. 11

17.2 QUALITY ASSURANCE PROGRAM

17.2.1 Applicability of Program

The GA QA program, the basic provisions of which are contained herein, applies to all activities that affect the quality of safety-related structures, systems, components, fuel of a reactor system licensed under 10CFR50, and shipping packages licensed under 10CFR71. A specific list of safety-related equipment will be compiled per Section 17.3.7 for each reactor system or shipping package. A partial listing of such structures, systems, and components for a reactor system is provided in Table 17-2.

17.2.2 GA QA Program Description

The procedures that implement the GA QA Program controls presented in this report are contained in the GA Quality Assurance Manual and the Quality Assurance Program Document for the project. These documents cover all work performed at GA on reactor systems and shipping packages and make provision for work done by others on behalf of GA. Changes to this report will be implemented in the GA Quality Assurance Manual and the Quality Assurance Program Document for the project when they affect these documents.

GA Quality Assurance Manual. The GA Quality Assurance Manual establishes the measures to achieve compliance with the requirements of this report. A listing of applicable Regulatory Guides and GA's position on these documents is provided in Table 17-3. The GA Quality Assurance Manual covers the 18 criteria of 10CFR50 Appendix B, NQA-1-1983 and NQA-1a-1983 addenda, 10CFR71 Subpart H, applicable Regulatory Guides and industry codes to implement the requirements within all organizations of GA, and in QA interfaces with (1) the owner, (2) architect/engineers and constructor(s) involved in the owner's project, and (3) shipping package program management. 11

Quality Assurance Program Document. The purpose of the Quality Assurance Program Document (QAPD) for a specific project is to describe the operating agreements made with the owner and/or his agents, the specific requirements

unique to the project as imposed by regulation and the contract, the identity of the personnel with assigned specific responsibilities and positions for the project, and the identity of the deliverable hardware subject to the requirements of the GA QA Program. Similar requirements are imposed on shipping packages for radioactive materials licensed pursuant to 10CFR71.

Relationship of Procedures to Criteria of 10CFR50 Appendix B, NQA-1-1983 and NQA-1a-1983 addenda, and 10CFR71 Subpart H. Table 17-1 of this report relates the quality procedures in effect at the date of this submittal and contained within the GA Quality Assurance Manual to the applicable criteria of 10CFR50 Appendix B, NQA-1-1983 and NQA-1a-1983 addenda, and 10CFR71 Subpart H. 11

17.2.3 Changes in the GA QA Program Description

Regulatory Guides are reviewed by the QA organization for impact on the GA QA Program. This topical report will be updated as required to reflect applicable changes or provide acceptable alternatives.

17.2.4 Specifications for Supplier Quality Assurance Requirements

Measures for imposing the applicable GA QA Program requirements on suppliers are described in Section 17.4.

17.2.5 Training

Training requirements for personnel performing quality assurance functions are described in Section 17.19. 11

17.2.6 Management Review of the Status and Adequacy of the QA Program

On a routine basis, reports of audits and corrective actions are disseminated to appropriate Sr. Vice Presidents, and other management levels of organizations involved in the activities of the QA Program. The Quality Assurance Director compiles for the Sr. Vice President, Reactor Group, a monthly report of quality-related activities, performance trends, and significant problems. In 11

addition, the Sr. Vice President, Reactor Group, appoints upper level managers from outside QA to assess the effectiveness of the QA Program at least once every three years. Reports of these assessments, and any resulting recommendations for improvement are made directly to the Sr. Vice President, Reactor Group. Corrective action initiated as a result of these management assessments is documented by Quality Assurance and is followed up during the next management assessment. 11 11

Management of other organizations participating in the QA Program assess the adequacy of that part of the program for which they are responsible and assure its effective implementation. The assessments are performed through a review of QA, customer, or regulatory agency audit reports, and corrective action requests, as applicable. 11

17.2.7 **Written Policies, Procedures and Instructions**

The policies, procedures, and instructions that implement the QA program described in this report are contained in the GA Quality Assurance Manual, which is prepared by Quality Assurance and reviewed and approved by the signature of the Director, Quality Assurance and the Sr. Vice President, Reactor Group. Changes to the procedures contained in the GA Quality Assurance Manual are processed and approved in the same manner. Distribution and control of the GA Quality Assurance Manual and changes thereto, are accomplished by the Quality Systems organization. The GA Quality Assurance Manual is issued by copy number to control distribution and updating of changes. A receipt is obtained from addressees for each controlled GA Quality Assurance Manual, and for all subsequent changes. 11

The GA Quality Assurance Manual provides for a Quality Assurance Program Document for the project, in which specific functional assignments are shown for the positions of responsibility for the project. Additionally, coordination and operating details for the project are described, and the items to which the program applies are identified. The Quality Assurance Program Document is approved by the Quality Assurance Director and the program/project manager. Approval of the GA Quality Assurance Program Document by the owner

will constitute approval of the GA QA Program for the reactor system. NRC licensing approval is required for packaging designs that are subject to 10CFR71 requirements. The subsections of this report describe the contents of policies, procedures, and instructions contained in the GA Quality Assurance Manual, which assure that quality-related activities are performed with specified equipment and under suitable environmental conditions, and that all prerequisites have been satisfied prior to commencement of any such activity.

The Chairman of General Atomics has directed that compliance with the procedures of the GA Quality Assurance Manual is mandatory for all personnel performing activities affecting the quality of reactor system or shipping package items at General Atomics. This is communicated to GA personnel through the Company Policy Manual and the GA Quality Assurance Manual, which contains a Statement of Authority signed by the Chairman of General Atomics. These Manuals are available to all personnel. It is also communicated to all GA employees through the Quality Assurance indoctrination brochure. 11

17.3 DESIGN CONTROL

17.3.1 Design Responsibility

The GA Quality Assurance Manual establishes procedures applicable to the Reactor Group organizations to assure controlled design of products supplied or specified by General Atomics within the scope of the program described in this report. The manual establishes a design control system for design documents (such as drawings, specifications, calculations, computer programs and associated documentation, etc.) that complies with the requirements of 10CFR50 Appendix B, NQA-1, 10CFR71 Subpart H, applicable industry and governmental codes, and Regulatory Guides. ||11 ||11

Design responsibility for equipment and systems that form part of a reactor system or for shipping packages for shipment of materials subject to requirements of 10CFR71 is assigned to specific organizations on the basis of functional responsibility. For all such equipment and systems, the assigned organizations have three major responsibilities associated with design control:

1. To develop and document the designs necessary to describe components or systems and enable manufacture of products that will meet contract requirements, NRC license application commitments, and all applicable codes and standards. It is the responsibility of the assigned organizations to: (1) develop and maintain a design control system, with associated standards and procedures that meet the requirements of the GA QA Program; (2) develop criteria defining the requirements imposed on systems and equipment that are outside of GA's responsibility; and (3) control the design interfaces to assure overall functional compatibility.

2. To retain technical cognizance of the product through fabrication, testing, installation, and acceptance. The responsible organizations have technical responsibility for approving and documenting the reasons for approval of all deviations from requirements of design documents, engineering test specifications, and installation specifications, and to assure that such deviations do not compromise the

functional and safety requirements of the systems or components affected.

3. To plan and carry out research and development programs necessary to establish feasibility, performance, and reliability of reactor system equipment and shipping packages for radioactive materials within GA's responsibility; to conduct programs to improve performance, safety, reliability, and economy of the products as appropriate; and to meet new industry and regulatory requirements.

17.3.2 Identification and Control of External Design Interfaces

GA Management coordinates with the owner in identifying the interfaces between that portion of plant design for which GA is responsible and those portions for which other organizations have design responsibility. GA Program/Resource Procedures Manual procedures are established for the control and documentation of technical communications across such interfaces, to assure timely and accurate transmittal and receipt of information affecting such design interfaces, to provide for appropriately scheduled design interface reviews, and to assure timely completion of review action items.

17.3.3 Identification and Control of Internal Design Interfaces

An internal design interface control function has been established within the Reactor Group. This group is the focal point and overall direction agency for design control system activities, with the authority to review and approve specified product design documents during the design phase for a project. The review includes coordination with representatives of Program Management; Licensing, Safety and Nuclear Compliance; and Quality Assurance, as applicable. The designated interface control function is responsible for assuring additional coordination with other representatives, who reflect different product areas, skills, and responsibilities, as deemed appropriate. 11

The designated interface control group is responsible for:

1. Establishing the design baselines beginning after the conceptual design phase and through final design.

2. Reviewing and approving the prime design documents for all systems and equipment items.

3. Verifying during review of prime design documents that all systems and equipment items are complete and producible; are within the scope of supply and cost parameters; and meet the established criteria for performance capability, interface compatibility, reliability, safety, and product support.

4. Reviewing, approving, and documenting all recommended additions or modifications submitted for incorporation into an established design baseline.

5. Reviewing, with the cognizant engineer, conformance of R&D program justification documents, test specifications, and related documents to established design baselines. They shall identify those documents that require their review.

Procedures are provided for the identification and control of interfaces relating to configuration and dimensions, processes and performance, materials, control and readout indication, testing, operation, and safety through design, fabrication, testing, and operation.

The procedures specify the level of detail to be controlled, the method of control, the control responsibility, the manner of feedback and documentation, and means of resolving incompatibilities.

The procedures cover interfaces and documentation for items supplied by GA and by its subcontractors as well as for the balance-of-plant.

The procedures provide for the action required to maintain compatibility when any interface characteristic is altered.

Unresolved issues are elevated to successively higher levels of management, culminating with the GA Chairman for resolution or with the owner when external interfaces are involved.

17.3.4 Translation of Basic Requirements into Design Documents

It is the responsibility of the design organization to provide design criteria or system description documents that meet all safety and functional requirements. The design organization is then responsible for correctly translating these requirements into specifications, drawings, diagrams, procedures, and instructions, all of which are used to control the manufacture, testing, use, and maintenance of the products.

It is the responsibility of the cognizant engineering manager to assure that all QA requirements are included in the design documents to meet the applicable codes, functional requirements, and safety and licensing requirements.

The Reactor Group licensing engineer is responsible for coordinating power reactor licensing activities within the project. The licensing engineer reviews the safety-related aspects of the reactor systems design and changes to assure conformance with NRC licensing criteria and regulations. The Licensing, Safety and Nuclear Compliance organization performs the above functions for GA research reactors, fuel and material facilities, and shipping packages for radioactive materials. 11

The Reactor Systems Engineering Department of Power Reactor Programs is responsible for the analysis of the reactor systems safety and reliability. Reactor Systems Engineering develops the safety-oriented material for the safety analysis reports, including the license technical specifications.

Quality Assurance/Quality Control provides review and approval of design documents to verify that:

1. Appropriate accept and reject criteria are specified.
2. The QA Level is specified.
3. Safety-related design characteristics can be inspected and controlled.

17.3.5 Application of Materials, Processes, and Parts

Materials, processes, and parts, including off-the-shelf and commercial items used in a design, are considered for suitability of application prior to selection. This is the responsibility of the cognizant design engineer or process engineer. An independent review of the materials and processes to be used is provided by draft review or a design review board. All design documents for safety-related systems, structures, and components, including off-the-shelf commercial items, are reviewed and/or approved by Quality Assurance and comments are resolved with the cognizant engineer/originator. Procurement documents for these items are reviewed and approved by Quality Assurance.

Commercial grade or off-the-shelf items which have been dedicated for a safety-related application are identified with a GA part number which is traceable to the dedication documentation. 11

The suitability of all parts, materials, and processes is reviewed during the independent review of the design as described in Section 17.3.6.

17.3.6 Verification of Design Adequacy

The adequacy of the design of all safety-related structures, systems, and components, and of shipping packages licensed in accordance with 10CFR71, is independently verified. The method and schedule of independent verification is specified in the Draft Review Transmittal form by the cognizant design engineer. Verification addresses adequacy in such areas as reactor physics, stress, thermal, health physics, hydraulic, accident analysis, compatibility of mater-

ials, accessibility for inservice inspection, maintenance and repair, and delineation of acceptance criteria for inspection and tests.

Verification of design adequacy may be accomplished by any one (or combination) of the following methods: design review; checking of analyses by alternative or simplified calculation methods, or by application to simplified and predictable models; or suitable testing. When a test program is used to verify the adequacy of a design, a qualification test of a prototype unit under the most adverse design conditions will be used.

Persons or organizations performing the independent review of design adequacy are technically qualified individuals or groups who have an adequate understanding of the requirements and intent of the design and are independent of those who performed or directed the original design, but may be from the same organization. The designer's immediate supervisor may perform a review as a supervisor, but does not perform the independent review. 12

Independent review reports and supporting attachments become part of the approval package and of the permanent record. Any deficiencies reported in the review are resolved by the cognizant engineer to the satisfaction of the reviewer and the cognizant engineering manager, with appropriate corrective action taken.

17.3.7 Quality Assurance Classification

As a part of the design control process, the cognizant design engineer will note the Quality Assurance Level (QAL) designation and, where applicable, the ASME Code classification on design documents used for the procurement, manufacturing, installation, test, and/or inspection of safety-related items. Quality Assurance Level I (QAL I) is the designation used for all safety-related structures, systems, and components identified as quality Groups A, B, C, and D, as defined in Regulatory Guide 1.26, and for Seismic Category I, as defined in Regulatory Guide 1.29. Quality Assurance Level I (QAL I) is defined in the GA Quality Assurance Manual to include the following: Applied to nuclear system, structure, subsystem, item, or design characteristic which

prevents or mitigates the consequences of postulated accidents that could cause undue risk to the health and safety of the public. QAL I also applies to ASME Code Section III, Division 1; ASME Code Section III, Division 2; ASME Code Section VIII, Division 1 (if the equipment contains or may contain radioactive material); and ANSI B31.1 (if the equipment contains or may contain radioactive material). The safety classification for elements of shipping packages are established during the licensing criteria review process

Quality Assurance reviews the classifications applied by Engineering to design documents

17.3.8 **Design Changes**

Changes to all released design documents, including field changes, are processed by controls equivalent to those implemented for the original release, including an evaluation of the effects of the changes on the overall design. The release of changes is withheld until the highest-level document within the responsibility of the engineering branch affected by the change has been identified for processing. 11

All changes to released design documents, except non-technical changes such as spelling errors, require approval of a Quality Assurance representative. This approval signifies that the necessary quality requirements associated with the change have been provided or planned for.

Approval and release of changes to released design documents are based on the following guidelines:

1. The necessary interface requirements have been evaluated.

2. The necessary engineering analysis and review actions have been performed.

3. The documented evidence of the above has been completed and is included in the Draft Review Report or approved Change Notice file.

4. The necessary quality requirements associated with the changes have been provided.

5. The part and serial numbers to which the change is applicable have been established and noted on Change Notices.

6. All configuration control lists affected by the change will be corrected.

17.3.9 Design Document Errors and Deficiencies

Errors or deficiencies discovered in design documents prior to their release are documented on review forms or on the draft documents. Resolution of such items is required before the document or drawing is released. When a significant design change is necessary because of an incorrect design, the design process is reviewed for corrective action, as described in Section 17.16. Deficiencies that result from design document errors and that are identified during manufacture or installation are documented, and initial corrective action is taken by revision and approval of the appropriate design documents and procedures, as described in Sections 17.15 and 17.16, respectively. Additionally, prompt corrective action to rectify design control system deficiencies documented during Quality Assurance audits, as described in Section 17.18, is provided by the organization responsible for the deficiency.

17.3.10 Design Document Release and Configuration Control

The release of all design documents is the responsibility of the releasing function of the cognizant engineering organization. A "Release" stamp on design documents signifies that the design, as represented on the document, is authorized for use.

All design documents, including changes, required to define the project configuration shall be recorded in a listing of required design documents. The design document listing, communicated to all working levels on a periodic basis

as changes occur, represents the official basis for monitoring, manufacturing, and constructing the reactor system. The design documents comprising the design of a shipping package for radioactive materials subject to requirements of 10CFR71 are indicated in the associated licensing documentation. Incorporation of approved changes in the design document listing is accomplished by the designated release authority. Appropriate task sections of the design document listing in which design changes are reflected are distributed to organizations whose work is affected by the changes.

17.4 PROCUREMENT DOCUMENT CONTROL

The guidance of Regulatory Guide 1.28, Revision 3, will be complied with in the procurement of material, equipment, and services. The procurement of reactor components, systems, structures, and shipping packages is initiated by Purchasing for deliverable items upon receipt of a Request for Bid or Procurement Requisition (PR) under controlled procedures. To assure that the applicable regulatory requirements, design bases, and QA requirements are included in the procurement documents, all identifiable requirements applicable to a procurement shall be included, by the originator, either by reference or on the face of the PR. The extent of QA program requirements depends on the type and use of the item or service being procured. Commercial off-the-shelf or catalog items procured for a safety-related application are dedicated by inspections, evaluations, and/or tests pertinent to the item's intended use. 11

Test and inspection, objective evidence documentation, and other QA requirements relative to GA design documents are prescribed in procurement specifications or directly on the procurement document and indicate those records to be retained, controlled, and maintained by the supplier and those to be delivered to GA prior to use or installation of the item.

Requirements for GA's and the Owner's access to the supplier's facility and records for source inspection, surveillance, and audits are prescribed in procurement specifications or on the procurement documents.

All identification, regulatory, technical, and QA requirements are transcribed to procurement documents under the direction of the assigned Buyer. Prior to release to a supplier, all procurement documents such as Purchase Orders (POs) for original equipment, replacements, or spares are approved by signature and/or stamp of a representative of Quality Assurance or Fuels Quality Control, as applicable, who is knowledgeable of the procurement requirements. 11 The purpose of this review is to (1) verify that the referenced design document(s) and/or specification(s) are released prior to work being performed on the item, (2) assure that all necessary quality assurance requirements have

been accurately transcribed to the PO, and (3) assure that the supplier has been approved by Quality Assurance as described in Section 17.7. Documentary evidence of Quality Assurance/ Quality Control review of procurement documents is maintained by Quality Assurance.

Written QA programs are required from suppliers of safety-related equipment items under conditions described in Section 17.7 of this report, and are reviewed and approved by Quality Assurance or Fuels Quality Control, as applicable, for the requirements applicable to the supplier's scope of activity.

Changes to the requirements imposed on a supplier are initiated by describing the change or referencing a changed product description document (such as a drawing and/or specification) on a PR. The PRs that make changes to the technical or QA requirements are reviewed and approved by the same organizations that reviewed and approved the original order. PO changes initiated by PRs are approved by Quality Assurance or Fuels Quality Control, as applicable. GA procurement personnel do not have the authority to change the technical or quality requirements contained in procurement documents, without the approvals specified above.

Suppliers and subcontractors are required to establish and implement controls equivalent to those described in this section, as applicable.

17.5 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

Activities affecting the quality of GA products and services within the scope of the Quality Assurance Program described in this report are accomplished in accordance with written procedures, instructions, or drawings appropriate to the type of work. The GA Quality Assurance Manual (QAM) describes the controls that apply to each category of work, in terms of quality assurance levels. The procedures in the QAM describe the methods established at GA for complying with each of the 18 criteria of 10CFR50 Appendix B, NQA-1, 10CFR71 Subpart H, and this report. Table 17-1 identifies the procedure that implements each criterion. 11

The Quality Assurance Program Document (QAPD) for each specific project identifies which level of controls applies to which items and services being produced in the project, what procedures and/or sections of procedures are to be used, where responsibility lies for each of the controls, and what unique contractual requirements may exist. QAPDs are approved as indicated in Section 17.2.7 of this report.

As key documents in the system, product-description documents, work-authorizing documents, and instruction documents define or reference the nature and sequence of operations as well as quantitative and/or qualitative acceptance criteria for each component, system, and structure. The purpose and controls of these documents are further described in Section 17.6 of this report. The use of these key documents is assured by QA and Fuels Quality Control personnel, who verify compliance. Assurance that all activities affecting quality are documented and performed as documented is achieved by audit of the QA program by the Quality Systems organization of QA, as well as by the owners or their agents.

Suppliers and subcontractors are required to establish and implement applicable controls equivalent to those described in this section.

17.6 DOCUMENT CONTROL

Documents that establish the product description and quality requirements, or that prescribe operations to determine compliance of deliverable products with those requirements, are defined at GA as product documents. These documents are subject to control measures implemented by procedures contained in the GA Quality Assurance Manual.

To assure that it is clear, accurate, and authorized, each product document is reviewed for adequacy by knowledgeable personnel in the originating organization and is approved for release by the appropriate authorized individual(s). In addition, prior to release, each such document is reviewed and/or approved by Quality Assurance or Fuels Quality Control personnel who are cognizant of the applicable quality requirements, to verify accuracy and completeness of quality requirements in the document, presence of acceptance criteria, unique identification, etc. Review comments are resolved prior to release of the document, and the comments and their resolutions are documented for the record.

Approval of the document by QA or Fuels Quality Control signifies that the control requirements applicable to the document have been satisfied and that the document is acceptable for its intended use. Review and/or approval is indicated by signature or stamp and date on the document, or on the design review transmittal for drawings and specifications as described in Section 17.3 of this report. Changes to product documents are reviewed and/or approved by the same organizations, including Quality Assurance or Fuels Quality Control, that performed the original review and/or approval. Reviewing organizations have access to pertinent background data or information upon which to base their review and approval. 11

Planning documents which provide instruction for manufacturing operations, such as Operating Procedures for Nuclear Fuel Fabrication are reviewed by the cognizant quality engineer. Such review assures that the document identifies all applicable quality requirements and the governing design documents.

These instructions are required to be at the point of use before work starts.

The initial release and distribution of product documents and changes thereto are the responsibility of a designated releasing authority. The releasing authority is also responsible for directing the user as to the disposition of obsolete or superseded product documents previously issued. The user is responsible for verifying that he is using the correct version, as follows:

Each product document, which is uniquely numbered, is identified on a controlled list or lists that indicate the current issue letter or number to facilitate, in a timely manner, verification of use of the correct issue of a document. The lists are updated as documents are changed and reissued. Design document changes that occur between issues of the lists are permitted when supported by approved Change Notices. 11

Document types subject to these controls include:

1. QA manuals and procedures.
2. Design documents (e.g., drawings, specifications, calculations, computer programs and associated documentation, etc.).
3. Manufacturing and inspection instructions and procurement documents.
4. Test specifications, procedures, and reports.

Use of released product documents is verified by QA/QC during routine inspection operations and by conducting periodic audits of the QA system.

Suppliers and subcontractors are required to establish and implement applicable controls equivalent to those described in this section.

17.7 CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES

General Atomics complies with the requirements of Regulatory Guide 1.28, Revision 3, for the control of safety-related purchased material, items, equipment, and services to be used in power reactors. 11

Procurement planning is accomplished as early as practicable in order to assure interface compatibility and a uniform approach to the procurement process. 11

The supplier's QA organization shall have the authority and responsibility for establishing, planning, and implementing the required quality program. No single organizational pattern is mandatory. However, an organized approach that clearly defines the authority and duties of all persons involved in the quality program is required.

The supplier's QA personnel shall have sufficient organizational freedom to identify quality problems; initiate, recommend, or provide solutions; and verify implementation of solutions. This freedom shall include authority to control further processing, delivery, or installation of a nonconforming item, deficiency, or unsatisfactory condition until proper dispositioning has occurred.

In addition, the person or organization responsible for the quality program shall have direct access to responsible management at a level where action can be taken, shall be independent from the pressures of production, and shall report periodically to responsible management on the effectiveness of the program.

17.7.1 Evaluation of Supplier Capabilities

Suppliers* of safety-related materials, items, equipment, or services 11

*Suppliers in this section include licensees and co-developers who provide services and/or test data for GA use under a purchase order or subcontract agreement.

must be approved by QA as capable of complying with those requirements of 10CFR50 Appendix B, NQA-1, 10CFR71 Subpart H, Regulatory Guides, the ASME Code, etc., that are applicable to the procurement. Such approval must precede placement of the procurement action, and consists of one of the following: 11

1. Pre-award survey of the supplier's facilities and QA program by qualified GA QA personnel to determine the supplier's capability to comply with applicable elements of 10CFR50 Appendix B, NQA-1, or 10CFR71 Subpart H, as appropriate. Surveys evaluate the supplier's facilities, personnel, and quality assurance program implementation. 11

2. Review and evaluation of objective evidence provided by others in the nuclear industry resulting in a determination that the supplier is in compliance with the GA QA program requirements for the procurement. ASME certification of authorization, the Coordinating Agency for Supplier Evaluation (CASE) Register (Nuclear Section), or the NRC's Licensee Contractor and Vendor Inspection Program may be used in this regard.

Evaluations described in the foregoing paragraphs include the supplier's compliance with requirements relating to such operations as calibration, welding, nondestructive and properties testing, inspection, personnel and procedure qualification, heat treating, quality assurance records, and auditing. These evaluations are documented on a listing of approved suppliers and are used as a basis for the selection of the supplier. The status of each supplier is updated at least annually based on supplier performance revealed through inspection results, re-evaluation of the supplier's QA Program, or audit of the supplier's implementation of his GA-approved QA Program.

Commercial, off-the-shelf products are receipt-inspected as determined by Quality Assurance/Quality Control.

In the event it is necessary to process procurement documents to a supplier who is not fully approved, specific provisions to assure full quality requirements compliance must be specified in the procurement documents. Such procurement documents must be approved by the GA Quality Assurance Director.

17.7.2 Source Quality Assurance Operations

GA's QA activities at suppliers, when required, are planned, witnessed, and audited by Quality Assurance or Fuels Quality Control to verify continued and proper use of the required QA/QC capabilities as well as to assure conformance of supplier products to procurement document requirements. Depending on the complexity, quantity, or relative importance or application of the end use of the supplier's product, QA/QC source activities are defined in a source inspection planning document written and approved by the cognizant quality engineer. This document identifies the characteristics to be inspected or tested, the methods to be employed, and documentation required. Mandatory QA/QC activities at the source are established with the supplier to assure that planned coverage is accomplished prior to formal release of the product for shipment. Source activities performed by GA personnel do not relieve the supplier of his responsibility to verify quality achievement. Quality Assurance audit activities at the supplier's plant, as described in Section 17.18 of this report, include verification that the supplier's QA activities produce documented evidence of compliance with requirements of the procurement documents and compliance with the documented procedures that control the operations performed. GA QA/QC activities at a supplier's plant are performed by GA inspectors, QA representatives, or quality engineers. On occasion, other personnel who have been appropriately trained and qualified are utilized for QA/QC activities if GA QA has determined that they can and will be able to operate independent from management pressure. GA may use approved consultants to perform activities at its suppliers when deemed appropriate. 11 11

Prior to release of the supplier's product for shipment, or during receiving inspection at GA, the supplier's quality records are reviewed for compliance with requirements of the procurement documents. Where supplier certificates of conformance are the specified documentation, validity of the certificates and effectiveness of the supplier's certification system are verified at intervals by independent inspection or test of items that have been so certified, or by GA audits of the supplier in accordance with Section 17.18 of this report. Intervals are determined on the basis of the supplier's past quality performance.

Copies of records stipulated in Regulatory guide 1.28, Revision 3, or the ASME Code as lifetime/permanent plant records are obtained, or record delivery commitment dates are established, to provide assurance that the records are available at the construction site or GA prior to installation or use of the supplier's product. Responsibility for delivery of the applicable records to the construction site prior to installation lies with the cognizant quality engineer or designee when final inspection at source is stipulated. The supplier's product is released on a GA Work Release form, prepared and approved by the GA QA representative, which signifies GA's QA approval for shipment to the receiving organization. Omitted or incomplete operations and documentation are identified on the Work Release directly or by reference to a Nonconformance Report (NR) or Supplier's Disposition Request (SDR). NRs or SDRs with GA QA-approved disposition actions not completed at the supplier's plant are also referenced on the Work Release to assure completion at the point of delivery. A copy of the Work Release form is sent to the GA Quality Assurance organization at the point of delivery to assure that the open items are identified and accomplished prior to commercial operation.

As a minimum, the certified Work Release form accompanying the item to the point of delivery will provide the following information:

1. The GA procurement document and revision to which the item was manufactured.

2. The engineering design document and applicable revision that defines the product.

3. A listing of all undispositioned and "open" nonconformance reports and supplier disposition requests.

4. A unique identifier of the specific source inspection plan(s) used.

5. The GA QA representative's signature, which provides certification and approval that all the required GA operations have been performed, or omitted operations and documentation are as noted on the Work Release.

17.7.3 Destination Quality Assurance Operations

As a minimum, materials, parts, components, and systems are inspected at the point of delivery for identification, damage, and documented evidence of prior source acceptance of the item by a GA Quality Assurance representative according to instructions specified and documented by the cognizant quality engineer. If not previously reviewed by GA at the source as evidenced on a Work Release form, the records prescribed by the procurement document and documents referenced therein are reviewed at the point of delivery to assure that the results show compliance with the applicable acceptance criteria. Prior to release of the supplied item for use, the receiving inspector documents on a controlled receiving inspection instruction the operations he performed, as well as his acceptance of the item delivered. Accepted items are tagged or otherwise identified to indicate the inspection status and are forwarded to a controlled storage area or released for installation or further work. Whenever possible, nonconforming items are held in a segregated or controlled area, their status clearly identified by tagging or other appropriate means, and with the appropriate documentation, until final disposition is made.

Suppliers and subcontractors are required to establish and implement equivalent controls as described in this section, as applicable.

17.8 IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS

Requirements for the identification of materials, parts, and components are established during design and are recorded or referenced on the drawing or specification. Methods and materials that provide legible markings not detrimental to the item are used.

The degree of identification, such as heat number, serial number, part number, or specification number, provided on the drawing or specifications is such as to assure material or item traceability to drawings, specifications, or work documents from receipt of raw material through fabrication, final inspection, receipt inspection, delivery, end use, or until the item is consumed, as applicable. 11

Compliance with identification requirements is verified and documented by receiving, in-process, and source inspection personnel, according to QA/QC instructions. Documents referenced or requirements contained on the procurement documents require suppliers of safety-related equipment to establish and implement methods for the identification and control of materials, parts, and components consistent with 10CFR50 Appendix B, NQA-1, or 10CFR71 Subpart H, as applicable, and GA requirements. 11

17.8.1 Materials

For GA-manufactured items, raw materials such as plates, bars, forgings, and castings are identified by heat number or heat code marked on the material, when required by drawing or specification. Additionally, the Purchase Order and item number is painted on the material when required. Virtually all such raw materials are procured to an end-use part number, which is identifiable on the Purchase Order. Similarly, welding filler materials are controlled and identified in accordance with ASME Code requirements.

For fuel element fabrication, raw materials such as uranium oxide, thorium oxide, and graphite are identified by lot numbers with identification, either by stenciling, painting, or tagging. Each lot of raw material is identi-

fied on its packaging with the GA specification number, the Purchase Order number, the amount of material involved, the lot or batch number, and the accountability form numbers.

The activities associated with material identification are inspected and audited by Quality Assurance to assure proper implementation of the requirements.

17.8.2 **Parts and Components**

GA-manufactured items, parts, and components are identified with unique part numbers marked on the item, part, or component, as prescribed on the drawing or specifications. Each level of assembly completed is identified by a part number. Fabrication, process, and inspection documentation is identified by the batch, part, component, serial, and/or heat numbers and traveler numbers, where such identification is necessary to provide traceability to the specific item fabricated, processed, or inspected. These activities are inspected and audited by Quality Assurance to assure proper implementation of the requirements.

17.9 CONTROL OF SPECIAL PROCESSES

Special processes, such as welding, brazing, heat treating, nondestructive testing and specific fuel process and inspection activities are controlled, as required, by the applicable Section of the ASME Code and/or by GA process specifications. The GA QA Program, including its provisions for controlling ASME Code related special processes, has been certified by the ASME as acceptable, on the basis of their surveys. Where the design requires the use of a special process, the applicable design document specifies the process and the acceptance criteria. Special processes will be performed in accordance with written controlled procedures which specify process parameter controls, applicable environmental conditions, acceptance criteria, the equipment to be used when specific equipment is required, and personnel, process, or equipment qualifications necessary for special processes not covered by existing codes and standards, or where quality requirements for an item exceed those of existing codes and standards. Procedures or instructions are reviewed and approved by cognizant Quality Assurance or Quality Control personnel, as indicated by signature or stamp, and means will be provided for recording evidence of verification of compliance in the application of these processes. 11 11

Personnel who will perform special processes are certified upon completion of applicable training and examination. Such training and examination complies with the recommendations of SNT-TC-1A, 1980 for nondestructive examination processes covered by that document, and is accomplished in accordance with specially developed process qualification procedures for processes not covered by SNT-TC-1A, 1980.

Results of examinations and other data demonstrating that GA's special process procedures, equipment, and personnel satisfy established qualification criteria are maintained in active, current files by Quality Assurance and/or Quality Control, as applicable. The Quality Systems organization monitors the records of annual physical examinations and triennial requalifications of NDE personnel and provides notification of approaching re-examination dates.

Fuels Quality Control monitors the qualification status of fuel manufacturing special process personnel, notifies appropriate management of impending qualification lapses, and verifies any necessary requalification.

Suppliers and subcontractors are required to establish and implement applicable controls equivalent to those described in this section.

17.10 INSPECTION

Inspection activities, including source inspections, are performed by personnel of Quality Assurance, Fuels Quality Control, or other independent personnel who have the experience or training commensurate with the scope, complexity, or special nature of the activity. All personnel performing inspections are qualified according to Regulatory Guide 1.28, Revision 3. 11

The QA activities necessary to perform source and final inspection of supplier furnished items are described in sequence in inspection plans prepared by the cognizant quality engineer of Fuels Quality Control or Quality Assurance. This plan identifies characteristics, methods, and acceptance criteria and provides for the required special tools, gages, and/or released documents necessary to control a particular inspection operation, and for recording objective evidence of inspection results. For GA-manufactured items and for receiving inspection planning, detailed instructions or procedures (travelers, inspection plans, or receiving inspection plans), prepared and/or approved by Quality Assurance/Quality Control are used to integrate inspection operations with fabrication operations, provide the required in-process inspection instructions, and provide the appropriate receiving inspection instructions for supplier furnished items. The inspection planning documents require that each inspection operation be documented by stamp and date, and that the inspection results or item acceptance status be documented. 11 11

Space is provided on travelers, inspection plans and receiving inspection plans to note serial numbers of Nonconformance Reports and Supplier's Disposition Requests on which discrepancies are recorded. Where detailed inspection procedures or instructions are used for laboratory operations, the Nonconformance Report/Supplier's Disposition Request serial numbers are entered into documentation systems that provide administrative control of the product or item, and associates the Nonconformance Report/Supplier's Disposition Request serial numbers with the product identification. The inspection document is required to be at the work station before the inspection activity is performed. The individual performing an inspection or acceptance measurement or test shall check to assure that the device or instrument to be used meets calibration interval requirements.

Mandatory hold points are identified on the inspection planning document to satisfy the requirements of the applicant, the ASME Authorized Nuclear Inspector, and the cognizant GA quality engineer. Before release, each inspection planning document is approved by the cognizant GA quality engineer to signify that, as applicable, the following have been included in the document or inspection instructions referenced thereon: (1) identification of the quality characteristic to be inspected; (2) identification of the individual or organization responsible for performing the inspection operation; (3) the accept or reject criteria; and (4) a description of the method of inspection, when appropriate. Cognizant inspection personnel from GA QA or Fuels Quality Control review the inspection planning document when the manufacturing sequence is complete to assure that a record of results and evidence of completion and certification exists for each operation prior to final approval of the document.

A Quality Assurance Work Release is used when GA inspection is required to verify that all quality requirements listed on the drawings, specifications, and Purchase Orders have been accomplished prior to shipment of a product. A QA Work Release is generated by cognizant GA QA personnel for all GA deliverable items to release them for shipment.

As a minimum, the Work Release form used to release deliverable items for shipment and accompanying the item(s) to the point of delivery will provide the following information:

1. The customer's procurement document number and/or contract number to which the item was manufactured.

2. The engineering design document and applicable revision that defines the product.

3. A list of all unapproved discrepancy reports (customer concurrence to ship is required).

4. A list of all nonconformance reports or supplier disposition requests with a disposition of "Use-As-Is" or "Repair".

5. The final inspection condition of the item.

6. The cognizant GA QA person's signature.

Contractually required construction site inspections will be performed by GA subcontractor inspection personnel who are independent from the individual or group performing the activity being inspected. GA's subcontractor for the contractually required construction of the reactor system will work to a Quality Assurance Program approved by GA Quality Assurance. GA's Quality Assurance site representatives will provide surveillance, monitoring, and auditing of the performance of the inspection operations of the contractor to the GA-approved Quality Assurance Program. Inspection operations will be controlled by procedural documents that include definition of the methods of inspection and recording of results as described in the preceding paragraphs. Documents used for the inspection of installation and erection operations for GA-supplied components, systems, and structures are subject to approval by cognizant GA Quality Assurance personnel prior to use. To assure appropriate GA coverage, QA activities are established in quality assurance planning. This planning includes inspection and tests that GA Quality Assurance will witness or audit. Mandatory hold points in the installation procedures will be established to assure necessary inspection and/or witnessing by GA Quality Assurance personnel and the applicant.

Release and revision of integrated inspection planning documents such as procedures, etc., are reviewed by designated members of the GA technical organizations as well as by cognizant quality engineers in Quality Assurance or Fuels Quality Control.

The Nonconformance Report, Supplier's Disposition Request, and Material Review Board (MRB) controls described in Section 17.15 of this report are used

at the construction site, at GA, and by the supplier to assure that modifications, repairs, and replacements are inspected to the appropriate design requirements.

Through training programs (Section 17.19), including on-the-job training, examinations, and experience, GA inspectors' qualifications are kept current with the needs of the work to be performed. Records of inspector qualifications are maintained by Quality Systems. 11

As described in Section 17.12 of this report, the equipment used for inspection is of the proper type, range, accuracy, and tolerance to accomplish the inspection and is calibrated at prescribed intervals. 11

Rework and repairs made after the initial inspection or test are inspected by QA or QC personnel or tested by the responsible organization in accordance with the original method and acceptance criteria, or as described in the disposition description on an approved Nonconformance Report or Supplier's Disposition Request (Section 17.15). Modifications and replacement items are inspected by QA or QC personnel in accordance with methods and acceptance criteria specified for the original item or as prescribed by the released design documents for the modification or replacement items.

If direct inspection of processed items is impossible or disadvantageous, indirect control by monitoring of processing methods, equipment, and personnel shall be conducted by GA Quality Assurance or Quality Control. Where process control is used by production personnel (e.g., fuel processing) to assure compliance with process specification requirements, QA or QC personnel will perform surveillance overchecks to assure compliance with procedural requirements. Both inspection and process monitoring are used when control by one is inadequate, to assure that the specified requirements for control of the process and quality of the item are being achieved throughout the duration of the process. 11

Inspection records are controlled as described in Section 17.17 and identify the (1) item inspected; (2) date of inspection; (3) inspector; (4) type of observation; (5) results or acceptability; and (6) reference to information on action taken in connection with nonconformances. 11

Suppliers and subcontractors are required to establish and implement applicable equivalent controls as described in this section.

17.11 TEST CONTROL

17.11.1 Preinstallation and Proof Tests

Preinstallation and proof testing to demonstrate that components or parts will perform satisfactorily in service is described in written test specifications or test procedures or in test plans that incorporate test specifications and/or procedures. These test specifications, and/or procedures, are approved by the cognizant design/test engineer. The cognizant quality engineer reviews and provides comments for resolution prior to release of the test specification and procedure.

Test procedures incorporate or reference:

1. The requirements and acceptance limits contained in applicable design documents.

2. Instructions for performing the test.

3. Test prerequisites such as:

   - Calibrated instrumentation.
   - Adequate and appropriate equipment.
   - Trained, qualified, and licensed or certified personnel.
   - Completeness of item to be tested.
   - Suitable and controlled environmental conditions.
   - Provisions for data collection and storage.

4. Mandatory inspection hold points for witness by owner, contractor, or QA inspector.

5. Acceptance and rejection criteria.

6. Methods of documenting or recording test data and results.

When required by the nature of the testing or test set-up, test specimens and test apparatus are examined by the Quality Control or Quality Assurance inspector for compliance with the test prerequisites cited in the released test specification. Test results are recorded, verified by GA QA/QC personnel when appropriate, and the test report is evaluated by the cognizant design authority to assure that the test requirements have been satisfied. Similar test controls are utilized for shipping packages for radioactive material prior to use.

Suppliers and subcontractors are required to establish and implement applicable controls equivalent to those described in this section.

17.11.2 Construction Testing

Construction testing includes contractually required tests performed to verify that a system or component is ready for preoperational and operational testing. Test specifications prepared by GA or at their direction are reviewed by cognizant personnel of Quality Assurance. The test specifications require submittal of a test procedure and Quality Assurance is included in the review of the test procedure. The test procedure shall define the conditions and equipment required for the test, the sequence of test operations, and the acceptance criteria as outlined above. Inspectors responsible to the senior site representative of Quality Assurance monitor construction tests that are within GA's scope, and signify acceptable performance and results by signature or stamp on the appropriate operation or data sheet as designated in the applicable procedure.

17.11.3 Operational Testing (In-Reactor)

In-Reactor operational testing, such as physics testing, is the responsibility of the owner. For the initial loading and physics test program, requirements of physics testing for the core are delineated in written procedures provided to the owner by GA. Cognizant GA personnel will provide assistance to the owner, as appropriate, and will be available for consultation relative to test program details.

17.12 CONTROL OF MEASURING AND TEST EQUIPMENT

Measuring and test equipment used for acceptance of products manufactured by GA are identified with unique numbers which are recorded on maintenance and calibration records maintained by the responsible GA calibration facility. Each record documents the frequency of calibration specified in the controlling Quality Procedure, the calibration history and maintenance actions taken, and the custodian of the equipment. Items are calibrated periodically by the responsible GA calibration facility or a QA-approved supplier of calibration services in accordance with predetermined calibration interval tables based on frequency of use, required accuracy, stability characteristics, and other conditions affecting measurement control. The records are arranged by a computerized system to recall-for-calibration dates to effect recall of equipment not submitted at the specified intervals. When equipment size permits, a calibration sticker is attached as visual evidence of calibration and the due date of the next calibration, otherwise the calibration sticker is affixed to the equipment container. Suppliers and subcontractors are required to establish and implement equivalent controls as described in this section for procured items, as applicable.

For GA-manufactured items, the facility for calibration of standards furnishes a certification document that identifies the calibrating standards used and their accuracies. These documents are maintained by the responsible GA calibration facility. External suppliers of calibration services are evaluated for QA approval as described in Section 17.7 of this report (i.e., by facility survey) to determine if the facility has the required capability to meet the accuracy requirements and has a suitable control system in place to assure validity and traceability of its calibrations. Periodic audits verify that this capability is maintained.

Standards used to calibrate measuring equipment or calibration standards have an uncertainty (error) no more than one-fourth of the uncertainty of the equipment or standard being calibrated. The acceptability of an uncertainty greater than this requires a case basis evaluation by the cognizant quality

engineer.

Calibration is performed against standards of known accuracy. Standards traceable to the National Institute of Standards and Technology (NIST), or 11
(nationally recognized standards as appropriate, are used when they are r(onably available to industry. When such standards are not available, the method of calibration used is documented and retained in the calibration files. Calibration is performed under environmental conditions commensurate with equipment accuracy requirements.

If an instrument is found to be out of calibration, the responsible manager or designee conducts and documents the results of an investigation to determine the validity of previous inspections, the quality status of items previously measured with the unacceptable instrument, and the need for performing additional inspections.

Suppliers are required to establish and implement equivalent controls for procured items, as applicable.

17.13 HANDLING, STORAGE, AND SHIPPING

Requirements for handling, storage, shipping, cleaning, and preservation will be specified on drawings, specifications, and procurement documents in accordance with Regulatory Guide 1.28, Revision 3, during the design phase or prior to procurement of the item for power reactor components. Fuel shipping containers are designed, tested, and licensed by the NRC in accordance with requirements stipulated in 10CFR71 and associated governing codes.

The cognizant design engineer is responsible for defining the measures for special packaging, shipping, storage, and handling of materials and products in accordance with governing code and regulatory requirements or other requirements which he determines will provide equivalent protection and control. These measures are intended to prevent loss, damage, deterioration, degradation, and substitution, and will specify any necessary provisions for special protective environments.

For GA manufacturing operations, these requirements are specified on the traveler authorizing and sequencing all operations including those necessary to handle, store, package, preserve, clean, and deliver a quality product. For fuel elements, requirements are described in the Manufacturing Operating Procedures, quality procedures and instructions, and in the Special Nuclear Material License.

Verification of inclusion of the appropriate quality requirements in design documents, procurement documents, packaging and handling procedures, and instructions is accomplished by Quality Assurance or Quality Control (as appropriate) review of the particular document involved as described in Sections 17.3, 17.4 and 17.6 of this report.

17.14 INSPECTION, TEST, AND OPERATING STATUS

The inspection and test status of GA-manufactured items is indicated by attaching tags, where practicable, to the item imprinted "Accept" (final), "In-Process Acceptance," 'Hold" or "Notice of Discrepancy" (for discrepancy disposition), or "Reject." Part and serial numbers of the item trace it to the traveler, run sheet, and/or release sheet, which controls and records the fabrication. (Operational status tags will be used during site installation and test operations by the site construction QA organizat on to indicate the status of components, systems, and structures to prevent their inadvertent operation where such operation would be detrimental to the quality of the component, system, or structure or would create a safety hazard.) Tags and/or completed traveler inspection activities are validated by the cognizant GA inspector's stamp or signature and the date it was applied. Inspection status tags shall be attached and/or removed only by cognizant Quality Assurance or Quality Control personnel.

Quality Systems is responsible for the design, control, issuance, and use of inspection, welding, and quality engineering stamps and quality status tags.

Bypassing of required inspections, tests, and other critical operations, controlled through documented measures that require Quality Assurance or Quality Control personnel concurrence, are handled in accordance with GA's procedures for handling nonconforming materials, parts, and components, as described in Section 17.15 of this report.

Suppliers and subcontractors are required to establish and implement applicable controls equivalent to those described in this section for procured items.

17.15 CONTROL OF NONCONFORMING ITEMS

For GA-manufactured items, a Nonconformance Report System is used by GA under the control of Quality Assurance to document discrepancies and to obtain authorized dispositions of discrepant parts, components, systems, or structures. The accountability of these reports is achieved by recording their serial numbers on the traveler, test procedure, or other QA-approved work instruction documents.

When a nonconformance is first detected, either by GA Manufacturing or Quality Assurance/Quality Control personnel, a Hold tag or Notice of Discrepancy tag is immediately attached to the item(s) where practicable, and the nonconforming item is withheld from normal production channels, unless size or processing stage precludes removal, to prevent installation or use. The discrepancy is recorded on the Nonconformance Report (NR) by Quality Assurance/Quality Control personnel. The cognizant inspection supervisor or quality engineer consults with predetermined qualified people of other departments to evaluate the discrepancy and arrive at an approved disposition. Personnel performing evaluations to determine a disposition have demonstrated competence in the specific area they are evaluating, have an adequate understanding of the requirements, and have access to pertinent background information. Dispositions provided are "Use-As-Is," "Rework," "Repair," "Reject," and "Return to Supplier." The terms "Use-As-Is," "Repair," and "Rework," as used by GA, are as defined by Regulatory Guide 1.28, Rev. 3. 11

Repair (except for a routine weld joint rework made in compliance with the original welding procedure before the item leaves the area where the original welding was performed) is not performed on ASME Code Section III materials, fabricated parts, or components without concurrence of the Authorized Nuclear Inspector. Radiographs and procedures for weld joints requiring repairs are made available for Authorized Nuclear Inspector review and are inspected to the same criteria as the original welds.

The Material Review Board (MRB), a technical group chaired by the QA or QC representative, is responsible for approving all "Use-As-Is" or "Repair"

dispositions of nonconforming items. The Board is comprised of representatives technically qualified and knowledgeable in the engineering nature and end use of the nonconforming item(s). For ASME Code Section III items, a GA registered Professional Engineer, competent in the field of pressure vessels and related components design, is included.

Standard repair procedures are used to provide dispositions for recurring discrepancies inherent in the process but not considered significant. Each standard repair procedure is approved by the MRB before it is used in production.

Suppliers use the GA Supplier's Disposition Request (SDR) form to request GA MRB consideration of discrepant items for acceptance or repair, forwarding the completed SDR to GA with supporting detail sufficient to permit a proper judgement to be made. Quality Assurance representatives use the SDR to initiate action on nonconformances identified during their activities relative to procurements. SDRs are also used by a supplier to request a deviation from drawing or specification requirements.

After verification that the work and/or repair and reinspection requirements, as stated or referenced on the NR/SDR, have been satisfactorily accomplished, cognizant QA or QC personnel will stamp or sign and date the NR/SDR and release the item for further processing. Copies of completed NRs/SDRs relative to "Use-As-Is" or "Repair" of safety-related items are forwarded to the Owners or their designated representatives in a timely manner after disposition of the NR/SDR to assure that the customer has this information before the items are received at the site.

Quality reports are generated by Quality Assurance to identify quality activities and problems and the effectiveness of corrective action taken. Such reports are distributed to cognizant Senior Vice Presidents, General Managers, Directors, and to managers of the appropriate departments.

At the construction site, the Nonconformance Report form and the MRB perform the same functions as at GA to control the construction activities of GA subcontractors. Nonconformance Reports are logged by the GA QA senior site representative.

17.16 CORRECTIVE ACTION

GA Quality Assurance operates a Corrective Action Request (CAR) system for documenting significant conditions adverse to quality (including hardware nonconformances, design errors, and quality system deviations or deficiencies), determining the cause of and establishing corrective action for such problems, and informing appropriate levels of management of such significant conditions, their causes, and the corrective actions taken. Any GA employee may initiate a CAR, and any significant GA condition adverse to quality that is brought to the attention of GA QA is incorporated in the CAR system for resolution and reporting.

Each CAR is channeled through Quality Assurance for logging and transmittal to the manager(s) responsible for defining and implementing corrective action.

The recipient documents the cause, action taken to correct the observed conditions, action to locate and correct similar conditions (if any), action to prevent recurrence, and the scheduled completion date for each kind of action, on the CAR. The CAR is then returned to Quality Assurance for evaluation of the adequacy of the proposed actions and schedules. Evaluation is performed jointly by senior QA personnel and the CAR initiator.

Each entry in the CAR log remains open until Quality Assurance verifies that the corrective action has been accomplished. Follow-up is accomplished as appropriate to verify the effectiveness of the implemented corrective action.

Customer requests for corrective action of a quality nature are forwarded to the Director, Quality Assurance for investigation, corrective action, and reply. Additional corrective action measures associated with audits are discussed in Section 17.18 of this report.

Corrective action requirements consistent with 10CFR50 Appendix B, NQA-1, or 10CFR71 Subpart H requirements are specified or referenced in procurement documents. ||11

Any GA employee who becomes aware of what appears to be a defect in a basic component that has been supplied for use in an NRC-licensed facility, or a noncompliance within the meaning of 10CFR21 that relates to or could create a substantial safety hazard at an NRC-licensed facility, reports it immediately to his or her supervisor and to the Chairman, Nuclear Defects and Noncompliance Committee.

17.17 QUALITY ASSURANCE RECORDS

Specific records that are evidence of performance and acceptance of activities affecting quality are identified in the engineering design documents, inspection and test procedures, and/or inspection documents. Applicable types of records and storage requirements are in compliance with Regulatory Guide 1.28, Revision 3. Most records are microfilmed and indexed for computerized retrieval. Microfilm duplicates are stored in remotely separated facilities. Records that are not microfilmed are stored in facilities constructed to prevent record deterioration from environmental conditions such as humidity, temperature, flooding, and damage due to fire or biological agents (such as insects or rodents).

The responsibility for obtaining, maintaining, and verifying timely delivery of the records to the construction site lies with the cognizant quality engineer. The retention and disposition of the required Quality Assurance records shall be established by the owner.

Product data records are managed by the procedures within QA and QC. The procedures provide complete accountability, retention, and retrieval information for quality assurance records used to determine, or created to record, compliance of GA products. As a minimum, product data records shall include:

1. Copies of GA unpriced procurement documents.

2. Configuration data including all "Use-As-Is" and "Repair" Nonconformance Reports (NR) and Supplier's Disposition Requests (SDR).

3. Copies of the fully executed GA source inspection plans, when applicable.

4. Copies of QA work releases.

Prior to final item acceptance, QA/QC personnel review work documents such as inspection and test procedures and manufacturing travelers to verify that evidence exists for (1) the completion and/or verification of manufacturing, inspection, or test operations; (2) results of the inspection or test; and (3) information related to nonconformances, inspector identification, and item acceptability. Such verification is evidenced by Quality Assurance or Quality Control personnel stamping and signing the documents for "Make" items. Initials are permitted in lieu of signatures, when cross-indexed initials and signature lists are a part of the permanent record. Suppliers are required to provide equivalent verification for QA "Buy" items.

17.18 AUDITS

The guidance of Regulatory Guide 1.28, Revision 3, is implemented by Quality Assurance. The system of reporting the results of internal audits differs slightly from the standard in that the results and corrective action commitments are compiled in a single audit report. The GA system is given in the following paragraphs.

The Quality Assurance documented procedures for conducting audits of the activities affecting quality within the GA and supplier organizations require that each audit be performed to an approved audit plan and checklist. The checklist identifies the points that are to be checked during the audit to verify implementation of the controls described in this report and compliance with the applicable policy directives and procedures. Each audit includes a reevaluation of the adequacy of the applicable part of the established GA QA program and of the effectiveness of the QA program in the audited areas. Additionally, the audits include the evaluation of work areas, activities, processes, and items, and the review of documents and records. When appropriate, these audits will also include periodic reinspections/tests of previously accepted items to assure validity of the documents and records.

Schedules of audits of the QA Program are established to coincide with and highlight the various organizational activities during the design, procurement, fabrication, construction, installation, and testing phases of the project. Active elements of the QA Program are scheduled for audit by Quality Systems at least once each year. The frequency is increased for more important functions, and shorter term programs are audited at least once during the life of the contract. Audits of suppliers and subcontractors of safety-related items are performed by Quality Assurance. These audits are determined by the nature and phase of fabrication activity and by the criticality of the items involved. Audit schedules and plans are coordinated with the Owner, the architects and engineers, and the constructor(s), as appropriate for their information and participation. 11

Follow-up audits to verify the effectiveness of documented corrective actions are coordinated by QA in accordance with procedures contained in the GA Quality Assurance Manual.

Quality Systems provides assistance to the cognizant quality engineer and/or the Fuels Quality Control Manager, during all regulatory agency and customer audits and follows through to assure all corrective action commitments are completed.

QA personnel discuss the audit findings with the responsible management in the areas being audited to assure that the documented findings are concurred with and understood, and that the necessary action is taken to correct the deficiencies revealed.

Audit reports are distributed by Quality Systems to the appropriate Senior Vice President(s) and the Director of Quality Assurance, as well as to the other cognizant managers of GA and to suppliers, as applicable. Audit reports at the construction site will be distributed, as appropriate, by QA to the owner, the architect and engineer, and the constructor(s). These audit reports, which reflect quality trends or deficient areas, provide management with an indication of the effectiveness of GA's QA Program. In addition, overall effectiveness of GA's QA Program is assessed every three years by upper level GA management personnel, as described in Section 17.2 of this report.

QA auditors are selected for their knowledge of the Quality Assurance system as it affects the operations to be audited. Where specific knowledge of the technologies involved in an audit is necessary, technical specialists are included in the audit team. In every case, those selected to perform audit operations have no direct responsibility for the operations to be audited. GA may use approved consultants to perform audits when deemed appropriate.

GA Quality Assurance maintains files of plans used, audits conducted, and resulting actions. These files are available for customer access at the GA facility in San Diego, California.

Suppliers and subcontractors are required to establish and implement equivalent audit controls at their facilities and their supplier's facilities.

17.19 QUALITY ASSURANCE TRAINING

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The Director, Quality Assurance, is responsible for assuring the development, implementation, and maintenance of programs for the training, qualification, and certification, as appropriate, of personnel performing activities affecting quality. The Director, Quality Assurance, is also responsible for evaluating the effectiveness of each group's Quality Assurance training program, which is accomplished by auditing as described in Section 17.18. All other GA directors and managers are responsible for assuring that their personnel acquire and maintain an adequate working knowledge of GA Quality Assurance requirements that directly affect their work. Each new employee to be assigned to an activity affecting quality receives the GA QA indoctrination brochure.

11

The QA Managers are responsible for training, evaluating, and certifying the qualification of personnel performing inspection and test activities. Qualification of personnel performing quality assurance activities complies with Regulatory Guide 1.28, Revision 3.

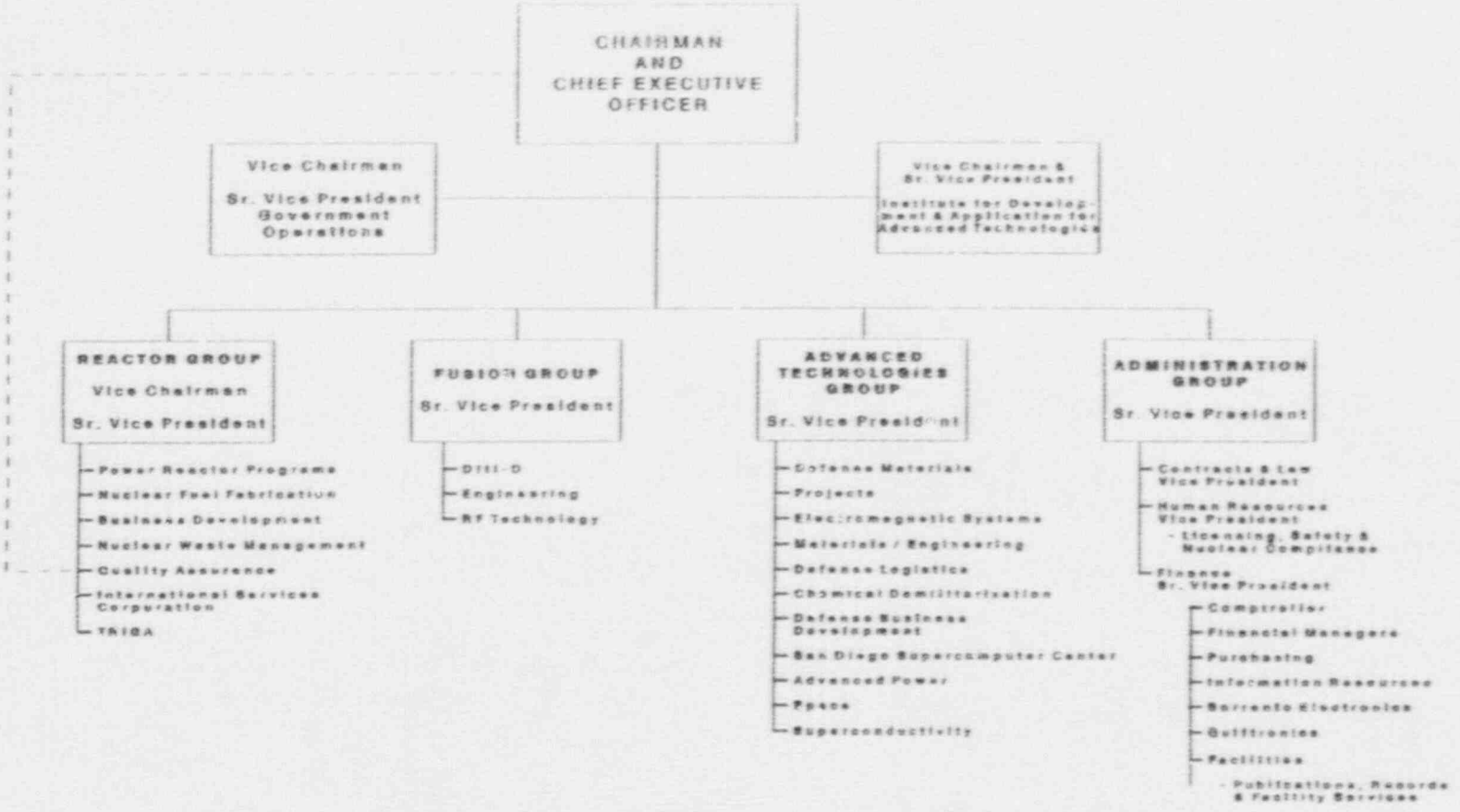
11

Specialized training courses for detailed studies in specific fields are developed and presented as management review of performance indicates a need. The training programs include training in the special processes leading to certification of compliance in accordance with the requirements of SNT-TC-1A, 1980, and Regulatory Guide 1.28, Revision 3, or in accordance with specially developed process qualification procedures for processes not covered by SNT-TC-1A, 1980.

Records of all formal training conducted by QA are maintained by Quality Assurance. These records include training schedules, the date(s), duration, subject(s), and attendance rosters for each course, and summaries or outlines of the material presented.

11

GENERAL ATOMICS OPERATING ORGANIZATION

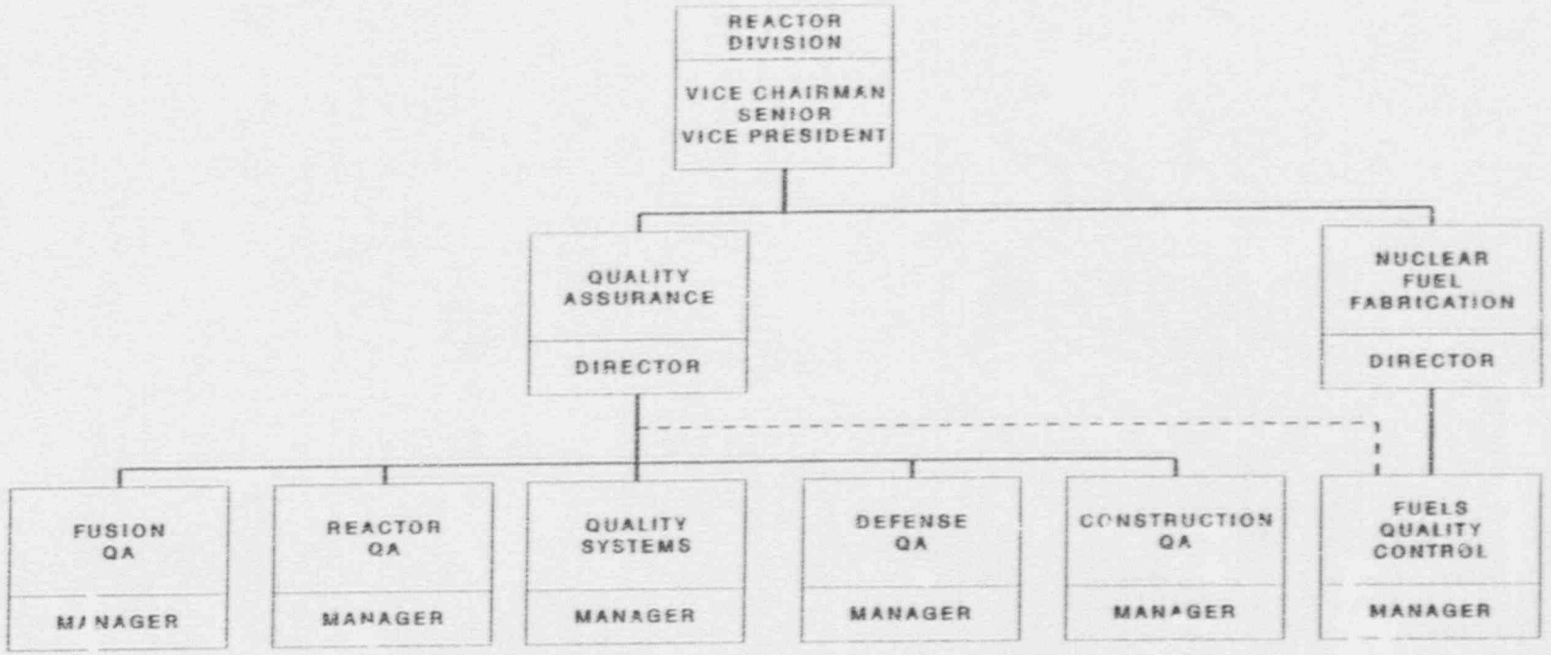


LEGEND

- - - - - - - - The Director QA has direct access to the Chairman of GA for all areas concerning the implementation of the QA Program.

_____ Lines of Authority

FIG. 17-1 GA OPERATING ORGANIZATION



LEGEND:
_____ DIRECT MANAGEMENT AUTHORITY
- - - - - - - - LINES OF COMMUNICATION OF QA POLICY

FIG. 17-2 QUALITY ASSURANCE ORGANIZATION

FIG. 17-2 QUALITY ASSURANCE ORGANIZATION

REACTOR QA ACTIVITIES

Define the QA program requirements for reactor programs.

Provide QA input and approval of proposals issued in area of responsibility.

Maintain current knowledge of proposal activity in area of responsibility to assure that proposals requiring QA approval are submitted in a timely manner.

Manage the reactor QA program for each project and assure QA program effectiveness through reviews and audits.

Coordinate reactor project audits by the customer and regulatory agency representatives at GA or GA's suppliers and provide resolution and corrective action responses for audit deficiencies.

Prepare, implement, and maintain QAPDs and QAPIs.

Prepare and coordinate QA input to all sections of the SAR including the entire Chapter 17. Maintain the SAR current with GA's QA Manual and regulatory requirements.

Translate contractual and regulatory requirements into working documents, also prepare test, source inspection and receiving inspection plans.

Provide reliability and statistical support to QA and Engineering.

Maintain and monitor tools, gages, and equipment used for product acceptance.

Maintain communications for quality matters across internal and external organizational interfaces.

Assure use of qualified personnel for special processes.

Perform source surveillance and inspection.

REACTOR QC ACTIVITIES

Verify that the required quality has been achieved and that work conforms to requirements.

Perform receiving, inprocess, and final inspections.

Provide control and calibration of measuring and test equipment.

FIG. 17-2 QUALITY ASSURANCE ORGANIZATION

QUALITY SYSTEMS QA ACTIVITIES

Develop and monitor implementation of new or improved Quality Systems.

Process and control Quality Assurance documents which implement the QA program.

Manage the Quality Assurance records program.

Provide control of Quality Assurance machinists', welders', and manufacturing engineers' stamps.

Operate the QA audit and corrective action system.

Plan, schedule, and coordinate the QA training program.

Evaluate supplier QA programs.

Perform failure trend analysis.

Represent QA on CASE.

FIG. 17-2 QUALITY ASSURANCE ORGANIZATION

CONSTRUCTION QA ACTIVITIES

Review quality plans for installation of equipment.

Determine witness and hold points for surveillances.

Perform surveillance of contractors.

Document nonconformances.

Coordinate disposition of discrepancies with GA plant operations.

Maintain records associated with quality.

Coordinate QA activities with other site contractors and the owner.

Direct the stopping of work by the site contractor if required.

Audit contractor QA program applied to installation of equipment.

Provide a surveillance for preoperational testing.

FIG. 17-2 QUALITY ASSURANCE ORGANIZATION

FUELS QUALITY CONTROL QA ACTIVITIES

Review design and procurement documents for fuel items.

Prepare inspection instructions and perform process and product monitoring measurement, evaluation, and testing to determine compliance of fuel materials and products with requirements, and issue material releases.

Inspect fuel materials at source and QA on receipt to assure compliance with GA Purchase Order requirements, including special nuclear materials requirements.

Maintain a quality control laboratory, appropriately equipped to determine that deliverable fuel is in compliance with design requirements.

Perform supplier surveillance and/or qualification for fuel related items.

Control calibration for production processes and product measurements.

Manage the nonconforming material review process for fuel operations.

Maintain liaison with customer representatives and provide them with assistance regarding the quality engineering aspects of GA fuel fabrication. Prepare and present documentation packages for review by customer representatives and provide information on quality control matters as requested.

TABLE 17-1

GA IMPLEMENTING DOCUMENTS

GA Implementing Document	Title	10CFR50 Appendix B 10CFR71 Subpart H NQA-1-1983 Criteria	Description
GA Quality Assurance Manual (QAM), Quality Procedure (QP) No. 1	Organization	I	Identifies organizations and their relationships in performance of activities affecting quality.
QAM, QP No. 2	QA Program	II	Describes basic methods for establishing a documented QA Program that implements requirements of Appendix B to 10CFR50, Subpart H to 10CFR71 and contracts with customers.
QAM, QP No. 3	Design Control	III	Describes design control measures established for HTGR structures, systems, and components to be delivered.
QAM, QP No. 4	Procurement Document Control	IV	Describes procedures for assuring that applicable regulatory requirements, design bases, and other requirements necessary to assure adequate quality are suitably included or referenced in documents for procurement of material, equipment, and services.
QAM, QP No. 5	Instructions, Procedures, and Drawings	V	Establishes measures for the preparation and implementation of detailed procedures for all organizational activities at GA that have an effect on requirements prescribed in the QAM.

TABLE 17-1 (Continued)

GA Implementing Document	Title	10CFR50 Appendix B 10CFR71 Subpart H NQA-1-1983 Criteria	Description
QAM, QP No. 6	Document Control	VI	Establishes measures to control issuance of documents, and changes thereto, which prescribe requirements that establish or evaluate product quality. Such documents are those used directly as a basis for achieving or determining compliance of deliverable items with the requirements.
QAM, QP No. 7	Control of Purchased Material, Equipment, and Services	VII	Defines measures established to assure purchased material, equipment, and services conform to procurement documents.
QAM, QP No. 8	Identification and Control of Materials, Parts, and Components	VIII	Establishes measures used to identify and control materials, manufacturing parts, components, and assemblies within GA scope of supply.
QAM, QP No. 9	Control of Special Processes	IX	Describes measures used to control special processes such as welding, heat treatment, cleaning, and nondestructive examination.
QAM, QP No. 10	Inspection	X	Establishes requirement that activities affecting quality of deliverable items be inspected to verify conformance with documented instructions, procedures, and drawings.

TABLE 17-1 (Continued)

GA Implementing Document	Title	10CFR50 Appendix B 10CFR71 Subpart H NQA-1-1983 Criteria	Description
QAM, QP No. 11	Test Control	XI	Defines measures for control of tests performed prior to shipment to assure that equipment will perform satisfactorily in service. (Does not apply to nonoperational tests such as hydrostatic, helium leak, radiographic, or other nondestructive tests. Such tests are controlled by requirements of Procedure No. 9.)
QAM, QP No. 12	Control of Measuring and Test Equipment	XII	Describes requirements and procedures for calibrating measuring and test equipment.
QAM, QP No. 13	Handling, Storage, and Shipping	XIII	Establishes procedures and responsibilities for assuring that proper methods, materials, and equipment are used in handling, preservation, storage, and shipping of products in compliance with applicable specifications and contractual requirements.
QAM, QP No. 14	Inspection, Test and Operating Status	XIV	Defines procedures and responsibilities for indicating inspection status of parts and materials throughout GA processing for contract end-item application.

TABLE 17-1 (Continued)

GA Implementing Document	Title	10CFR50 Appendix B 10CFR71 Subpart H NQA-1-1983 Criteria	Description
QAM, QP No. 15	Control of Nonconforming Items	XV	Establishes procedures and responsibilities for identification, segregation, review, and disposition of nonconforming parts and materials throughout GA processing for contract end-item application.
QAM, QP No. 16	Corrective Action	XVI	Establishes requirements and procedures for corrective action within the General Atomics Quality Assurance program.
QAM, QP No. 17	Quality Assurance Records	XVII	Establishes measures for retention and retrieval of Quality Assurance records, defined as documents that furnish evidence of compliance of safety-related deliverable hardware and of activities affecting quality.
QAM, QP No. 18	Audits	XVIII	Establishes requirements and procedures for audits to verify effectiveness of GA QA Program.
QAM, QP No. 19	Authorized Nuclear Inspector	N/A	Establishes requirements associated with performance of Authorized Nuclear Inspection activity for GA work under the ASME Code.

TABLE 17-1 (Continued)

GA Implementing Document	Title	10CFR50 Appendix B 10CFR71 Subpart H NQA-1-1983 Criteria	Description
QAM, QP No. 20	Quality Assurance Training	II	Establishes responsibilities, and procedures for developing, implementing, and maintaining programs for indoctrination and training of personnel who perform activities affecting quality of GA products/services.

TABLE 17-2
EXAMPLE OF GA EQUIPMENT CLASSIFICATION LISTING

This example is taken from a GA report that would normally be issued with tables listing individual structures, systems, and components established as safety-related within GA's scope of supply in accordance with the definition prescribed in the introduction to Appendix B, 10CFR50.

EQUIPMENT CLASSIFICATION

Principal Component	Safety-Related	Non Safety-Related	Safety-Related Functions: Basic Function	Safety-Related Functions: Subfunction/Operation	Applicable Codes & Standards
REACTOR SYSTEM, HFD-31000					
NeutroN Control Assembly	X		Control Heat Generation	Control with Moveable Poisons, Reserve Shutdown Insertion	IEEE 603; 1E ASME XI, Div. 2
In-Vessel Flux Mapping Unit		X			
Ex-Vessel Neutron Detection Equipment	X		Control Heat Generation	Sense, Command, Execute Post-Trip Monitoring	IEEE 603, 1E
Startup Detector Assembly		X			
Reactor Trip Control Cabinet	X		Control Heat Generation	Sense, Command Execute	IEEE 603, 1E
Reserve Shutdown Control Equipment Control Cabinet	X		Control Heat Generation	Sense, Command Execute	IEEE 603, 1E
Rod Drive Control Cabinet		X			

TYPICAL EXAMPLE

SIMULATED DATA

TABLE 17-3
CODES AND REGULATION COMPLIANCE

GA's QA Program complies with the following documents except as noted.

Document No.	Title
Regulatory Guide 1.26 (Rev. 3, 2/1/76)	Quality Group Classification and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants
Regulatory Guide 1.28 (Rev. 3, 8-1-85)	Quality Assurance Program Requirements Design and Construction (See Note 1)
Regulatory Guide 1.29 (Rev. 3, 9-1-78)	Seismic Design Classification
Regulatory Guide 1.30 (dated 8/11/72)	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment
Regulatory Guide 1.31 (Rev. 3, 4-1-78)	Control of Ferrite Content in Stainless Steel Weld Metal (See Note 2)
Regulatory Guide 1.37 (dated 3/16/73)	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants
Regulatory Guide 1.38 (Rev. 2, 5/1/77)	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items f Water-Cooled Nuclear Power Plants
Regulatory Guide 1.39 (Rev. 2, 9/1/77)	Housekeeping Requirements for Water-Cooled Nuclear Power Plants
Regulatory Guide 1.54 (dated 6/1/73)	Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants
Regulatory Guide 1.116 (Rev. 1, 5/1/77)	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems

Notes:

1. GA commits to scheduling active elements of the GA QA Program for audit at least once a year. The frequency is increased for more important functions, and shorter term programs are audited at least once during the life of the contract. ||11
2. GA commits to this Regulatory Guide to the extent defined in the ASME Code, Section III.