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SBWR Team Organization and Procedures Manual

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Date

Simplified Boiling Water Reactor

SBWR

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INTRODUCTION

In April 1990, the U.S. Department of Energy and GE reached contractual agreement on a new program for the design, development and U.S. NRC certification of the SBWR. The end result of this effort will be a U.S. NRC certified, investor-ready SBWR design. The Electric Power Research Institute (EPRI) will play a key role in financing this program and will provide worldwide utility review for compliance of the SBWR design to EPRI's Passive Plant Requirements Documents.

GE is supported in this effort by a team of leading nuclear system suppliers, architect-engineers, constructors, utilities and universities with extensive LWR experience and complementary skills. This SBWR team included Bechtel, Burns and Roe, Foster Wheeler, Southern Caompny, MIT, UCB, Ansaldo, ENEA, ENEL, Hitachi, KEMA, NUCON, and Toshiba, when the project began. Many have joined the team since.

The purpose of this manual is to provide participating parties and personnel with information and guidelines for the SBWR Team's organization and operation.

1.0 ORGANIZATION

Work on the SBWR Design and Certification Program is being carried out under a contract between the U.S. Department of Energy (DOE) and GE Nuclear Energy (GE) to provide an SBWR design that is certified by the U.S. Nuclear Regulatory Commission (NRC) and investor-ready. A separate contract between the Electric Power Research Institute (EPRI) and GE provides for utility review and assessment of the SBWR design against EPRI's Passive Plant Requirements Documents.

GE is the prime contractor for the project effort and will have the overall Project Management responsibility. In this capability, GE maintains the interfaces with both DOE headquarters and field offices as well as with EPRI and NRC.

To complement GE's resources and ensure successful completion of the program, GE has selected from the international BWR community those organizations whose technical leadership, specific resources and proven records of accomplishment are preeminent. The SBWR team is composed of leading nuclear system suppliers, architect-engineers, constructors, utilities and universities with extensive LWR experience and complementary skills.

The SBWR Team is composed of the following organizations, and others who may join. The Project Office maintains an up-to-date list of team members:

Company Name	Identification Code	Country
Ansaldo Spa	AN	Italy
Batan	BA	Indonesia
Bechtel	BC	USA
Bernische-Kraftwerke (BKW)	BK	Switzerland
Burns & Roe	BR	USA
Carolina Power & Light	CP	USA
CFE	CF	Mexico
Ciemat	CT	Spain
Cleveland Electric	CI	USA
Commonwealth Edison	CE	USA
Criepi	CR	Japan

Company Name	Identification Code	Country
Dept. of Energy	DO	USA
ECN	EC	Netherlands
EDF	EF	France
Empresarios Agrupados	EA	Spain
Enea-Disp	ED	Italy
Enea-Nuc & Rin	EN	Italy
Enel Spa	EL	Italy
ENSA	ES	Spain
ENUSA	EU	Spain
EPRI	EP	USA
EVS	EV	Germany
Fiat-CIEI	FI	Italy
Foster Wheeler	FW	USA
General Electric	GE	USA
GKN	KN	Netherlands
GPU	GP	USA
HEW	HE	Germany
Hitachi Ltd	HI	Japan
IIE	II	Mexico
Initec SA	IT	Spain
JAPC	JA	Japan
KEMA	KE	Netherlands
MIT	MI	USA
NUCON	NU	Netherlands
Philadelphia Electric Co.	PE	USA
PSI	PI	Switzerland
Public Services Electric & Gas	PS	USA
RWE	RW	Germany
SIET	SI	Italy
Southern Electric Int'l	SE	USA
Studsvik	ST	Sweden
Tecnatom	TE	Spain
Tsing-HUA University	TU	Taiwan

Company Name	Identification Code	Country
Toshiba	TS	Japan
TVA	TV	USA
UC Berkeley	UC	USA
UNESA	UN	Spain
VDEW	VD	Germany
Yankee Atomic	YA	USA
UTE-INITEC/Empressarios Agrupados	AI	Spain

The SBWR Team interrelationships are shown schematically in Figure 1.0-1.

1.1 SBWR PROJECT OFFICE AND MANAGEMENT REVIEW COMMITTEE

1.1.1 Management Control Approach

The approach to management control on the SBWR Design and Certification Program is based on the following:

- Organization of the SBWR TEAM by major functions and areas of responsibility with clear work responsibilities and assignments based on their strengths and capabilities.

- Utilization of direct lines of communication between working levels of the various team members (e.g., technical to technical and program management to program management).

- Structuring of the work to be accomplished and monitored through a work breakdown structure (WBS).

- Breaking down the work to be accomplished to a manageable level (cost account), with a GE engineer responsible for each account (cost account manager).

- Monitoring work plans and approval of major deliverables by the cost account manager; work monitoring through monthly cost and status reports and at monthly or quarterly program reviews, as well as direct communication.

- o Effective reporting of accomplishments, issues and plans for corrective actions in monthly reports and management reviews.

The original SBWR Project Organization within GE is shown in Figure 1.1-1. The current organization is maintained on file in the Project Office.

1.1.2 SBWR Project Office

Authority for the overall SBWR Project Management is centered in the SBWR Project Office, headed by the Project Manager. The Project Manager is selected for this position because of his experience with the SBWR conceptual design effort and his successful leadership. In carrying out his responsibilities for the SBWR program, the Project Manager reports to the top levels of GE's Nuclear Energy Management.* This access to GE's corporate level Nuclear Energy management reflects the importance GE places on this program.

The program control functions of the SBWR Project have been vested in the Project organization (Figure 1.1-2)*. The Project Manager is responsible for this organization, and directs the day-to-day operation of the Project. The Project Manager is selected for this role because of his knowledge of the SBWR conceptual design program and the current DOE SBWR development program, and his earlier management assignments in the BWR design and technology. Program cost and schedule performance, customer interactions, progress reports and deliverables will be achieved through the Project organization. This organization will also interact with DOE-SAN and EPRI on contractual matters.

Programmatic interaction with the SBWR Team members will be maintained between the Project organization and the respective Team members program manager. Additionally, cost estimates in support of proposals and trade-off studies, as well as plant construction estimates, are prepared by this organization. Cost effective management of the Program is assured due to utilization of experienced personnel in this organization.

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*Up to date Organization documents are kept on file in the Project Office.

1.1.3 Management Review Committee

A Management Review Committee provides guidance and direction with respect to items such as key design decisions, resource application and prioritization. GE will chair the Management Review Committee and it will be comprised of senior management persons from the organizations participating in the Program. The Management Review Committee will meet approximately twice a year.

1.1.4 Working Groups

The SBWR engineering structure is organized to ensure that technical experts from the various SBWR Team members are integrated into the appropriate design activities. This was done by establishing functionally oriented technical Working Groups. The Working Group concept was selected to obtain maximum coordination of technical data and effort and to maximize communications, interaction, and synergism among the Program participants. This organizational approach was successfully utilized on the ABWR design and development effort, which also involved a large multi-discipline, multi-organizational and multi-national effort.

Technical and programmatic integration among Working Groups is provided by the Project Office. The Project Office provides overall product definition, coordinates the resolution of issues involving more than one working group and plays a key role in the work progress for technical issue resolution. The Project Office also coordinates the resolution of work priorities and schedules from a technical viewpoint. The Technical Integration Group functions as the principal agent of the Project Office for these issues.

Seven Working Groups were originally identified with each Working Group's technical responsibilities focused on a particular aspect of the plant design or other Program element. Some of the groups have been subdivided for easier management, and other divisions may be desirable in the future. The original group for a task will always be traceable, and up to date lists of groups and Work Breakdown Structure assignments are maintained in the Project Office and in the annual DOE Work Plan. Each element of the work required to complete the detailed design of the SBWR and obtain Design Certification from the NRC has been identified and planned in the unified Work Breakdown Structure (WBS) (Table 1.1-1). Based on the

technical content of the work, each element has been assigned by Project Management to the Working Group which contains a predominance of the skills and resources needed to complete that element. A listing of the elements assigned to each original Working Group is contained in Table 1.1-2. Each Working Group is led by an experienced GE technical manager who is the Manager or Lead engineer for the corresponding GE SBWR Project group and who reports directly to the Project Manager. This Lead engineer/Manager integrates the technical, cost and schedule performance of all work elements assigned to the Working Group and to his GE technical group. Each Working Group consists of GE participants as well as participants from other organizations, all of whom report to the Lead engineer in accomplishing the technical work.

In all cases, the responsibility for the technical, cost and schedule performance for the work tasks assigned to each Working Group will reside with the Lead engineer/Manager, who is also the Cost Account Manager. The work assigned to the Working Group will be accomplished in the following ways:

- Work will be assigned directly to engineers, either GE or otherwise, resident at San Jose and will be managed day-to-day by the Lead engineer/Manager. As required, a Working Group Manager may draw on the skills of any other Working Group or the broader organizations of the SBWR Team members.

- Work will be assigned to non-resident Working Group members at periodic Working Group meetings. Work will be performed at the home offices of the Working Group members and progress will be reported periodically to the Lead engineer/Manager.

- Work will be packaged, milestones established and responsibility assigned, utilizing the appropriate procurement or Project management channel, to one of the SBWR Team members. Technical, cost and schedule performance will be reported monthly by the Working Group Manager.

- A Technical Project Engineer (TPE) is assigned to each WBS element to act as the technical lead for the particular system or function of the SBWR.

The Cost Account Responsibility Matrix in Table 1.1-3 summarizes the WBS elements, responsible managers, and TPEs. Extensive review and comment cycles within a particular Working Group and among Working Groups will result in the final design documents or other output reflecting the combined expertise of the SBWR Team members.

The seven original Working Groups were as follows:

(1) Working Group A - Performance Engineering

The Performance Engineering Working Group is responsible for establishment of the performance requirements of the key systems. In addition, core and fuel design activities will be performed in this working group.

(2) Working Group B - Safety and Auxiliary System Design

The Safety and Auxiliary System Design Working Group is responsible for the system design and equipment specification for mechanical and process systems in the Nuclear Island and Radwaste facility.

(3) Working Group C - Containment and Reactor Building Design

The Containment and Reactor Building Design Working Group is responsible for the design of Reactor Building and primary containment system.

(4) Working Group D - Design Certification

The Design Certification Working Group is responsible for the preparation and submittal of the Standardized Safety Analysis Report (SSAR), resolution of questions and support of hearings during licensing.

(5) Working Group E - Reactor System Engineering

The Reactor System Engineering Working Group is responsible for the design of the Reactor Pressure Vessel and its internals, the control rod drives, the reactor servicing equipment and the fuel handling equipment.

(6) Working Group F - Plant Control and Electrical System Engineering

The Plant Control and Electrical System Engineering Working Group is responsible for the design of the safety and protection system, plant monitoring and control systems, process control systems and plant electrical systems.

(7) Working Group G - Turbine Island Design

The Turbine Island Design Working Group is responsible for designing the SBWR Turbine Island, incorporating the latest world-wide experience and technology. Southern Electric International was selected by competitive bids to complete a major portion of this work.

As the project progressed, the work of each group was divided into subtasks. When GE nuclear energy division reorganized in 1992 the subtasks were assigned to specific Lead Engineers/Managers. The Project Office maintains the up to date list of Work Group subtask assignments.

1.2 INTERNATIONAL TECHNICAL ASSOCIATES

An important aspect of the overall SBWR Team capability is the technical contribution of GE's International Technical Associates. Originally, Ansaldo, Hitachi and Toshiba provided portions of the Nuclear Island design and construction planning efforts, and performed assigned activities at their home offices/facilities. Ansaldo also participated extensively in the Probabilistic Risk Assessment work. KEMA provided natural circulation analysis and testing, while NUCON provided Nuclear Island arrangements and civil/structural design.

As was done on the ABWR effort, engineering specialists from GE's International Technical Associates will be integrated into the appropriate Working Group. Some engineers will be located in and will continue to be in GE's San Jose office for extended periods of time. Each associate has assigned a liaison/program manager to integrate their home office activities with GE. The Project Office maintains an up to date list of ITA's and other personnel assigned to the team.

The SBWR organization structures of the ITA members are on record in the Project Manager's office and distributed to the team members who need them.

1.3 U.S. TEAM MEMBERS

The broad workscope of the Program led GE to select U.S. Team members whose expertise complemented GE's technical strengths in plant systems engineering, nuclear steam system fuel and turbine generator supply, and plant licensing. GE provides the technical leadership for the nuclear steam supply system, turbine generator and NRC certification. From the original team, Bechtel provided the technical leadership in the balance of Nuclear Island (NI) areas, including the detailed NI building design, auxiliary systems design and construction planning. Southern Company Services (SCS) has the lead technical role in the Turbine Island design and construction planning. Burns and Roe (BRC) was selected to provide design support in selected areas such as High Temperature Effects on Concrete. FW Energy Applications (FWEA) supports the isolation condenser design based on their broad expertise in design and manufacture of nuclear heat exchanger hardware. The U.S. Team also includes two univer[illegible], MIT and UC Berkeley, who will provide support consisting of special studies, consu[illegible]sign reviews and testing. Additional companies have joined and are joining the team. The Project Office maintains up to date lists of team members and their scope of work.

Each of the SBWR Team members will maintain a matrix organization in their respective corporations in support of the SBWR Program. These organization records are maintained in the Project Manager's office and distributed to the team members who need them. Each team member's organization will be headed by a manager who will report to the Project Manager for formal functions. The managers are identified on the organization records maintained in the Project Manager's office.

These managers are responsible for their respective organizations as shown; however, they are also accountable for assigned SBWR Program responsibilities through their respective subcontract requirements. Formal communications with the SBWR Project organization will be through the Project Management Office, while day-to-day interfacing will be with the responsible Working Group Manager.

1.4 UTILITIES

EPRI and the ALWR Utility Steering Committee have endorsed the SBWR technical approach and have made a major financial commitment to fund a significant portion of the Program effort. Additionally, the utilities and EPRI provide utility requirements for the SBWR design and assess the design against those requirements. GE requested a number of utilities to assign experienced utility engineers to work directly with GE and the other Program participants in GE's office in San Jose. The utility engineers are totally integrated into the SBWR Team, enabling it to reflect the needs of the potential utility operators into the design at the detailed level.

A list of Utility personnel assigned to the team is maintained by the Project Office.

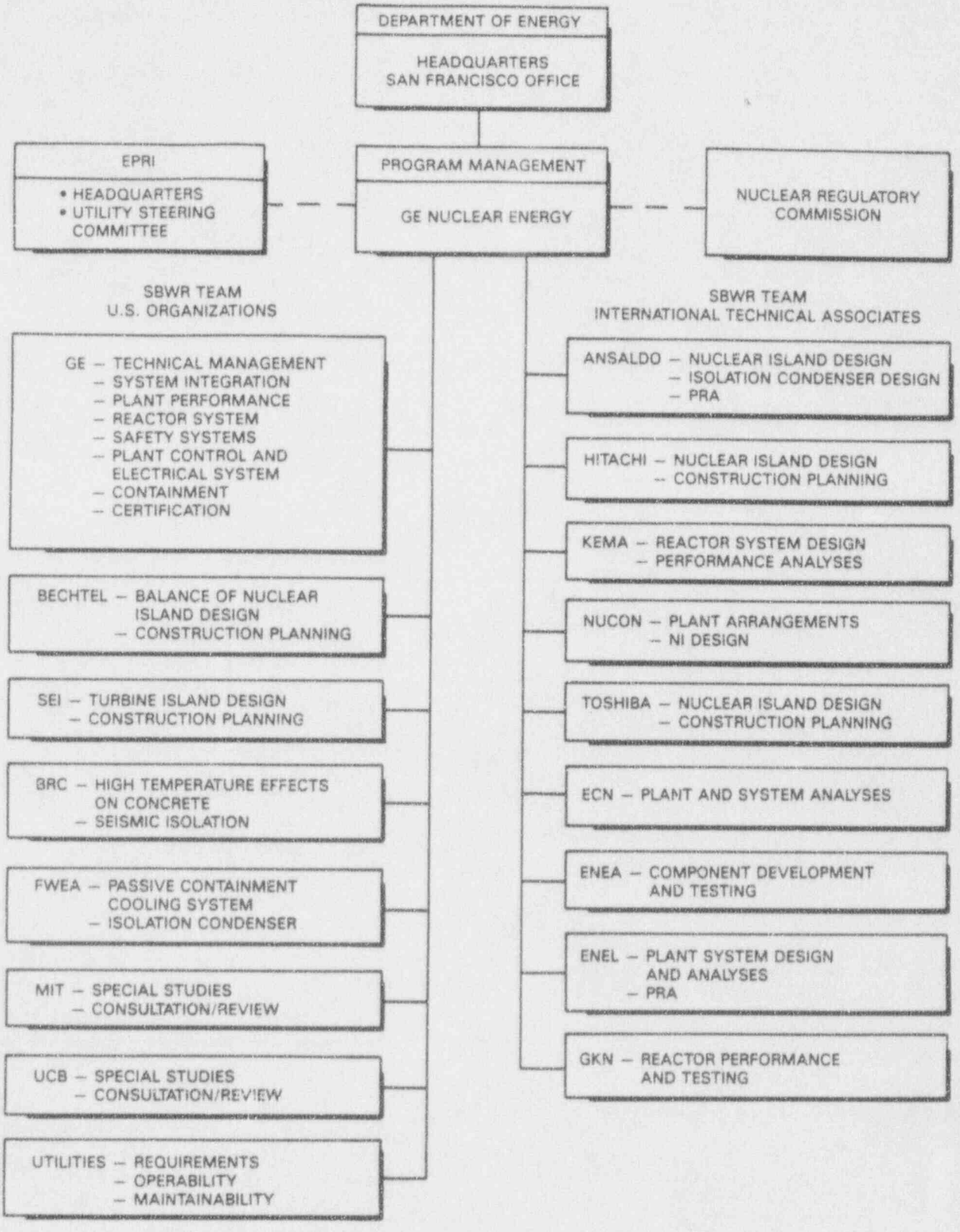


Figure 1.0-1. SBWR Team Interrelationships (Original Members Shown)

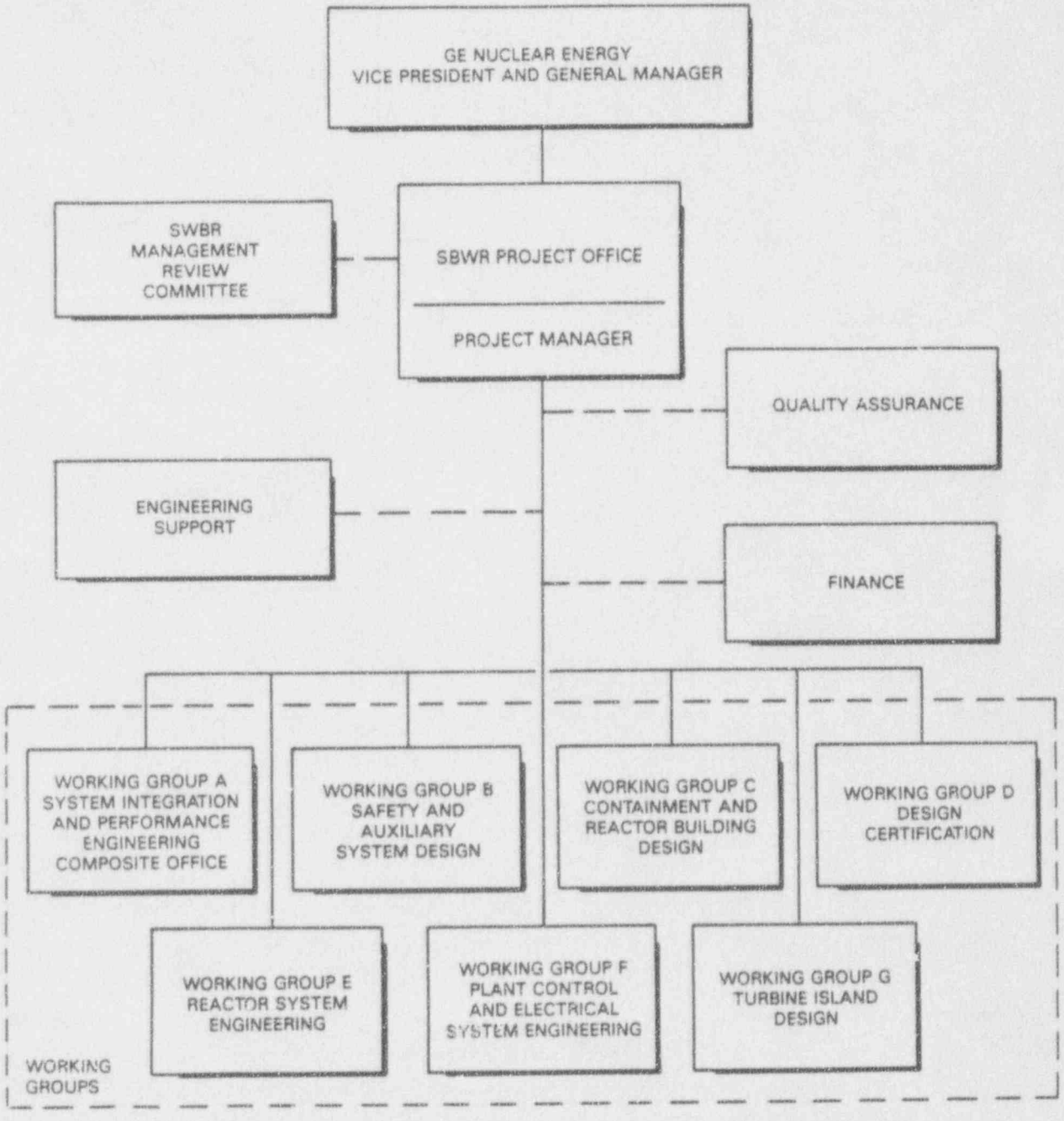


Figure 1.1-1. Original SBWR Working Group Organization

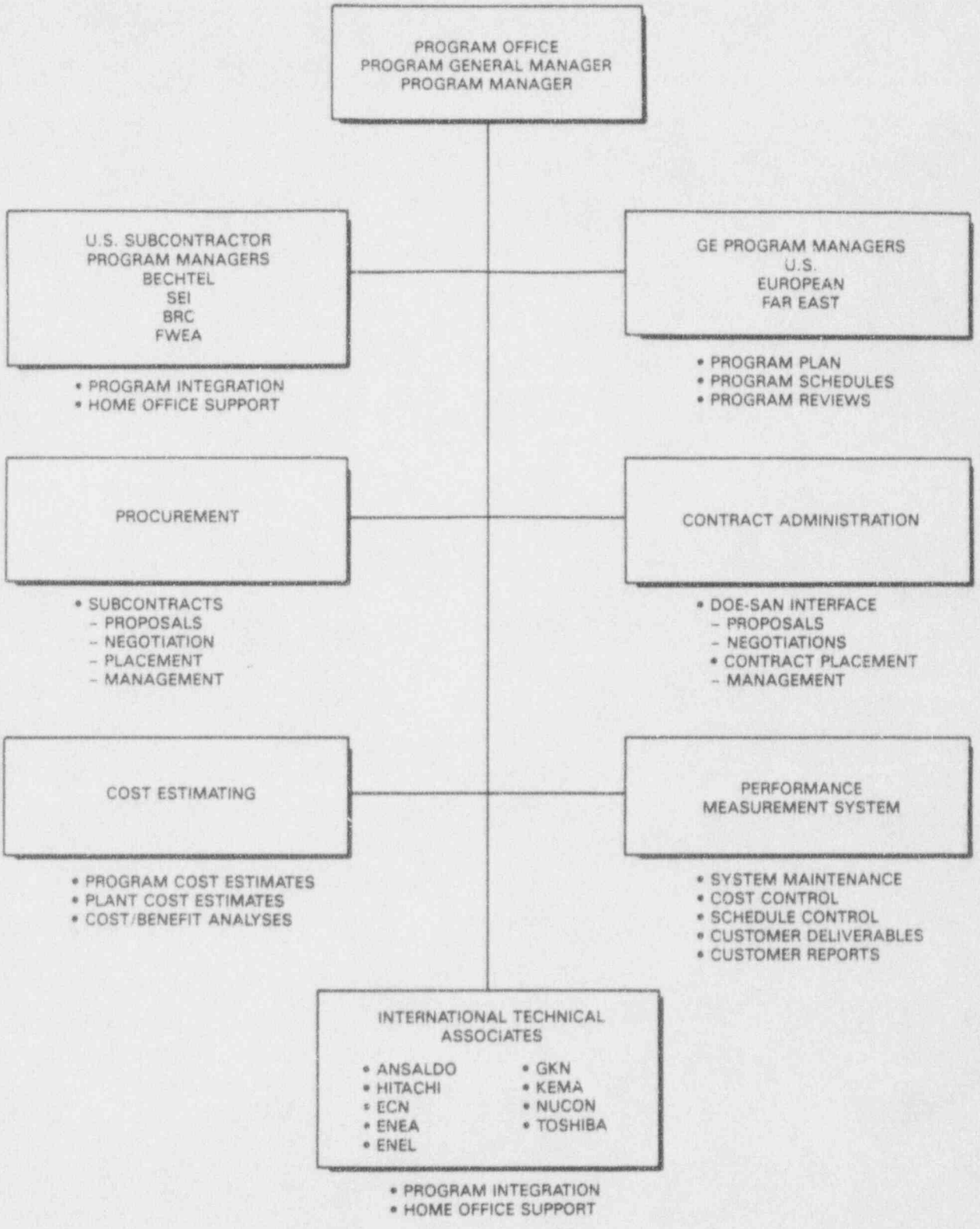


Figure 1.1-2. Original SBWR GE Program Organization

Table 1.1-1

WORK BREAKDOWN STRUCTURE (TO LEVEL 3)

1.0 PROGRAM MANAGEMENT

- 1.1 Management Control
  - 1.1.1 Program Direction, Planning and Control
  - 1.1.2 Management Information and Program Reviews
- 1.2 Program Plans
  - 1.2.1 Quality Assurance Plan
  - 1.2.2 Reliability, Availability and Maintainability Plan
  - 1.2.3 Configuration Management Plan

2.0 INITIAL DESIGN DEFINITION

- 2.1 Passive Plant Requirements
  - 2.1.1 Turbine Island
  - 2.1.2 Core and Fuel
  - 2.1.3 Passive Safety Systems
  - 2.1.4 Plant Requirements Technical Bases
- 2.2 Test and Development
  - 2.2.1 Gravity-Driven Cooling System Test
  - 2.2.2 Depressurization Valve Development
  - 2.2.3 Steam Injector System Development
  - 2.2.4 Containment Definition
  - 2.2.5 Construction Plan
- 2.3 Plant Definition
  - 2.3.1 Reactor Design
  - 2.3.2 System Design
  - 2.3.3 Arrangement and Containment
  - 2.3.4 Design Definition
  - 2.3.5 Test and Development

3.0 DETAIL DESIGN AND DEVELOPMENT

- 3.1 Plant Level Design and Analyses
  - 3.1.1 Design Requirements and Integration
  - 3.1.2 Plant Arrangements and Configuration
  - 3.1.3 Man-Machine Interface Design
  - 3.1.4 EPRI/Utility Design Requirements
  - 3.1.5 Plant Level Analyses
  - 3.1.6 Preliminary Probabilistic Risk Assessment
  - 3.1.7 Preliminary Technical Specifications
  - 3.1.8 Plant Operations and Maintenance
  - 3.1.9 ITA/Utility Landlord Expenses

Table 1.1-1 (Continued)
WORK BREAKDOWN STRUCTURE (TO LEVEL 3)

3.2 Plant Construction Evaluations
- 3.2.1 Construction Plan
- 3.2.2 Construction Cost Estimate

3.3 Nuclear Island Systems Design
- 3.3.1 Reactor Pressure Vessel and Components
- 3.3.2 Nuclear Fuel
- 3.3.3 Nuclear and Process Systems
- 3.3.4 Instrumentation, Control and Monitoring Systems
- 3.3.5 Reactor Refueling and Servicing

3.4 Turbine Island Systems Design
- 3.4.1 Turbine, Generator and Auxiliary Systems
- 3.4.2 Power Cycle and Auxiliary Systems

3.5 Balance-of-Plant Systems Design
- 3.5.1 Station Auxiliary Systems
- 3.5.2 Station Electrical Systems

3.6 Main Structures and Service Systems
- 3.6.1 Reactor Building
- 3.6.2 Turbine Building
- 3.6.3 Radwaste Building
- 3.6.4 Other Buildings
- 3.6.5 Service Systems and Equipment

3.7 Development and Testing Programs
- 3.7.1 Passive Containment Cooling System (PCCS)
- 3.7.2 Free Surface Steam Separation and Carryunder Tests
- 3.7.3 GIST Dismantling Cost

4.0 DESIGN CERTIFICATION

4.1 Licensing Basis
- 4.1.1 Licensing Review Bases Document

4.2 Standard Safety Analysis Report
- 4.2.1 Preparation, Submittal and Defense of SSAR Chapters 1-18
- 4.2.2 Preparation, Submittal and Defense of SSAR Chapter 19 (Severe Accident Submittal)
- 4.2.3 SSAR Supporting Documents

4.3 Rulemaking and Commission Certification
- 4.3.1 Rulemaking Support

Table 1.1-2

WBS ASSIGNMENTS BY ORIGINAL WORKING GROUP

SBWR Project Control Organization - Project Management
- 1.1.1 Program Direction, Planning and Control
- 1.1.2 Management Information and Program Reviews
- 1.2.1 Quality Assurance Plan
- 1.2.2 Reliability, Availability and Maintainability Plan
- 1.2.3 Configuration Management Plan

Initial Design Definition - Project Management
- 2.1.1 Turbine Island
- 2.1.2 Core and Fuel
- 2.1.3 Passive Safety Systems
- 2.1.4 Plant Requirements Technical Bases
- 2.2.1 Gravity-Driven Cooling System Test
- 2.2.2 Depressurization Valve Development
- 2.2.3 Steam Injector System Development
- 2.2.4 Containment Definition
- 2.2.5 Construction Plan
- 2.3.1 Reactor Design
- 2.3.2 System Design
- 2.3.3 Arrangement and Containment
- 2.3.4 Design Definition
- 2.3.5 Test and Development

System Integration and Performance Engineering - Working Group A
- 3.1.1 Design Requirements and Integration
- 3.1.4 EPRI/Utility Design Requirements
- 3.1.5 Plant Level Analyses
- 3.1.6 Preliminary Probabilistic Risk Assessment
- 3.1.7 Preliminary Technical Specifications
- 3.1.8 Plant Operations and Maintenance
- 3.1.9 ITA/Utility Landlord Expenses
- 3.3.2 Nuclear Fuel

Reactor System Engineering - Working Group E
- 3.3.1 Reactor Pressure Vessel and Components
- 3.3.5 Reactor Refueling and Servicing
- 3.7.2 Free Surface Steam Separation and Carryunder Tests

Safety and Auxiliary System Design - Working Group B
- 3.3.3 Nuclear and Process Systems
- 3.5.1 Station Auxiliary Systems
- 3.6.5 Service Systems and Equipment
- 3.7.3 GIST Dismantling Cost

Plant Control and Electrical System Engineering - Working Group F
- 3.1.3 Man-Machine Interface Design
- 3.3.4 Instrumentation, Control and Monitoring Systems
- 3.5.2 Station Electrical Systems

Table 1.1-2 (Continued)

WBS ASSIGNMENTS BY ORIGINAL WORKING GROUP

Containment and Reactor Building Design - Working Group C

- 3.1.2 Plant Arrangements and Configuration
- 3.2.1 Construction Plan
- 3.2.2 Construction Cost Estimate
- 3.6.1 Reactor Building
- 3.6.3 Radwaste Building
- 3.6.4 Other Buildings and Structures
- 3.7.1 Passive Containment Cooling System (PCCS)

Turbine Island Design - Working Group G

- 3.4.1 Turbine, Generator and Auxiliary Systems
- 3.4.2 Power Cycle and Auxiliary Systems
- 3.6.2 Turbine Building

Design Certification - Working Group D

- 4.1.1 Licensing Review Bases Document
- 4.2.1 Preparation, Submittal and Defense at SSAR Chapter 1-18
- 4.2.2 Preparation, Submittal and Defense at SSAR Chapter 19 (Severe Accident)
- 4.2.3 SSAR Supporting Documents
- 4.3.1 Rulemaking Support

Table 1.1-3

SBWR COST ACCOUNT RESPONSIBILITY MATRIX
(PROJECT P2A06 - June 1993)

WBS Number	Description	Cost Account Number
1.1.1	Program Director, Planning and Control	BG550
	Procurement (J/O)	BG647
1.1.2	Management Information and Program Review	BG551
1.2.1	Quality Assurance Program	BG552
1.2.2	Reliability, Availability and Maintainability Program	BG553
1.2.3	Configuration Management Program	BG554
2.1.1	Turbine Island	BG588
2.1.2	Core and Fuel	BG594
2.1.3	Passive Safety Systems	BG595
2.1.4	Plant Requirements Technical Bases	BG596
2.2.1	Gravity Driven Cooling System Test	BG589
2.2.2	Depressurization Valve Development	BG597
2.2.3	Steam Injector System Development	BG598
2.2.4	Containment Definition	BG599
2.2.5	Construction Plan	BG628
2.3.1	Reactor Design	BG590
2.3.2	Systems Design	BG629
2.3.3	Arrangements and Containment	BG630
2.3.4	Design Definition	BG631
2.3.5	Test and Development	BG632
3.1.1	Design Requirements and Integration	BG555
3.1.2	Plant Arrangements and Configuration	BG556
3.1.3	Man-Machine Interface	BG557
3.1.4	EPRI/Utility Design Requirements	BG558
	NRC/EPRI Conformance (J/O)	BG649
3.1.5	Plant Level Analyses	BG559
	Radiological Assessment (J/O)	BG643
3.1.6	Preliminary Probabalistic Risk Assessment	BG560
	Preliminary Probabalistic Risk Assessment	BG591
	Preliminary Probabalistic Risk Assessment	BG592
	Preliminary Probabalistic Risk Assessment	BG593
3.1.7	Preliminary Technical Specifications	BG561
3.1.8	Plant Operations and Maintenance	BG562
3.1.9	ITA/Utility Landlord Expenses	BG586
3.2.1	Construction Plan	BG563
3.2.2	Construction Cost Estimate	BG564

Table 1.1-3 (Continued)

SBWR COST ACCOUNT RESPONSIBILITY MATRIX
(PROJECT P2A06 - June 1993)

WBS Number	Description	Cost Account Number
3.3.1	Reactor Pressure Vessel and Components	BG565
3.3.2	Nuclear Fuel	BG566
3.3.3	Nuclear and Process Systems	BG567
	Nuclear and Process Systems (J/O)	BG640
	Piping Design	BG646
	Isol. Conds. and Pass. Cont. Cool. Systems	BG641
3.3.4	Instrumentation Control and Monitoring Systems	BG568
3.3.5	Reactor Refueling and Servicing	BG569
3.4.1	Turbine, Generator and Auxiliary Systems	BG570
3.4.2	Power Cycle and Auxiliary System	BG585
3.5.1	Station Auxiliary Systems	BG571
3.5.2	Station Electrical Systems	BG572
3.6.1	Reactor Building and Containment	BG573
	Control Room Habitability	BG642
	Vacuum Breaker Design and Test	BG644
3.6.2	Turbine Building	BG574
3.6.3	Radwaste Building	BG575
3.6.4	Other Building and Structures	BG576
3.6.5	Service Systems and Equipment	BG577
3.7.1	Containment Analysis	BG578
	Containment Test Programs	BG645
3.7.2	Free Surf. Stm. Spn. and Carry Tests	BG579
3.7.3	GIST Dismantling Costs	BG587
4.1.1	Licensing Review Basis Documents	BG580
4.2.1	Prep., Sub. and Defense SSAR 1-18	BG581
4.2.2	Prep., Sub. and Defense SSAR 19	BG582
4.2.3	SSAR Support Documents	BG583
4.3.1	Rulemaking Support	BG584

2.0 PROCEDURES

These procedures provide the guidelines under which the SBWR Team will operate and are intended to produce consistent actions and documents by the various participating organizations. The procedures are generally discussed in this section. The detailed procedures are in the Appendices. Forms and examples as well as information of a more current nature are updated immediately, without the need to revise this manual, and are maintained in the Project Management office. Appendices may be issued separately from the body of this document.

2.1 ORGANIZATION AND PROCEDURES MANUAL DISTRIBUTION AND REVISION

Distribution of the SBWR Team Organization and Procedures Manual (Manual) will be made by the Project Office to organizations and personnel with a working relationship with the SBWR. The Manual will require revision from time to time, and up to date lists and charts are maintained by the Project Office.

2.2 COMMUNICATIONS AND CORRESPONDENCE

Effective communications between the various participants of the Program is a major challenge. The Working Group technique, in which individuals from different companies (many assigned to GE's San Jose office) work in close contact with their associates, helps to ensure excellent communications among all SBWR Team members. On-site representatives also serve as informed liaisons with their home offices. Extensive use of electronic mail and or rapifax machines also enhances rapid communication and turnaround of information between locations. GE utilizes its electronic mail network to communicate with DOE Headquarters as well as technical associates worldwide.

Figure 2.2-1 indicates the many informal lines of communication which are present in the Program, as well as the relatively few formal lines of communication. Section 2.2.1 describes more specific communications policy and Section 2.2.2 discusses communications data for SBWR Team members.

2.2.1 Policy

The SBWR Project Office is the central organization in all formal communications. Formal written communications among the participating companies and organizations are between the GE Project Manager and the responsible Project Managers designated by the other organizations. DOE will be kept advised of the status and progress of the work and their advice and agreement on the Program work as it proceeds will be obtained by the GE Project Manager. Informal communications are all those between various levels needed to complete the work (e.g., working group member to working group member).

Communication between the participating organizations is conducted by letter, rapifax, telephone, electronic mail, and telex as required to effectively carry on the Program work. Standard transmittal letters or forms are used to provide uniformity of distribution to cognizant persons and to assure traceability. Up to date forms used are kept on file by the Project Office.

2.2.2 Communications Data for Team Members

The Project Office maintains communication information up to date. It is made available to all team members and individuals as requested.

2.3 SCOPE OF WORK

A current workscope statement for each program participant is maintained in the Project Office and distributed as needed.

2.4 SCHEDULING AND PROJECT CONTROL

2.4.1 Background

The SBWR Project can be defined in terms of two different but interrelated structures. The structure associated with the Master Parts List (MPL) represents specific engineering output and design documentation. The structure associated with the Work Breakdown Structure (WBS) represents engineering major work effort. Work, cost and schedule planning and tracking are closely related to the WBS, which forms the basis for reporting to DOE. The

mechanism used for this tracking is the Management Information System (MIS), which is a DOE-recognized system that has been used by GE for government programs.

The Nuclear Plant Product Structure shows the various systems comprising the SBWR along with their assigned MPL indices. This structure and the MPL are illustrated in Figure 2.4-1. For each MPL index, a list of design specifications, design drawings, data reports and data books containing the results of various analyses will be maintained under configuration control as discussed in the Configuration Management Plan, NEDG-31834. This list will specify the status of the system design descriptions, and will be the basis for providing the various lists of documentation to be submitted to the DOE as required by the Contract Data Requirements (CDR) List.

The WBS for the SBWR Design and Certification Program to the third level was previously illustrated in Table 1.1-1. The work to be completed as part of this Program is represented by three of the first level items [i.e., Program Management (WBS 1.0), Detail Design and Development (WBS 3.0) and Design Certification (WBS 4.0)]. The fourth first level item, Initial Design Definition (WBS 2.0), represents work activities already conducted to complete the conceptual design and the supporting test and development activities already complete or underway. The work to be performed during the six-year Program builds upon the previous work which established the reference conceptual design. Additional levels of WBS detail will be defined by the Working Group Managers to adequately plan and track the Program activities.

2.4.2 Deliverables, Schedule and Milestones

A number of Program deliverables are identified in the Contract Data Requirements List to provide documentation of the design. Table 2.4-1 lists the original Program deliverables. Up to date lists are in the annual Work Plans. This list was developed from detailed knowledge of the process being successfully followed for the ABWR design certification program. Activities of appropriate duration have been established for: (1) developing the Licensing Review Bases Document; (2) preparation and submittal of the Standard Safety Analysis Report and Probabilistic Risk Assessment; (3) review of the submittals by the NRC and ACRS and issuance of the Safety Evaluation Report and Final Design Approval; and (4) the final rulemaking and certification activities. In addition, various informal technical interactions with the NRC have been identified.

The Program was designed to obtain NRC Design Certification by mid-1995. To achieve this schedule, critical path items were identified for issuance of the Licensing Plan and submittal of the Standard Safety Analysis Report to the NRC.

The licensing activities began with Program briefing meetings (kickoff) between GE/DOE and the Commission, NRC Staff Management, and the ACRS Full Committee. The purpose of these meetings was to obtain an endorsement by way of commitment of resources. Following the briefings, the development of a draft Licensing Plan (DL002) was initiated.

The Licensing Plan addresses process and administrative matters related to the SBWR licensing activities and deals with those technical issues where regulatory acceptance criteria are evolving.

To support the design and certification effort, the engineering activities are divided into three phases. The first phase was slightly more than one year in duration starting April 2, 1990. This phase (Preliminary Design) entailed, as a major activity, the development and submittal to the DOE for concurrence the Summary Plant Description and Overall Requirements (DD001/DD002). Management plans and lists of design documents to be produced with schedule completion dates are also provided to the DOE as specified in the Annual Work Plan.

The second phase was approximately two years in duration. This phase (Final Design) includes the detailed design work required to support, prepare and submit the SSAR (DC001) and PRA (SAL001) for NRC review based on the Licensing Review Bases Document (DL002). Included in this phase were the preliminary design reviews of the system designs to assure compatible integration with other associated systems.

The third phase (Documentation Completion) continues for the remainder of the Program. During this phase, final interdisciplinary design reviews will be completed to assure that: (1) the integrated designs conform to all applicable criteria; (2) system design description documents will be completed; and (3) NRC questions and comments will be resolved. Final revisions of the deliverables DD001/DD002, C001 and C002 will also be provided to the DOE.

In parallel with the deliverables, Program support in the form of management and project control will be provided. This support includes Program direction, planning and control, as well as management information and Program reviews. A list of original contract milestones which control the overall schedule are presented in Table 2.4-1. Updated liss are found in the yearly work plans.

2.5 FILES PROCEDURE

The GE Project Manager is responsible for establishing and maintaining a record of all transmittals between SBWR Program participants and the DOE or NRC. In the case of documents developed and submitted to DOE or NRC, a record of the status of DOE or NRC response, and the follow-up action taken by the SBWR Program is also maintained.

Design Record Files shall be established and maintained by each participating organization in accordance with the established quality procedures of each participating organization. These records shall be available for review and use by GE and shall be offered to GE prior to their destruction. An acceptable procedure for the development and maintenance of design record files is shown in an appendix to this procedure.

Each organization will be responsible for maintaining files for their work. Program documents that require permanent retention and other documents of common usage shall be kept in the SBWR Program Files maintained by GE. This file system is maintained as detailed in an appendix to this procedure.

2.6 DOCUMENT CONTROL PROCEDURE

2.6.1 Document List

Formal documents to be developed and submitted to DOE and the NRC for information and comment during the SBWR Program are defined in the following lists:

- o SBWR System Design Description
- o Design Drawings
- o Design Specification
- o Miscellaneous Technical Documents and Reports

2.6.2 Responsibilities

The GE Project Manager is responsible for maintaining the document lists and the status of the documents in them.

These documents shall be assigned a GE corporate number in accordance with the GE standard corporate document numbering system. The document source identification shall be preserved.

GE is responsible for the control, issue, and change of all GE corporate numbered documents.

All participating organizations are responsible to document their input to the SBWR design in English according to their respective procedures for controlled, retrievable engineering information.

GE is responsible for maintaining a complete physical file of all relevant design input documents received from participating organizations.

Figure 2.6-1 (flow chart for ANSALDO design activities) illustrates typical design interactions between GE and non-GE organizations such as ITAs.

Each document listed shall have a GE engineer assigned responsibility to open and maintain a GE Design Record File for that document. This engineer shall coordinate the GE comments for any ERMs affecting the document, including those initiated because of changes to interfacing documents, and shall maintain an appropriate record to support the GE SBWR Project Manager in tracking the technical content and status of the document. Design Record Files shall be maintained as per GE Engineering Operating Procedures and an appendix to this procedure.

Where design activities are performed by other than GE, the design process shall be controlled using the design control procedures of the participating organizations.

When the results of their work is ready for documentation and integration into the work of other participating organizations, the appropriate document(s) shall be circulated to GE and other affected organizations for review using the Engineering Review Memorandum (ERM) procedure shown in an appendix to this procedure. Responsibility for internal design verification shall be noted and appropriate areas of external review for interface compatibility and application and shall be assigned.

After review and resolution of all comments, the accuracy and adequacy of each design document shall be verified by the originating organization using one or a combination of the following methods: (1) design review, (2) alternate calculation, or (3) test. Design verification shall comply with or be equivalent to the design verification procedure shown in an appendix to this procedure.

All participating organizations shall be responsible for implementing an engineering document change control system with appropriate quality assurance requirements. Changes to issued design documents shall be coordinated and controlled using the design change option of the Engineering Review Memorandum procedure shown in an appendix to this procedure.

2.7 QUALITY ASSURANCE

2.7.1 Quality Assurance

The final design of safety-related components and systems, including supporting tests and calculations, shall be performed in accordance with ANSI/ASME NQA-1-1983 and NQA-1a-1983.

The QA procedure for GE and the organizations participating in the SBWR Program is described in detail in the "Quality Assurance Plan - NEDG-31831".

2.8 MEETINGS

A meeting schedule for SBWR Integrated Working Group meetings and SBWR Management Review Committee meetings is prepared and distributed to provide advance notice of formal program meetings. The dates and locations of these meetings are published to allow ample time for planning.

2.8.1 Integrated Working Group Meetings

Integrated Working Group Meetings are meetings where all working groups are present in one location and meet in parallel and together as needed to integrate overall efforts. Individual working group meetings are scheduled as needed by the Working Group Managers.

2.8.2 Meeting Minutes

Meeting minutes are prepared to document discussion topics and action items of all formal program meetings with DOE and among the participating parties. It shall be the responsibility of the persons designated by the Project Manager to write the meeting minutes and arrange for distribution to all parties. As a minimum, the minutes will include subject, location, date, time, agenda, attendees, documents presented and discussed, discussion items including commitments, agreements, action items, responsible persons or organization, and committed completion dates.

2.9 CONFIGURATION MANAGEMENT

The SBWR Configuration Management Plan is described in NEDG-31834. It is based on GE's standard configuration control methods and uses GE-NE Engineering Operating Procedures.

SBWR management began configuration control immediately after the first submittal of the SSAR (August 28, 1992). Prior to that time, designs were preliminary and evolving. The process, called the Change Action List (CAL) process, is described in an appendix to this manual, placed here for convenience.

2.10 TECHNICAL ISSUES RESOLUTION

The Project Control function has responsibility for Project management and control, including schedule control. The Project Office provides overall product definition, coordinates the resolution of issues involving more than one working group, and plays a key role in the work process for technical issue resolution. The Project Office also coordinates the resolution of work priorities and schedules from a technical viewpoint. The Project Control function will

be involved in the process for resolving issues and determining which issues require the attention of the Management Review Committee.

Figure 2.10-1 summarizes the process and responsibilities for resolving technical issues. The Technical Project Engineer (TPE) and Working Group Manager have first and second level responsibility, respectively, for resolving issues. At the next level, the Project Office has responsibility to resolve issues; this third level should normally involve issues that affect more than one working group (e.g., intersystem issues on high level design configuration issues). At the next level, Project Control has responsibility to resolve issues. At the final (i.e. fifth) level, the Management Review Committee (MRC) will resolve any issue that cannot be resolved at a lower tier. The MRC is normally expected to be involved in resolving issues of a broad programmatic or significant technical nature (i.e., issues that have major impact on the program plan or major impact on the product).

2.11 SBWR PROJECT-UNIQUE PROCEDURES

The SBWR Project uses GE-NE's standard Engineering Operating Procedures, and other standard procedures for its work. Team members use the standard procedures in their organizations. These procedures, in all team members, have been proven to meet all Quality Assurance and other requirements.

When a procedure unique to the SBWR project is required, it is developed, approved, and issued as an appendix to this manual.

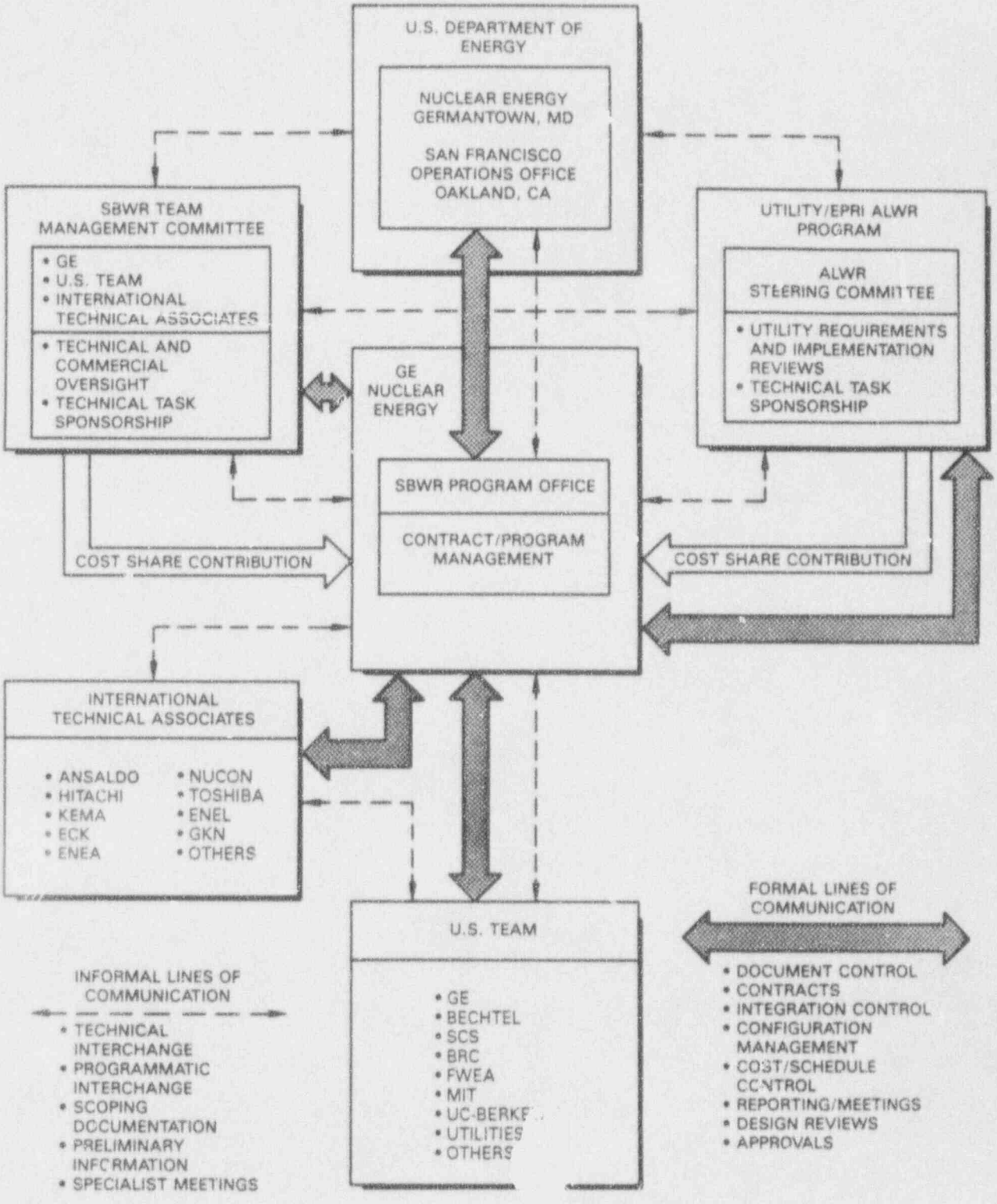
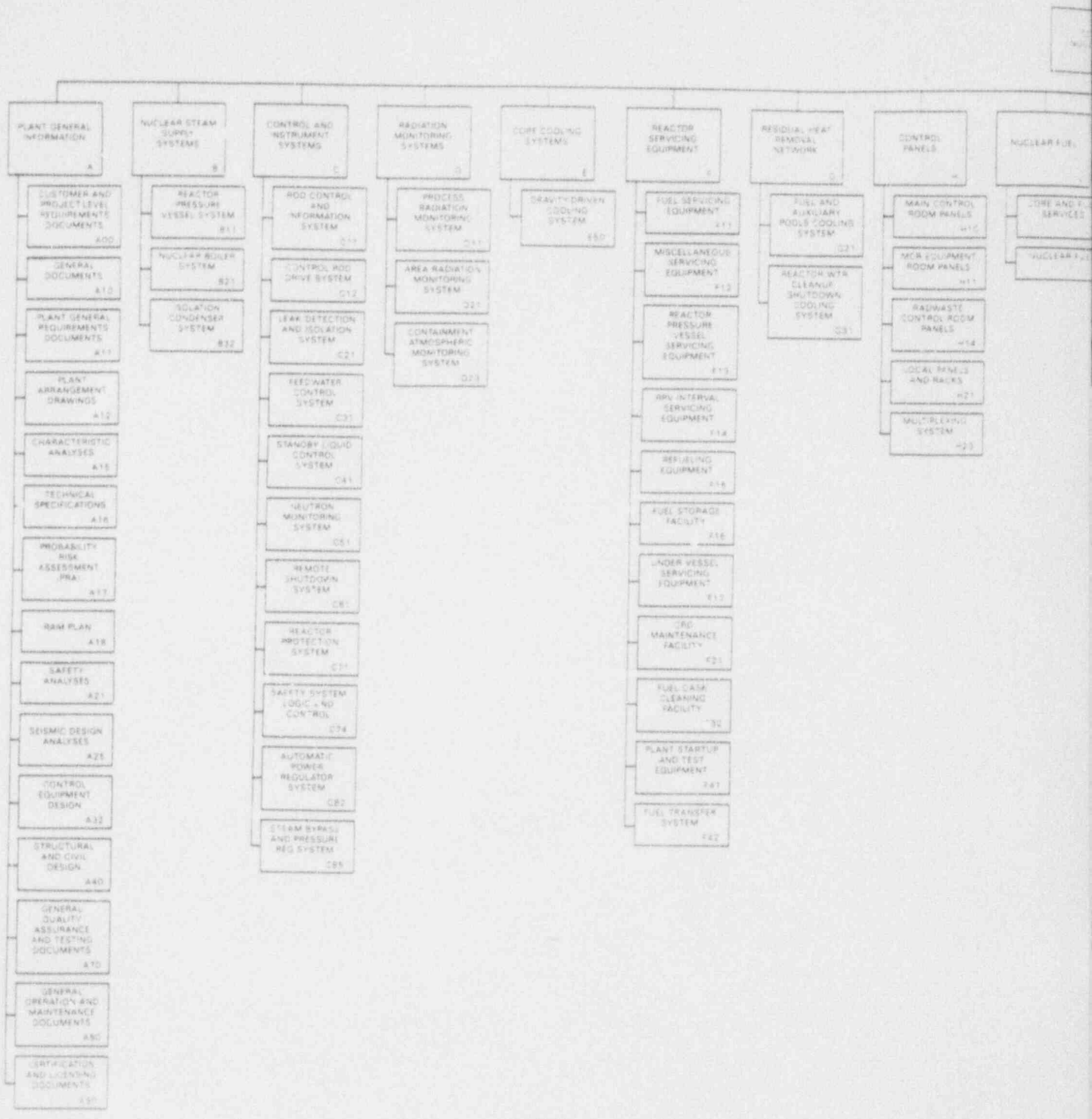


Figure 2.2-1. Typical Program Coordination and Communications


PLANT GENERAL INFORMATION
A
CUSTOMER AND PROJECT LEVEL REQUIREMENTS DOCUMENTS
A00
GENERAL DOCUMENTS
A10
PLANT GENERAL REQUIREMENTS DOCUMENTS
A11
PLANT ARRANGEMENT DRAWINGS
A12
CHARACTERISTIC ANALYSES
A15
TECHNICAL SPECIFICATIONS
A16
PROBABILITY RISK ASSESSMENT (PRA)
A17
RAM PLAN
A18
SAFETY ANALYSES
A21
SEISMIC DESIGN ANALYSES
A25
CONTROL EQUIPMENT DESIGN
A32
STRUCTURAL AND CIVIL DESIGN
A40
GENERAL QUALITY ASSURANCE AND TESTING DOCUMENTS
A70
GENERAL OPERATION AND MAINTENANCE DOCUMENTS
A80
CERTIFICATION AND LICENSING DOCUMENTS
A90
NUCLEAR STEAM SUPPLY SYSTEMS
B
REACTOR PRESSURE VESSEL SYSTEM
B11
NUCLEAR BOILER SYSTEM
B21
ISOLATION CONDENSER SYSTEM
B32
CONTROL AND INSTRUMENT SYSTEMS
C
ROD CONTROL AND INFORMATION SYSTEM
C11
CONTROL ROD DRIVE SYSTEM
C12
LEAK DETECTION AND ISOLATION SYSTEM
C21
FEEDWATER CONTROL SYSTEM
C31
STANDBY LIQUID CONTROL SYSTEM
C41
NEUTRON MONITORING SYSTEM
C51
REMOTE SHUTDOWN SYSTEM
C61
REACTOR PROTECTION SYSTEM
C71
SAFETY SYSTEM LOGIC AND CONTROL
C74
AUTOMATIC POWER REGULATOR SYSTEM
C82
STEAM BYPASS AND PRESSURE REG SYSTEM
C85
RADIATION MONITORING SYSTEMS
D
PROCESS RADIATION MONITORING SYSTEM
D11
AREA RADIATION MONITORING SYSTEM
D21
CONTAINMENT ATMOSPHERIC MONITORING SYSTEM
D23
CORE COOLING SYSTEMS
E
GRAVITY-DRIVEN COOLING SYSTEM
E50
REACTOR SERVICING EQUIPMENT
F
FUEL SERVICING EQUIPMENT
F11
MISCELLANEOUS SERVICING EQUIPMENT
F13
REACTOR PRESSURE VESSEL SERVICING EQUIPMENT
F15
RPV INTERNAL SERVICING EQUIPMENT
F18
REFUELING EQUIPMENT
F16
FUEL STORAGE FACILITY
F16
UNDER VESSEL SERVICING EQUIPMENT
F17
CRD MAINTENANCE FACILITY
F21
FUEL CASK CLEANING FACILITY
F32
PLANT STARTUP AND TEST EQUIPMENT
F47
FUEL TRANSFER SYSTEM
F42
RESIDUAL HEAT REMOVAL NETWORK
G
FUEL AND AUXILIARY POOLS COOLING SYSTEM
G21
REACTOR WATER CLEANUP SHUTDOWN COOLING SYSTEM
G31
CONTROL PANELS
H
MAIN CONTROL ROOM PANELS
H10
MCR EQUIPMENT ROOM PANELS
H11
RADWASTE CONTROL ROOM PANELS
H14
LOCAL PANELS AND RACKS
H21
MULTIPLEXING SYSTEM
H23
NUCLEAR FUEL
CORE AND FUEL SERVICES

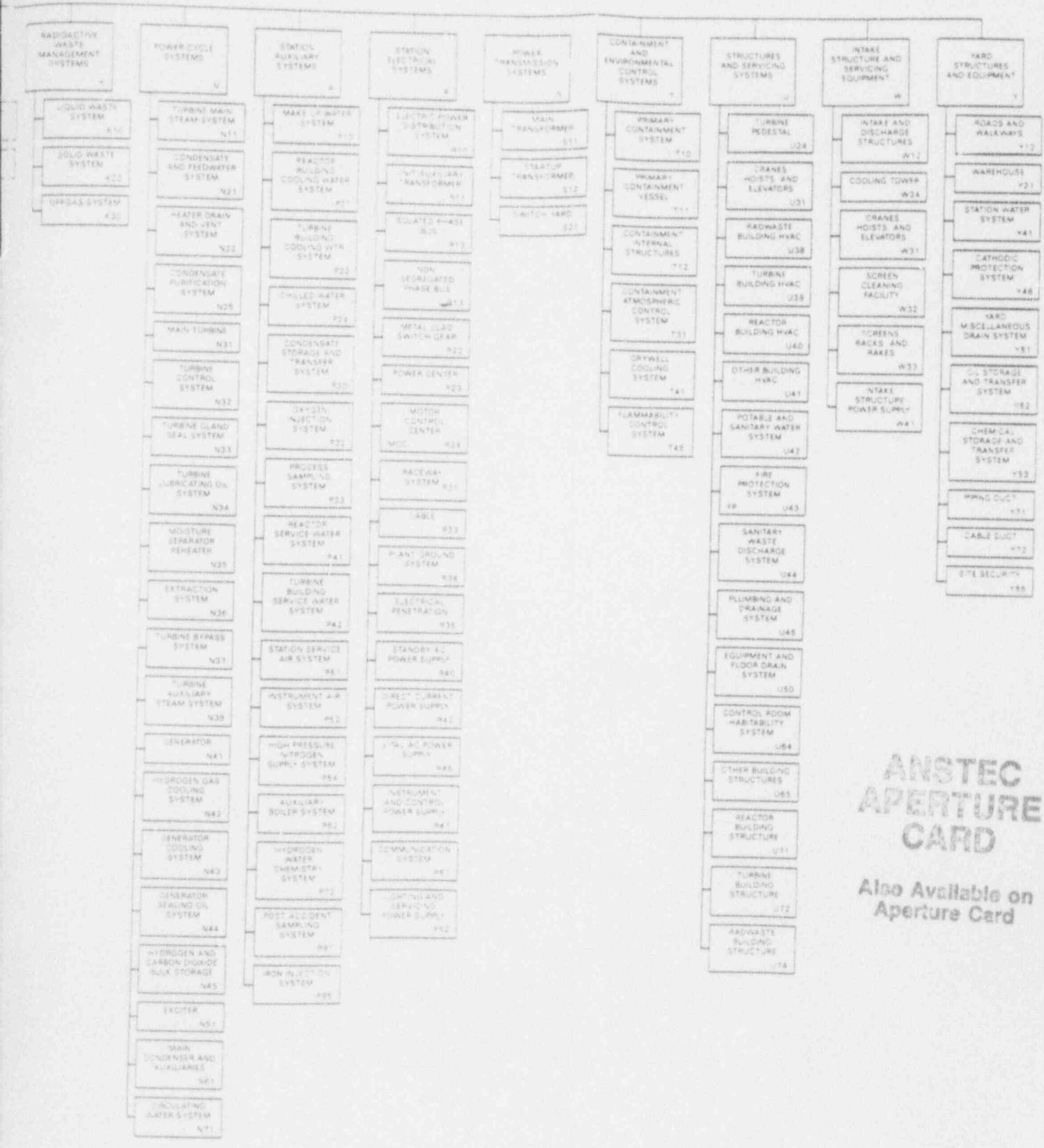
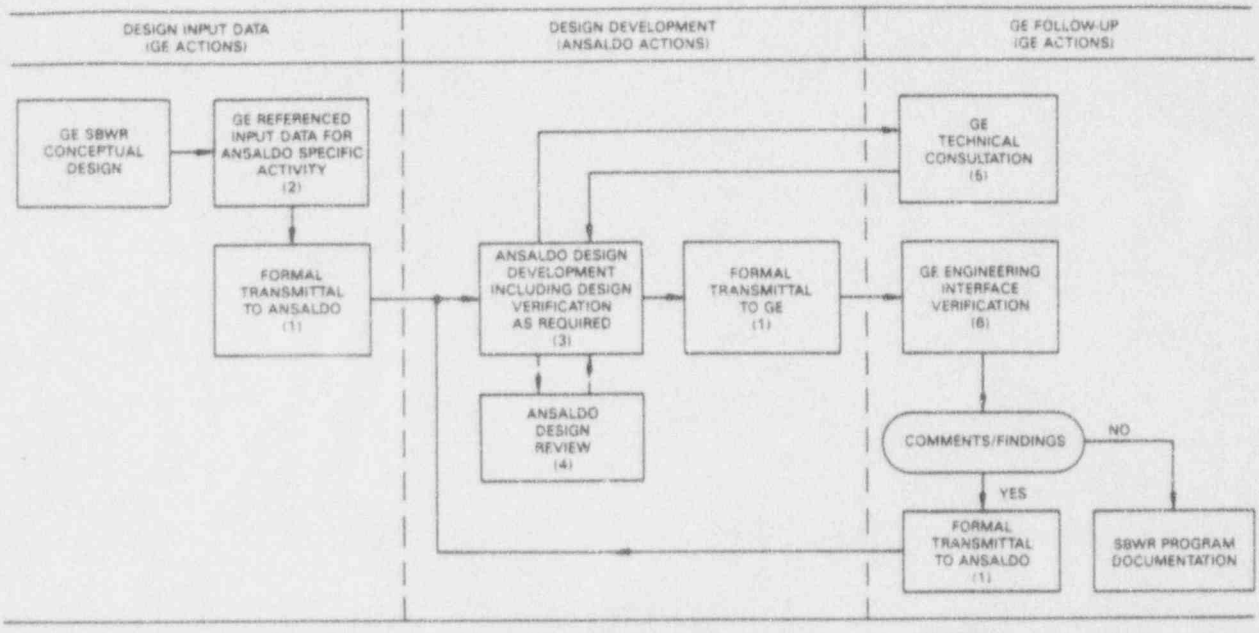


Figure 2.4-1. Example SBWR Product Structure



NOTES:

(1) TRANSMITTAL SHALL BE BETWEEN GE AND ANSALDO PROJECTS.

(2) APPLICABILITY LIMITS SHALL BE CLEARLY IDENTIFIED. ANY CHANGE TO INPUT DATA SHALL BE NOTIFIED TO ANSALDO IN A FORMAL WAY.

(3) INDEPENDENT DESIGN VERIFICATION SHALL BE CLEARLY DOCUMENTED AND FILED.

(4) DESIGN REVIEW FORESEEN FOR RELEVANT DESIGN ACTIVITIES ONLY. TO BE AGREED UPON BETWEEN GE AND ANSALDO. ALL THE RELATED ISSUES SHALL BE CLEARLY DOCUMENTED AND FILED.

(5) INTERFACE BETWEEN GE AND ANSALDO COGNIZANT ENGINEERS THRU ANSALDO LEAD ENGINEER AND GE TECHNICAL PROJECT ENGINEERS.

(6) REVIEW AND AUTHORIZE APPLICATION OF DOCUMENTS TO MPL BY ENGINEERING REVIEW MEMORANDUMS.

REFERENCE:

(a) ANSALDO NUCLEAR DIVISION QUALITY ASSURANCE MANUAL (SECTION 3).

Figure 2.6-1. Example Flow Chart of ITA SBWR Design Activities Performed

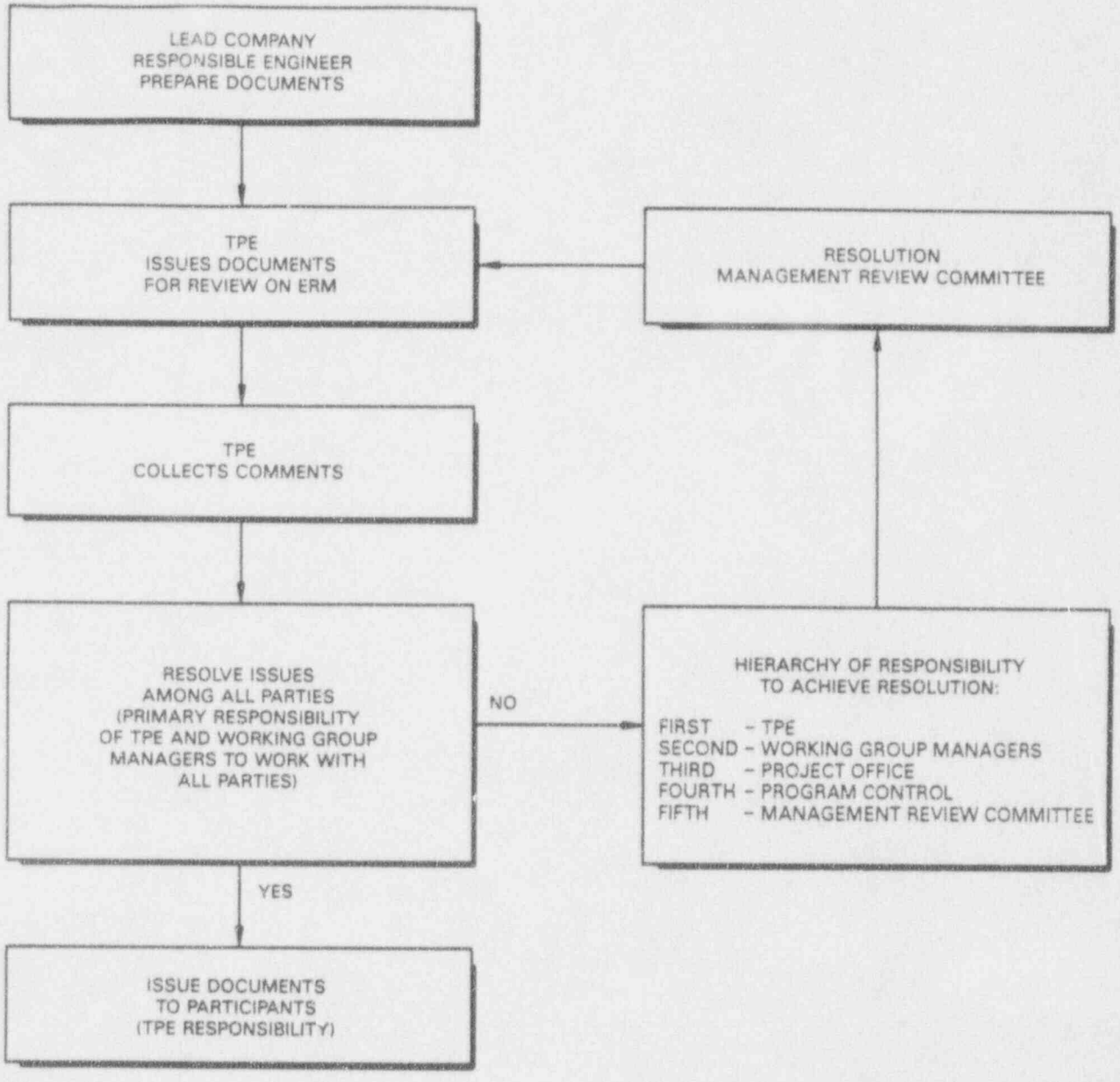


Figure 2.10-1. Resolution of Technical Issues

Table 2.4-1

PROGRAM DELIVERABLES

Initial List. See the yearly Work Plan for updated lists.

ORD No.	WBS No.	Description
DD001/ DD002	3.1.1	Summary Plant Description and Overall Requirements (combines contract deliverables DD001 and DD002)
SDDL000	3.1.1	System Design Description List
DDL000	3.1.1	Design Drawings List
DSL000	3.1.1	Design Specifications List
MRL000	3.1.1	Miscellaneous Technical Documents and Reports List
DRL000	3.1.1	Design Review List
SAL000	3.1.1	Safety Analysis List
DC001	4.2.2 (4.2.1)	Standard Safety Analysis Report (SSAR)
SAL001	4.2.2	Probabilistic Risk Assessment (PRA)
DL002	4.1.1	Licensing Review Bases Document
C001	3.2.1	Construction Plan and Schedule
C002	3.2.2	Construction Cost Estimate
M001	1.2.3	Configuration Management Plan
M002	1.2.2	Reliability, Availability, and Maintainability (RAM) Plan
M003	1.2.1	Quality Assurance Plan

APPENDIX A

SBWR CORRESPONDENCE CONTROL AND FILES

APPENDIX A
SBWR CORRESPONDENCE CONTROL

A.1 FORMAL CORRESPONDENCE FROM TEAM MEMBER ORGANIZATIONS TO GE-NE

A.1.1 Sending Organization

A.1.1.1 General

All formal correspondence to GE-NE (Nuclear Energy) shall be addressed to the appropriate GE SBWR Project Control function.

A.1.1.2 Format

(1) **Date/Protocol Number**

All correspondence addressed to GE from team members shall be dated and is recommended to contain an SBWR-unique sequential protocol number identification, in addition to any other numbering system used by the sending organization.

(2) **Work Breakdown Structure Number**

All technical correspondence pertaining to SBWR work identified by a Work Breakdown Structure (WBS) identifier, shall contain the appropriate identifier, in addition to any file numbering system used by the sending organization. If the WBS is not applicable, then the team member may leave this blank.

(3) **Reference to Task Number (where applicable)**

All technical correspondence pertaining to Specific SBWR work tasks numbers (identified in individual TDP's or other Agreements) shall clearly reference the appropriate work task number, in addition to any WBS number.

A.1.1.3 Letter Correspondence (including faxes)

(1) All letter correspondence shall be addressed to the appropriate SBWR project control function.

A.1.1.4 Document Transmittals

(1) All documents (Reports, Specifications, Drawings, etc) shall be transmitted using a "Document Transmittal Form" equivalent to the Example.

(2) All document transmittals shall be addressed to the appropriate SBWR project control function.

(3) All document transmittals shall contain the following information as a minimum:

(a) Document Identification Number
(b) Document Revision Number and Date
(c) Name of Issuing Organization
(d) Title of Document
(e) Task Number (where applicable)
(f) WBS Identifier Number
(g) MPL Number (when applicable)

A.1.2 Responsibility for Action at GE

(1) Non Technical

All non-technical correspondence will be dispositioned by the appropriate Project Control function.

(2) Technical

All technical correspondence will be dispositioned by the cognizant Technical Project Engineer (TPE). The cognizant TPE will have primary responsibility for coordinating

any associated review, consultation, work, etc. with other appropriate engineers, TPE's and Working Groups, etc. This includes arranging meetings, making additional distribution of correspondence, documents, other data, etc. available to others.

The cognizant TPE is responsible for assuring the timely preparation and sending of any required response.

A.2 FORMAL CORRESPONDENCE FROM GE-NE TO TEAM MEMBER ORGANIZATIONS

A.2.1 Authority for Sending Correspondence

(1) All programmatic, administrative, or other non-technical correspondence from GE to other participating Team Members shall be sent from the appropriate GE SBWR Project Office function.

(2) All technical correspondence from GE to other participating Team Members shall be sent from the appropriate Working Group Manager (WGM), Technical Project Engineer (TPE) or Project Office only. Generally it is expected that the TPE will be the initiator/sender of most technical correspondence. Where the correspondence is originated by someone other than the WGM, TPE or Project Office, the TPE must sign/initial it before sending.

A.2.2 Date

All GE outgoing correspondence shall be dated. In order to avoid any confusion between American and European dating systems, the date shall be given in <u>one</u> of the following two forms only:

(1) 01 Jan 1990, or
(2) Jan 1, 1990

A.2.3 Protocol Number and Logs

All GE outgoing correspondence shall contain an SBWR-unique sequential protocol number for identification. A standard and uniform method of sequential numbering and identification of the corresponding organization(s) has been established. The SBWR Project file office maintains a correspondence letter numbering log for each individual organization. The originator of the correspondence shall complete the log entry whenever a new number is taken out.

Example: (correspondence addressed to Ansaldo)

> GEAN-0033 - where "AN" reflects that the letter is addressed to Ansaldo, and "GE" reflects that it originates from GE. "0033" identifies the correspondence as the thirty-third letter in the sequence of letters sent to Ansaldo. Conversely, ANGE-0033 would be used for correspondence originating from Ansaldo and addressed to GE.

The organization-unique numbering shall apply whenever the correspondence is addressed to one of the participating Team Member Organizations. Where GE is addressing common correspondence to multiple (more than one) organization concurrently, the correspondence will be identified as:

GEMD-0000 - where MD mean "multiple distribution"

> NOTE: Where the correspondence is addressed to only one team member with multiple copies to other Team members, the organization-unique number for the addressee organization shall always be used.

A.2.4 Additional Filing Numbers

In addition to the sequential Protocol Number, all technical correspondence pertaining to SBWR work identified by a Work Breakdown Structure (WBS) number shall contain the appropriate WBS number. Where the correspondence pertains to a specific Master Parts List (MPL) item number, the MPL number shall also be identified in addition to the WBS file number.

A.2.5 Reference to Task Number (where applicable)

All technical correspondence pertaining to specific SBWR work task numbers (identified in individual TDP's of other Agreement workscopes) shall clearly reference the appropriate work task number, in addition to the sequential protocol number and any WBS file number or MPL number.

A.2.6 Other References

All correspondence which relates to a previous communication (GE or otherwise) shall include appropriate reference identification.

A.2.7 Document Transmittals

All document transmittals shall comply with the above. Document transmittals shall contain the following (minimum) information on the transmittal cover sheet/letter. See Example transmittal sheets. The Project Office will provide current transmittal sheets.

(1) Name of Issuing Organization
(2) Title of Document
(3) Document Identification Number
(4) Document Revision Number
(5) Document Revision Date
(6) Filing Number
(7) Signatures and Initials Required
(8) Task Number (where applicable)
(9) WBS Number
(10) MPL Number (where applicable)
(11) Purpose/Requested action (review/comment, information/reference, etc.)

A.3 GE LOGGING AND FILING OF INCOMING AND OUTGOING FORMAL CORRESPONDENCE

All incoming and outgoing correspondence will be processed through the SBWR Program Support organization which will perform the following functions:

(1) For incoming correspondence, assign a sequential protocol number for filing if none was assigned by the originator.

(2) Maintain the electronic log (SBWR Program File, also called the Letter Book File) and files.

(3) Send outgoing correspondence by U.S. Mail, Express Mail, Telex, Fax, etc., as appropriate.

(4) Make copies for file and distribution to include:

(a) Addressee (original)
(b) SBWR Project File (the sequential protocol number file)
(c) Other external and internal individuals identified
(d) SBWR Project Manager
(e) Project Control (1 or more as appropriate)
- SBWR - U.S. Programs
- SBWR - Far East Programs
- SBWR - European Programs
(f) Originator - outgoing only
(g) Cognizant Technical Project Engineer (TPE)
(h) Cognizant Working Group Manager (WGM)

(5) Placing items in the mail, (3) above, may be performed directly by TPE's (or others), in which case the person sending the correspondence shall assure that the SBWR Support organization receives a copy for completion of logging and filing.

NOTE: Copies of documents attached to Transmittals shall be made only for the file and distribution to the TPE and WGM. All other distribution will receive a copy of the Transmittal cover sheet only.

A.4 FILES

The Project Office maintains:

(1) The "SBWR Program File" [Letter Book File] is an electronic data base, for the hard copies. It contains the sequential protocol number, date, title, and other identifying numbers.

(2) SBWR Project File. This is the hard copy file, grouped in alphanetical order by team member letter designator. Within each group, items are filed by sequential protocol number.

Example: The AI-GE file is first. The GE-AI file is right behind it. Within each, the filing is by sequential protocol number. AI-GE 0001, 0002 ...; GE-AI 0001, 0002, etc.

(3) MPL and ERM Files. These files are maintained to assist SBWR engineers in performing their work. They are not necessarily complete. The GE-NE document control system will have to be used to insure all documents are obtained.

(4) Indexed GE SBWR Program File. This file is available for use as needed. The index listing is attached to this appendix.

A.5 SBWR PROGRAM DOCUMENT CONTROL CLERK FUNCTIONS

These functions are described in the procedure and flow charts attached to this appendix.

APPENDIX B

DESIGN DOCUMENTATION AND REPORTING REQUIREMENTS

APPENDIX B
DESIGN DOCUMENTATION AND REPORTING REQUIREMENTS

The overall (major) milestones, deliverables and schedule for the SBWR program are shown in the Annual Work Plan. Periodic reporting requirements and design documents are summarized in Tables B-1 and B-2, respectively.

Table B-1

INITIAL DESIGN DOCUMENTS (GFY90)

See the yearly Work Plan for up to date lists.

System	Document Title
B21	Nuclear Boiler System P&ID
B32	Isolation Condenser System P&ID
C11	Rod Control & Information System IED
C12	Control Rod Drive Hydraulic System P&ID
C21	Leak Detection & Isolation System IED
C31	Feedwater Control system IED
C41	Standby Liquid Control System P&ID
C51	Neutron Monitoring System IED
C61	Remote Shutdown System IED
C85	Steam Bypass and Pressure Regulator System IED
D11	Process Radiation Monitoring System IED
D21	Area Radiation Monitoring System IED
D23	Containment Atmospheric Monitoring System IED
E50	Gravity-Driven Cooling System P&ID
G21	Residual Heat removal System/Fuel and Auxiliary Pools Cooling System P&ID
G31	Reactor Water Cleanup/Shutdown Cooling System P&ID

P&ID - Process and Instrumentation Diagram

IED - Instrument Electrical Diagram

Table B-2
PERIODIC REPORTING REQUIREMENTS

Element Code (WBS)	Periodic Report Description	Frequency of Issue
1.1	*Small Business Subcontracting Report	Quarterly(1)
1.1	*Monthly Technical Progress and Status Report	Monthly(2)
1.1	*Milestone Schedule/Status (1332.3)	Monthly(2)
1.1	*Cost Management Report (1332.9)	Monthly(3)
1.1	*Cost Performance Report (1332.12)	Monthly(3)

(1) Due on the 25th day of the month following the end of each Government fiscal quarter.

(2) By the 10th day of the following month.

(3) By the 20th day of the following month.

EXAMPLE

SBWR DOCUMENT DATA TRANSMITTAL – TO GE

From: _____
Sender Organization

Reference No.: XXGE- _____

Date: 3 June 1993

Page 1 of 1

ECN _____

To: L. L. Myers
GE SBWR Program Office

File: WBS No. 3.1.6

Attention: TPE
J. D. Duncan

Task No.: 3.1

GE Diestribution: _____

Description: Prel. Prob. Risk Assess.
SA Analysis (PRA)

Liaison Engineer:
WGM:
RE: C.E. buchholz

Your Reference: _____

Purpose/Requested Action:

( ) Design Input
(/) Review/Comment
( ) Reference
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J. Hart, S. Spoelstra
ECN-CX--93-012
Severe Accident Analysis
for the SBR
April 1993
WBS 3.1.6

Comments:

Best Regards,

_____

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Rev. 17
5/93

APPENDIX C

CHANGE ACTION LIST

APPENDIX C
ADMINISTRATIVE GUIDE FOR THE CHANGE ACTION LIST (CAL)

C.1 BACKGROUND

The Change Action List was initiated upon SSAR submittal, August 28, 1992. The List was initially kept by the Project Management group, and was transferred to the Technical Integration Group in the fall GE reorganization. The List was kept per the first issue of this guide. A revision was created dated Dec. 14, 1992, but was not widely distributed. Then the process was revised and made this Appendix. Items on the list remained the same through the revisions.

C.2 PURPOSES

2.1 Manage changes to the SBWR design after submittal of the SSAR (August, 1992). [Other than typographical errors.]

2.2 List and track changes on the Change Action List (CAL).

2.3 Ensure proper review and approval of changes.

2.4 Properly define issues presented.

2.5 Clarify and document the scope of changes.

2.6 Notify all action parties.

2.7 Ensure correct interfaces with all parties.

2.8 Ensure correct entry into existing processes, of items to be changed.

2.9 Provide for listing of all required actions in the Design Action Plan (DAP) which will then track completion of items created by the Change Action List.

2.10 Provide for a Change Action List file for copies of in-process and completed Change Action List packages.

C.3 PROCESS - SEE FLOW CHART

C.4 RESPONSIBILITIES AND PROCEDURES

C.4.1 Originator

a. Decide on the need for a change.

b. Get Change Action List (CAL) number from Technical Integration Group (TIG) and provide preliminary description.

c. Complete Change Action forms, as applicable.

d. Forward Change Action forms to the TIG.

e. Provide additional information to TIG/Responsible Engineer, as requested.

C.4.2 Technical Integration Group

a. Maintain the Change Action List (CAL) on GE's electronic mail system.

b. Provide CAL number in sequence as requested.

c. Receive Change Action List (CAL) packages from originators.

d. Screen CAL packages for:

1. Completeness

2. Type of Change - per GE Engineering Operating Procedure EOP 55-2.00

(a) Changes requiring Change Control Board (CCB) approval. [See EOP 55-4.00 for CCB]

(1) Category I per EOP 55-2.00 - criteria attached for reference. Always use the criteria in the current revision of EOP 55-2.00.

(2) Those that deviate from the Utility Requirements Document or other Commitments.

(b) Category II - Changes that can be implemented without Change Control Board approval are any changes not in the categories above. Changes that add hardware may be implemented without CCB approval, as long as the criteria above are not violated.

When in doubt, the TIG will confer with the SBWR CCB chair and document this on the screening form.

3. More information required.

e. Make a copy of the screened package for the CAL Process file. The CAL process files will be placed in a Design Record File.

f. Determine action, then forward the screened package with TIG management action to the Responsible Engineer, Change Control Board or Originator.

1. If forwarded for more information, note this on the CAL.

2. If to Responsible Engineer, note this on the CAL.

3. If to the CCB, note this on the CAL. It also goes to the Responsible Engineer who will attend the CCB meeting.

4. For other actions, such as defer or disapprove, after getting more information, note this on the CAL.

g. Receive Design Activity Plan (DAP) Input Form from the Responsible Engineer, when Change Action List items have been determined.

1. Note receipt of DAP inputs on the Change Action List (CAL).

2. Retain DAP Input Form until next issue of DAP.

3. Check DAP against DAP Input Form.

- If correct, change CAL status to ''Complete''

- If not correct, have corrected.

4. File DAP input Form with completed CA package.

h. Receive completed CA package from Responsible Engineer.

1. Verify completeness.

2. File. SSAR text changes are included. They will be retrieved when needed for the next SSAR change.

C.4.3 Responsible Engineer

a. Receive CA package from TIG, for:

1. More information, or

2. Preparation for going to Change Control Board, or

3. Preparation of Change Action List implementing actions.

b. Develop Change Actions

1. Coordinate agreement from persons responsible for interfacing systems and documents. Get their initials on the "Change Action Interfaces" form.

2. Develop all needed change documents, in accordance with existing applicable procedures.

c. Obtain concurrence of the Technical Project Engineer (TPE) with the details of the change. TPE signs CAL form.

d. Attach SSAR text changes to CAL package.

e. Prepare DAP Input Forms. Forward original to Administrative group, copy to TIG.

f. Forward completed CAL package, with SSAR text change, if any, to TIG.

C.4.4 Administrative Group will update and maintain DAP per input from many sources, and periodically provide the status.

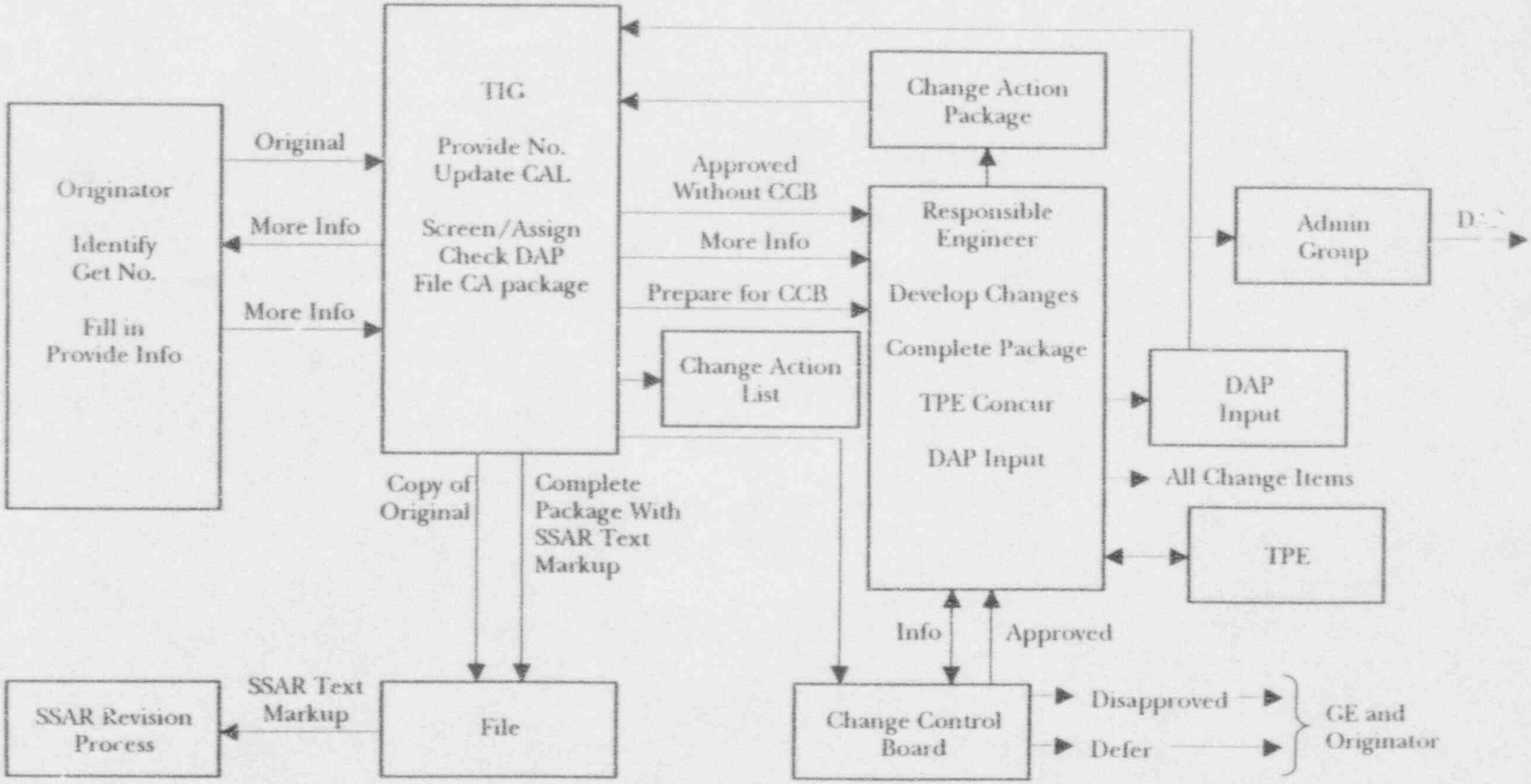

Figure C.1-1. SBWR Change Action List (CAL) Process

For Reference. Always use the up to date revision of EOP 55-2.00

B3.1.1 CATEGORY I (HIGHEST IMPACT) - A change that affects one or more of the following factors is designated as Category I and requires approval by the Change Control Board (CCB).

a. SAFETY AND LICENSING - A change required to correct a condition that is hazardous to the health or safety of the public or plant personnel, such as, deviations from approved safety standards, regulatory guides, General Electric Standard Safety Analysis Report (GESSAR) or other Safety Analysis Report (SAR) commitments, operating licenses, and technical specifications. This includes changes in the safety-related classification of the Master Parts List level hardware.

b. SYSTEM OR PLANT PERFORMANCE - A change that improves or degrades system or plant operating performance outside the limits set forth in the contract specification. Changes in this category include those required to bring an existing system or plant within specification limits.

c. AVAILABILITY - A change that improves or degrades system or plant operational availability. This includes both reliability and maintainability.

d. OPERATION, MAINTENANCE, OR LOGISTICS - A change that improves or degrades the operation, maintenance or logistics support of a plant or system. This includes changes that alter operation or maintenance procedures, spare parts inventory levels, or requirements for special tools or test equipment.

e. STANDARDIZATION OR INTERCHANGEABILITY - A change that creates a nonstandard condition with respect to standard plant design or results in a noninterchangeable item (refer to EOP 55-10.00).

f. INTERFACE - A change that alters a physical or functional interface commitment and requires customer or regulatory agency approval. Proposed changes having prior authorization of the interfacing organizations are exempt from this category.

g. COST - A Change estimated to have a gross cost difference of at least $20,000 for any one application of the change. Gross cost difference is defined as the total engineering, manufacturing, procurement, and field costs to be incurred, saved or avoided by implementation of the change.

h. INDETERMINATE COST - A change where cost estimates are indeterminate.

i. ENGINEERED EQUIPMENT SUPPLIER DESIGN - A change to a previously "Approved Without Comment" design that deviates from the specific design requirements.

j. SCHEDULE - A change affecting contract delivery schedule by delaying delivery of equipment or causing construction or plant startup delays.

k. CONFIGURATION - A change that significantly alters system or plant configuration. This includes all items planned for product offering.

l. WARRANTY - A change that improves or degrades the system or plant operating performance outside the limits set forth in the sales contract.

m. CONTRACT DEVIATION - A change that deviates from the contract as defined in project requirements documentation.

n. PRODUCT APPEARANCE - A change that permits a significant product appearance problem or other nontechnical aspect that might pose an adverse quality image.

o. OPERATING PLANT - A change that affects the operation, performance, warranty, or availability of an operating plant and has the potential for generic application (refer to Paragraph B3.1.1.d. and Appendix C).

B3.1.2 CATEGORY II (LOWER IMPACT) - Changes that do not have the significant economic or technical impact defined for Category I changes are designated as Category II.

B3.1.3 CATEGORY III - Administrative or nontechnical changes to engineering controlled documents that address one or more of the items listed below are designated as Category III and can be made without the use of an Engineering Change Authorization/Engineering Change Notice (ECA/ECN). Except for Paragraphs B3.1.3.a. and B3.1.3.g., advancement of revision numbers and distribution of copies is required for documents having Category III changes:

a. Correction of document distribution codes.

b. Correction of spelling, punctuation, or paragraph numbering errors that do not affect the technical content of the document.

c. Retracing or duplication of a document with no change to the document.

d. In the case of older multi-sheet drawings, a revision solely for the purpose of bringing all sheets to a common revision status.

e. Addition, deletion, or change of administrative designations to a document with no technical change to the document. Designations include but are not limited to: First Made For, MPL No. on first sheet of document, Design-Frozen Document (DFZ), Completion Status Code (ICER), conditional release, and C/C ISSUED. Each of these changes is based on there being traceability for the change.

f. Addition of a notation to a document to identify a superseding document issued in accordance with the requirements of EOP 42-8.00.

g. Administrative changes to issued unincorporated or incorporated ECN sheets are designated as Category III and can be made without the use of ECA/ECN to correct:

(1) Authorization

(2) Revision Status

(3) Source Code

(4) Master Parts List (MPL) number

(5) Reason for change/component responsibility

(6) Design Record File reference.

h. Addition or deletion of alternate supplier and item identification.

i. Change in a non-nuclear safety related supplier item identification (e.g. catalog number) where form, fit, and function of the supplier item is not affected.

SBWR
CHANGE ACTION LIST PACKAGE

CAL# _____
SHEET 1 OF _____

CHANGE ACTION (Title) _____

ORIGINATOR

Major System(s)/Equipment Affected (MPL#)

_____

Other Product Lines Affected: _____ ABWR _____ Other _____ None

Reason for CAL:

NRC Negotiated	____
URD/Conformance Assessment	____
PRA	____
Cost Reduction	____
Product Improvement	____
Further Design Development	____
Other _____	____

Estimated Resource Impact: mnhrs: _____

Estimated Schedule Impact: _____

Problem Statement (Sheet 2) completed.

Originator _____ Date _____
Print/ Sign

TECHNICAL INTEGRATION GROUP

_____ Approved without CCB _____ Disapprove _____ Defer until ___

_____ Additional Information Required

_____ Scheduled for Change Control Board on _____

Assigned to Responsible Engineer: _____
Print

Technical Integration Group

Manager _____ Date _____
Sign

PROBLEM STATEMENT FOR DESIGN CONCERNS

CAL# _____
SHEET 2 OF _____

CHANGE ACTION (Title) _____

WHERE/HOW PROBLEM IDENTIFIED: (NRC question # _____)

WHAT IS THE PROBLEM:

HOW DOES PROBLEM AFFECT SYSTEM(S)/PLANTS:

CONSEQUENCE (RISK) OF NOT ADDRESSING THIS PROBLEM:

ACTION REQUIRED TO SOLVE THIS PROBLEM:

PROGRAM MANAGEMENT OR CCB COMMENTS:

CAL# _____
SHEET 3 OF _____

CHANGE CONTROL BOARD (if applicable)

	Approved		Disapproved		Deferred

CCB Chairman _____ Date _____
Additional Direction:

_____

_____

Responsible Engineer attach copy of CCB meeting minutes to CAL package.

Acknowledgement of CCB action. _____ _____
Responsible Engineer sign Date

Responsible Engineer

1. Changes Developed (List)

_____

_____

SSAR Text Markup Included?

RE _____ Date _____

2. All Change Action Interfaces determined (Sheet 5).

RE _____ Date _____

3. Technical Project Engineer Concurrence.

TPE _____ _____ Date _____

4. DAP input prepared and sent to Administrative Group. Copy to TIG.

RE _____ Date _____

5. Changes Action Package Complete. Sent to TIG on _____

RE _____ Date _____

TECHNICAL INTEGRATION GROUP

CAL# _____
SHEET 4 OF _____

1. DAP INPUT FORM received. CAL updated.

   By _____ Date _____

2. Updated DAP checked against DAP Input List. CAL updated to "Complete".

3. CA package received. Checked for completeness. Sent to file on

   _____ _____
   Date Name-sign

CHANGE ACTION ON INTERFACES

CAL# _____
SHEET 5 OF _____

Instructions: Obtain the initials of the person responsible for the affected system and document. (denotes acknowledgement of the proposed change)

AFFECTED DOCUMENT / SYSTEM	P & ID	Flow Diagram	Design Spec.	Arrangement	IED	Single Line	Load List	Tech Spec	PRA	SSAR	URD	Structural	Logic Diagram	Rad. Dose	Cost	Turbine	other:			
INITIATING:																				

INITIATING DOCUMENT:	NOTES:
AFFECTED DOCUMENTS:	
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SBWR

GE Nuclear Energy

DESIGN ACTIVITY PLAN INPUT FORM

TO ADD LINE ITEMS TO DAP

1. FILL IN BLANKS
2. SEND TO KEN BIBY X3061 M/S 781

DESIGN ACTIVITY DESCRIPTION: ______________________________

MPL NUMBER	DOC TYPE	DOC NUMBER	DOC REV.	TPE INTL.	RESP ENGR. INTL.	SUP ORG.	GE MHRS.	NON GE MHRS.	ITA MHRS.	START ESTIMATE (ACTUAL)	REVIEW ESTIMATE (ACTUAL)	COMPLETE ESTIMATE (ACTUAL)

DESIGN ACTIVITY DESCRIPTION: ______________________________

MPL NUMBER	DOC TYPE	DOC NUMBER	DOC REV.	TPE INTL.	RESP ENGR. INTL.	SUP ORG.	GE MHRS.	NON GE MHRS.	ITA MHRS.	START ESTIMATE (ACTUAL)	REVIEW ESTIMATE (ACTUAL)	COMPLETE ESTIMATE (ACTUAL)

DESIGN ACTIVITY DESCRIPTION: ______________________________

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DESIGN ACTIVITY DESCRIPTION: ______________________________

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APPENDIX D

DESIGN RECORD FILES

APPENDIX D
DESIGN RECORD FILES

Based on GE-NO EOP 42-10.00.

D.1 PURPOSE

Government regulations and industry standards require designers of nuclear systems and components to collect, store, and maintain design documentation and records which provide evidence that the design and review process is complete. Also required is the identification of important design steps and sources that support the final design and permit verification and auditing.

Good engineering practice also requires records be kept to assure that origin and evaluation of design can be traced, design assumptions noted, and supporting agreements and analyses made available so future reasonable judgements can be made without having to reconstruct the design activity.

This appendix defines responsibility and requirements for the initiation, maintenance, and retention of Design Record Files.

D.2 GENERAL AND APPLICATION

A Design Record File (DRF) is a formal, organized accumulation of information, which provides a controlled system for retention of documented engineering activities necessary to substantiate significant design decisions. The DRF provides a mechanism for controlling and archiving important design records, such as evidence of design verification, studies and analyses.

The DRF is a living (i.e., "in-process") receptacle of design records which is subject to change until it is permanently recorded, usually on microfilm at 12 month intervals or at the completion of discrete pieces of work.

It should be noted that this appendix is based on the internal GE procedure for establishing and maintaining design record files. This procedure should be used as a general guide by other participating organizations for their use in collecting and recording SBWR design data. The applicable Quality Assurance requirements for the SBWR Program used by each company must be followed. As such, some deviations from this procedure may be necessary to reflect each company's specific QA requirements. Sample responsibility matrices are shown and sample design record file guides are provided.

D.3 SUMMARY OF PRIMARY ACTIVITIES AND RESPONSIBILITIES

The following tabulation summarizes the primary activities and responsibilities established in Section 4.0 of this procedure.

Key Activity (Reference)	Responsibility
Determine whether a new DRF is required or if assigned task is included in an existing DRF.	(C) Responsible Engineer (X) Responsible Manager
Initiate and Maintain DRF during engineering phase of assigned activity.	(X) Responsible Engineer
Assign DRF Number/process DRF records for permanent storage.	(X) Configuration Management

KEY

(X) = Prime Responsibility
(C) = Contributory Responsibility

Responsible Manager - Person responsible for engineering documentation practices and quality who assigns tasks to reporting personnel.

Responsible Engineer - Person responsible for developing product technical data and assigned as DRF custodian.

Configuration Management - Component responsible for engineering record identification systems and engineering record retention.

D.4 PROCEDURE AND RESPONSIBILITIES

D.4.1 Responsible Manager

(1) Assign Responsible Engineer as DRF Custodian who has the expertise to judge the adequacy of the technical input and relevance to the task being documented in the DRF.

(2) Assist assigned DRF Custodian in determining when DRFs are to be submitted for microfilming or other form of permanent retention.

(3) At the time of submittal for microfilming, review the DRF and sign and date the DRF Assignment Sheet beneath the abstract statement to signify that pertinent design records are included and traceable, that superfluous data have been removed, and the DRF meets the requirements of this procedure.

D.4.2 Responsible Engineer

(1) Initiate DRF or enter task title on Table of Contents of existing DRF, and assure maintenance of the file.

(2) Assess the need for submittal of DRFs for microfilming. Generally, DRFs are microfilmed when:

(a) All activities relating to the verification and certification of an initial design are completed and it has been unconditionally released for use.

(b) Subsequent design activities, such as design changes, reapplications, or design deviations having a significant technical impact, are approved and verified.

(c) Engineering Computer Codes reach production status and are approved for a specific application.

(d) Tests, analyses, and other technical activities are completed.

(3) Develop and maintain DRF contents and Table of Contents (see Attachment 2) to provide traceable and retrievable evidence to support technical activities undertaken, such as but not limited to:

(a) Reference to codes and standards applied to the design.

(b) Input data, design criteria, design bases data and assumptions that are not separately controlled.

(c) Design notes, calculations, records, computer outputs and other supporting information.

- Calculations shall identify the subject, originator, data, and, in cases where the calculations have been reviewed by others, the name of the reviewer and the date the review was performed. In addition, computer calculations are to identify computer type, code or programming, and inputs and outputs.

- Computer output shall be summarized and computer output submitted for record retention.

(d) Design conclusions or other information that satisfies the assigned activity.

(e) Design Review Reports including closeout of open items.

(f) Evidence of appropriate design verification for initial design release and all changes thereto, including applicable personal computer (PC) programs used in the design.

(g) Reference to Stress or Design Reports and Design Certifications when applicable.

(h) Studies or analyses to support safety evaluations and reliability studies.

(i) Cross-reference related or supporting DRFs.

(j) Test procedures, test data records, and test reports.

(k) Other pertinent references and documentation that support the design.

(4) The following shall apply to changes made to DRFs:

(a) Changes to verification statements shall be lined out, initialed and dated. The name of the person so initialing shall be printed adjacent to the verification statement to identify the initials. Changes to verification statements shall be reverified.

(b) Technical changes to previously verified documents shall be initialed and dated; changes shall be verified or the changed document reverified.

(c) Since the Responsible Engineer accepts total responsibility for the DRF, changes that do not affect previously accomplished design verifications do not require initialing and dating. The final acceptance by the Responsible Engineer prior to microfilming attests to the acceptance of the entire DRF, including any changes.

(d) If changes are made subsequent to microfilming, the changed documents shall be compiled into a supplemental DRF.

(5) Complete the DRF Assignment Sheet (see Attachment 1), obtain manager's review, release signature, date, and submit DRF for microfilming to Configuration Management. At the time of submittal, advise Configuration Management of any special requirements for return of original and microfilm of the DRF.

D.4.3 Configuration Management

(1) Assign controlled numbers to the DRF. Schedule DRF submittal for record retention as directed by the Responsible Engineer

(2) Maintain logs for DRF identification.

(3) Receive and process DRFs submitted for permanent retention (see Attachment 3).

D.5 RESPONSIBILITY FOR COUNSELING

GE SBWR Project Manager

SUBJECT: DRF ASSIGNMENT SHEET

GE Nuclear Energy

DRF Assignment Sheet

(REF. EDP 42-10.00)

DRF NO. (C)

ASSIGNMENT DATE

1. IDENTIFICATION (A)

TITLE

MFL ITEM

JOB NO.

PROJECT

SCHEDULED SUBMITTAL DATE

2. APPROVAL (B)

(Print / Type) Responsible Engineer — Comp — Dept

Signature

3. ABSTRACT (D)

(Print / Type) Responsible Manager / Approved for Content or Completeness — Dept

Signature

4. SUBMITTED FOR MICROFILMING (E)

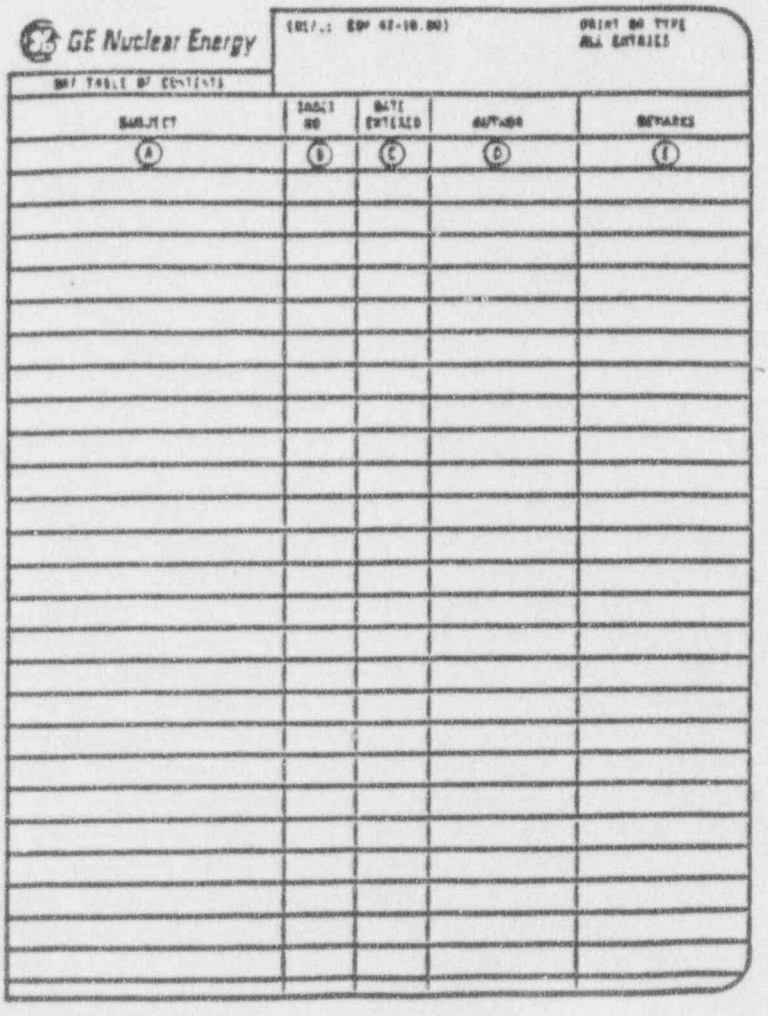
Date

ATTACHMENT 1
DRF ASSIGNMENT SHEET - FORM COMPLETION INSTRUCTIONS

Items	Completion Responsibility
A. Complete Identification section.	
1. Title - enter the file title.	Responsible Engineer
2. MPL item	Responsible Engineer
3. Project - record the appropriate project name	Responsible Engineer
4. Job Number - enter the job number authorizing the design task.	Responsible Engineer
5. Schedule Submittal Date - enter the estimated date on which the DRF will be submitted for permanent record retention.	Respnsible Engineer
B. Complete Approval section	
1. Responsible Engineer - typed or printed name, signature, component number, and mail code.	Responsible Engineer
C. Complete Number section.	
1. Enter assigned DRF number and date assigned.	Configuration Management
D. Complete Abstract section.	
1. When DRF is ready to be submitted for microfilming write abstract statement. The abstract should summarize the subject matter and general content of the DRF.	Responsible Engineer
2. Sign and date for approval for closure of cancellation of DRF, see paragraph 4.1.6.	Responsible Manager
E. Complete Microfilming section.	
1. Enter the date the DRF file is submitted for microfilming as a permanent record.	Configuration Management

ATTACHMENT A2

DESIGN RECORD FILE TABLE OF CONTENTS



INSTRUCTIONS - DESIGN RECORD FILES TABLE OF CONTENTS

Items	Completion Responsibility
A. Elements of Assigned Task	Responsible Engineer
B. Location in File	Responsible Engineer
C. Self Explanatory	Responsible Engineer
D. Person Providing Input	Responsible Engineer
E. Include referenced information used but not included in File (e.g., GESSAR).	Responsible Engineer

ATTACHMENT 3
GUIDELINES FOR SATISFYING PERMANENT RECORDS RETENTION REQUIREMENTS

A3.1 GENERAL

Timely and adequate submittal of Design Record Files (DRF) for the generation of records retention is dependent on the completion status and significance of the documentation.

In general:

(1) Incremental activities are submitted in accordance with the requirements of the work in progress.

(2) Long cycle activities are submitted in accordance with schedule milestones or on a defined periodic basis.

(3) Initial and subsequent submittals are based on the significance of the DRF contents and changes thereto.

A3.2 DRF Submittal Preparation

The Responsible Engineer should, when preparing a DRF for submittal, review the DRF and assure the file is ready for permanent record retention.

(1) The review should check for discontinuities and missing information such as missing pages and approvals and verification requirements and signatures. Crossouts or corrections of verification data should be initialed and dated.

(2) The DRF Table of Contents should identify all significant blocks of data in the file and location in the file.

(3) Open items and comments should be identified, resolved, and documented closure provided where necessary to substantiate independent design verification.

(4) Superfluous material should be purged from the file. Documents with retrievable identities, which are individually controlled, should be referenced.

(5) Where one DRF is an extension of another, a cross-reference between DRFs should be provided.

(6) Certain types of material are not suitable for microfilming or archive storage and alternate plans should be discussed with Configuration Management and provided. Examples are:

(a) Computer Tape
(b) Movie Film
(c) Black and White or Color Pictures
(d) Video Tape
(e) Blue Lines, Sepias, or Reverse Reading Translucent Drawings

APPENDIX E

INDEPENDENT DESIGN VERIFICATION

APPENDIX E

INDEPENDENT DESIGN VERIFICATION

E.1 PURPOSE

The purpose of this appendix is to define responsibility and procedural requirements for the performance of independent design verification.

E.2 GENERAL AND APPLICATION

Independent Design Verification is a design/product assurance action which is required to assure adequate safety, reliability, and performance of a design. It is the process of reviewing and substantiating a design, whether hardware or software, to provide controlled, independent, documented confirmation that the design meets its requirements. Design verification is confirmation of design adequacy which is performed by a knowledgeable individual other than the person responsible for the design.

In general, all SBWR design documents prepared by any of the SBWR team members, including International Technical Associates (ITA), and each application of or change to them are verified. The detailed requirements are contained in this procedure.

Guidelines for design verification are contained in Attachment A.

It should be noted that this procedure is based on the internal GE procedure for the independent design verification of corporate numbered engineering documents. This procedure should be used as a general guide by other participating organizations for their use verifying SBWR designs. The applicable Quality Assurance requirements for the SBWR E. used by each company must be followed. As such, some deviations from this procedure may be necessary to reflect each company's specific QA requirements. Sample responsibility matrices are shown and sample design verification guides are provided.

E.3 SUMMARY OF PRIMARY ACTIVITIES AND RESPONSIBILITIES

The following tabulation summarizes the primary activities and responsibilities established in Section 4.0 of this procedure.

Activity (Reference)	Responsibility
Document scope and method of verification	(X) Responsible Engineer
Provide verification package.	(X) Responsible Engineer
Prepare and sign verification statement.	(X) Verifier
Assure verification statement is in a Design Record File	(X) Responsible Engineer
Approve sufficiency of verification.	(X) Responsible Manager

KEY

(X) = Prime Responsibility

Responsible Engineer - Person responsible for the design, design document, or design application requiring verification.

Responsible Manager - Responsible Engineer's manager.

Verifier - Person or review team chairperson responsible for the independent assessment of adequacy of design.

E.4 PROCEDURE AND RESPONSIBILITIES

E.4.1 Responsible Engineer

E.4.1.1 Performing Verification

(a) Assure that all new designs and changes to verified designs, including all applications of design and design changes, are verified before issue or application as numeric revision documents. Data transmitted in uncontrolled documents to others for use in design, shall also be verified.

(b) Determine when the design is ready to be verified.

(c) Determine and document the scope and method of verification to be used to confirm that the design meets its specified requirements. Refer to Attachment 1 for applicable design verification guidelines.

(d) Select a Verifier who:

(1) Qualifies by knowledge and experience to verify the design of design change.

(2) Is not directly responsible and accountable for the design, design input, or design change being verified.

(3) Is not the Responsible Engineer's technical supervisor, unless the supervisor is the only technically qualified person available in Engineering to perform the verification. Document and sign the justification for selecting the supervisor as Verifier and file the justification in the appropriate Design Record File.

(4) Is not the Responsible Engineer's subordinate unless the subordinate is the only technically qualified person available in Engineering to perform the verification. Document and sign the justification for selecting the subordinate as Verifier and file the justification in the appropriate Design Record File.

(e) When the design or design change is complete, provide a verification package to the Verifier. The package shall consist of the information the Verifier needs to perform the verification, and includes:

(1) The design results (including assumptions, calculations, design related notes and reports, etc.,) to be verified;

(2) The documented scope and method for verification including specification of any necessary additional checking of documents;

(3) Identification of the design requirements, including a list of input documents;

(4) Selection and identification of the detailed information on drawings to be checked by the Verifier.

(f) Provide clarification, additional information, or necessary corrections to the design documentation as requested by the Verifier. When changes are made as a result to technical or verification reviews, consider what verification these changes require and have the verification performed.

(g) Assure that the statement made by the Verifier is either on the ERM or ECN or is filed in a DRF referenced on the ERM or ECN.

E.4.2 Verifier

(1) Upon receipt of the verification package from the Responsible Engineer, perform the verification within the scope and method established by the Responsible Engineer to assure that the design satisfies its requirements or the proposed application of the design is correct. Utilize applicable design verification guidelines contained in Attachment 1. If the Verifier judges that the established scope and method are not sufficient to verify design adequacy, the Verifier shall discuss and resolve them with the Responsible Engineer.

(2) Obtain additional information or necessary corrections from the Responsible Engineer, as required.

(3) When the design is verified, the Verifier shall prepare and sign a verification statement that includes:

(a) Identification of the design or design application verified or both.

(b) Description of the verification performed, including scope, method, inputs, and outputs.

(c) Any open items resulting from the design verification process have been resolved and closed.

(d) Statement of design adequacy made by the Verifier from results of the verification.

(e) The name of the Verifier and the date of verification.

(4) Return the verification package and the verification statement to the Responsible Engineer.

(5) If the design cannot be verified, document the reason and return the verification package to the Responsible Engineer.

E.4.3 Responsible Manager

(1) Approving Verification

(a) Review completed verification package for the design or design change to assure that verification is sufficient to issue or apply the design or design change and denote this by approving the ERM or ECN and/or other verification document.

(b) Assure design requirements are identified and technical issues that result from the verification are resolved.

E.4.4 Responsibility for Counseling

GE SBWR Project Manager

ATTACHMENT A
DESIGN VERIFICATION GUIDELINES

The review shall cover the following design elements where applicable:

A1 Were the design requirement inputs correctly selected and incorporated into the design, including applicable standards and regulatory requirements, Codes and Code Cases?

A2 If assumptions were necessary to perform the design action, are the assumptions reasonable?

A3 Are the appropriate quality assurance requirements specified?

A4 Are the design results compatible with all the design interfaces?

A5 Was an appropriate design method used?

A6 Is the output reasonable compared to the inputs? One of the best ways to determine reasonableness of output is to compare it with that of a previous design to check if the changed output is consistent with the changed inputs.

A7 Are the specified parts, equipment, and processes suitable for the required application?

A8 Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?

A9 Has adequate accessibility been provided to perform needed maintenance and repair?

A10 Have adequate maintenance features and requirements been specified?

A11 Has adequate accessibility been provided to perform the in-service inspection expected to be required during plant life?

ATTACHMENT A (Continued)

A12 Has the design properly considered radiation exposure to the public and plant personnel?

A13 Have acceptance criteria been delineated on the design document, such as drawing, specification or other instruction, which are sufficient to assure that adequate standards are maintained and that the activities prescribed by the design document have been satisfactorily accomplished?

A14 Are adequate identification handling, storage, cleaning and shipping requirements specified?

APPENDIX F

EXTERNAL INTERFACE REVIEW FOR DOCUMENT ISSUE AND CHANGE

APPENDIX F
EXTERNAL INTERFACE REVIEW FOR DOCUMENT ISSUE AND CHANGE

F.1 PURPOSE

The purpose of this appendix is to establish a procedure for the external review of SBWR Program documents by GE and other affected participating organizations prior to their issue.

F.2 GENERAL AND APPLICATION

A systematic review by GE and other affected participating organizations is required prior to the issue of SBWR Program design documents.

This appendix shall be applied by all participating organizations prior to the initial issue or change of previously issued design documents prepared for the SBWR Program. It may also be used to review special studies, evaluations, and other reports relevant to the SBWR Program.

It should be noted that this appendix is based on the internal GE procedure for the review and issue of corporate numbered engineering documents. This appendix should be used as a general guide by other participating organizations for their use of the Engineering Review Memorandum. The applicable Quality Assurance requirements for each company must be followed. As such, some deviations from this procedure may be necessary to reflect each company's specific QA requirements. Sample responsibility matrices are shown and sample ERM sheets are provided.

F.3 SUMMARY OF PRIMARY ACTIVITIES AND RESPONSIBILITIES

The following tabulation summarizes the primary activities and responsibilities established in Section F.4.

Activity (Reference)	Responsibility
Assure adequacy of technical content of review documents:	
Component	(X) Responsible Engineer
System	(X) Technical Project Engineer (TPE) (C) Responsible Engineer
Identify person to perform review.	(X) Responsible Engineer
Review document for assigned area of responsibility and sign ERM	(X) Reviewer
Resolve comments and approve the review documents:	
Component	(X) Responsible Engineer (C) TPE (C) Working Group Manager (C) Reviewer
System	(X) TPE (C) Responsible Engineer (C) Working Group Manager (C) Reviewer
Authorize application of documents applicable projects.	(X) SBWR Program Manager (C) Responsible Engineer
For design changes, authorize change of affected interfacing documents	(X) SBWR Program Manager (C) Responsible Engineer (C) Working Group Manager
Prepare document and ERM package; incorporate comments, and forward.	(X) Engineering Support (C) Responsible Engineer
Issue document, maintain record copy, file originals, and distribute document copies.	(X) Configuration Management

KEY

(X) = Prime Responsibility
(C) = Contributory Responsibility

Configuration Management - Component responsibility for issuance, distribution, and control of engineering documents, and maintenance of configuration records.

Engineering Support - Component responsible for preparation, review, and completion of ERM and engineering document.

Technical Project Engineer - Person responsible for specifying the design and performance requirements of a product line or system.

SBWR Program Manager - Person assigned project management responsibility for SBWR Program.

Responsible Engineer - Person responsible for the document that is to be issued or applied.

Working Group Manager - Manager in charge of a particular working group.

Reviewer - Person assigned to a specific area of review.

F.4 PROCEDURE AND RESPONSIBILITIES

F.4.1 Responsible Engineer

(1) Based upon an approved work authorization, or other authorizing document if applicable, perform design tasks for preparation or change of design document and associated ERM (see Attachments 1 and 2).

(2) Provide information for preparation of ERM and document review package.

(3) Determine document review requirements, including but not limited to:

(a) Interface compatibility - for systems, component/equipment, and software.

(b) Producibility - for specified items.

(c) Code Compliance.

(d) Material/process application.

(e) Design verification.

(f) Project Manager for:

- Project Application

(g) System Compatibility.

(h) Quality Assurance.

(i) Document Quality.

(j) For design changes, identify all issued SBWR Program design documents affected by the change.

(k) Other, as necessary to provide complete review.

(4) Select Reviewers and obtain concurrence of the Responsible Manager.

For design changes, assign responsible engineers for affected interfacing documents as reviewers.

(5) Obtain commitments from the appropriate reviewers and concurrence of the responsible manager.

(6) Forward ERM and document review package to the first scheduled Reviewer. For verification review, include documentation required for Design Verification procedure.

(7) Resolve all documented comments and provide a copy of comments resolution package to each reviewer. When appropriate, discuss resolutions with commentors prior to issuing the comments resolution package. When appropriate, follow the technical issues resolution process of Section 2.10.

(8) When significant modifications to the document are required to resolve comments, obtain rereview from those Reviewers who previously approved the ERM.

(9) Approve ERM upon incorporation of resolved comments.

(10) Submit ERM/document package to Responsible Manager for approval, then forward for document issue.

(11) Upon receipt of the finalized ERM/document package, approve for issue by resigning ERM, then return to Engineering Support.

(12) For design changes, use internal engineering change control procedures. Reference ERM review on appropriate internal form. Identify all affected interfacing documents and changes.

F.4.2 Lead System Engineer

(1) Perform Responsible Engineer functions, when applicable, for assigned documents for intersystem impacts.

(2) Approve system application, or changes thereto, of MPL level documents.

F.4.3 Responsible Manager

(1) Assure scope of review and selection of reviewers is adequate.

(2) Assure that design verification requirements have been completed in accordance with the Design Verification procedure.

(3) For design changes, assure all interfacing design documents are identified and changes scheduled.

(4) Approve ERM after review is complete and all comments have been resolved.

F.4.4 Reviewer

(1) Notify the Responsible Engineer when committed document review schedule cannot be met.

(2) Review the document in the area of review specified by the ERM.

(3) Sign ERM and comment if appropriate.

(4) Return the ERM and document review package to the Responsible Engineer when all the reviews have been completed.

F.4.5 SBWR Program Manager

(1) Review and authorize application of documents to assigned projects, as applicable.

(2) For design changes, review, authorize, and schedule changes to interfacing design documents when identified in ERM review.

(3) Supply project information to the Responsible Engineer, as requested.

F.4.6 Engineering Support

(1) Prepare ERM and document package and forward to the Responsible Engineer.

(2) Receive document package and approved ERM. Incorporate resolved ERM comments and obtain Responsible Engineer's final approval.

(3) Forward approved ERM/document package to Configuration Management.

F.4.7 Configuration Management

(1) Receive approved ERM/document package, apply issue date, issue document and enter document status into the Engineering Information System (EIS).

(2) For design changes, enter schedule changes to affected interfacing design documents into control system, if appropriate.

(3) Process Product Summary and MPL additions or revisions as authorized by ERM.

(4) Provide for microfilming and distribution.

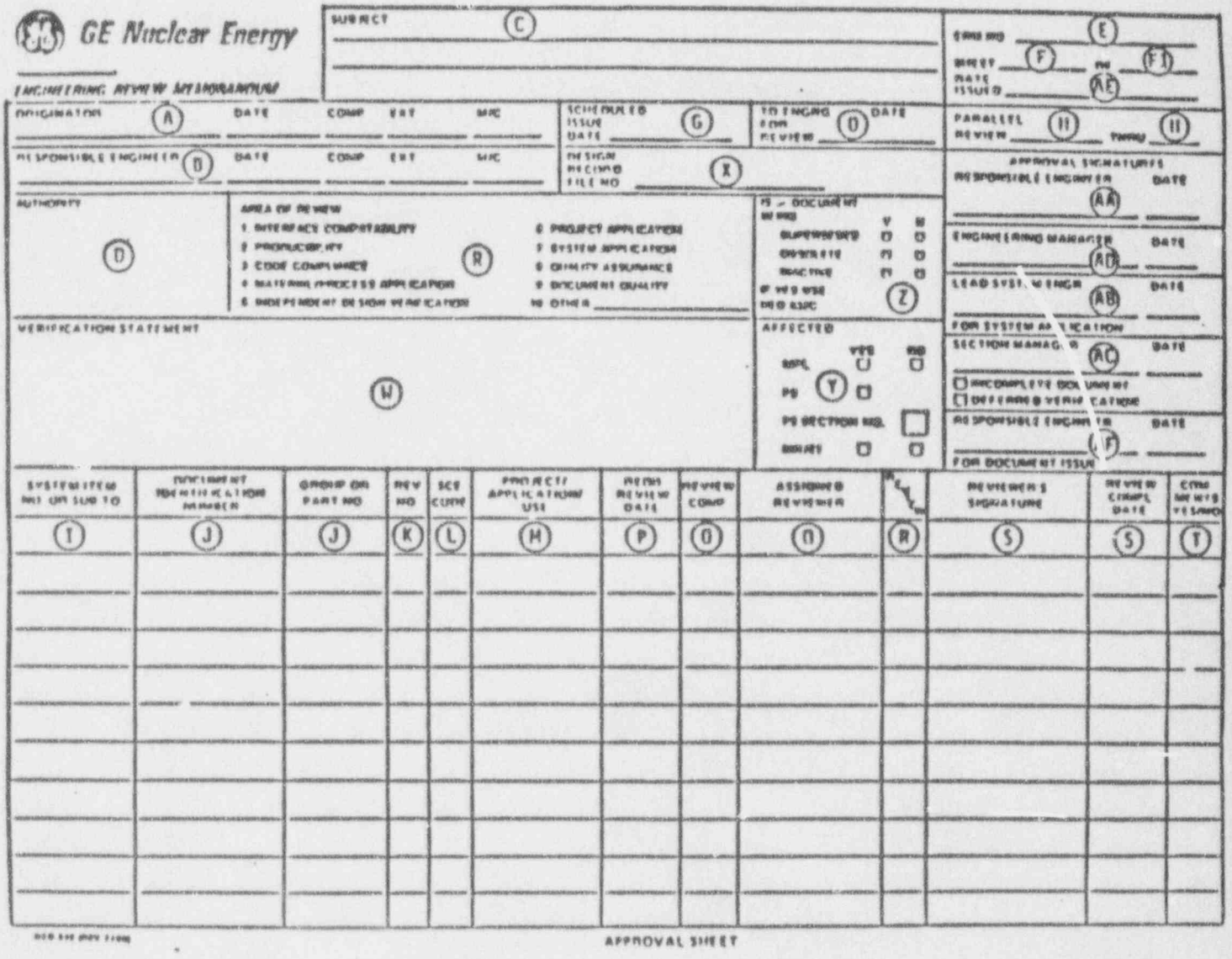
(5) Store ERM originals

F.5 RESPONSIBILITY FOR COUNSELING

GE SBWR Program Manager

Attachment 1

ENGINEERING REVIEW MEMORANDUM APPROVAL SHEET (NEO 632)



NOTE: Each company may prepare a similar sheet based on their own QA requirements but the information should be similar. This is a guide to be used, if possible.

Attachment 1 (Continued)
ENGINEERING REVIEW MEMORANDUM COMMENT SHEET (NEO 632A)

GE Nuclear Energy

ENGINEERING REVIEW MEMORANDUM

ERM NO. (E)
SHEET (F) OF (F1)
DATE ISSUED (AT)

REVIEWER'S COMMENTS (SIGN AND DATE)	RESPONSIBLE ENGINEER'S RESOLUTION (SIGN & DATE)
(U)	(V)

NEO 632A (REV. 2/98)

COMMENT SHEET

Attachment 1 (Continued)

ENGINEERING REVIEW MEMORANDUM COMMENT SHEET (NEO 632B)

GE Nuclear Energy

ENGINEERING REVIEW MEMORANDUM

ERM NO (E)

SHEET (F) OF (F)

DATE ISSUED (AE)

DOCUMENT IDENTIFICATION NUMBER (N)	REPLACES	DOCUMENT IDENTIFICATION NUMBER (N)	FOR	MATERIAL/HARDWARE STATUS				
				PROJECT (N)	QTY (N)	STATUS (N)	DISPOSITION (N)	EI, MR, PO NO (N)

NEO 1000 (REV. 0493)

SUPPLEMENTAL SHEET

Attachment 1 (Continued)

ENGINEERING REVIEW MEMORANDUM - FORM COMPLETION INSTRUCTIONS

	Item	Completion Responsibility
A.	On Form NEO 632 print name and organization information. Signature is required (See Notes 1 and 2).	Engineering Support
B.	Print name and organization information. Signature is not required.	Engineering Support
C.	Define the subject of the review package. It should be: (1) A document title; (2) the name of a part of system; or (3) a narrative description. THIS IS NOT EIS INFORMATION.	Engineering Support
D.	Authority references are required to be traceable. Enter the number of the document authorizing the review and the applicable Job Order number. An approved ECA is to be used in all cases where it immediately precedes an ERM as authority. NOTE: If no other traceable authority exists, enter RESPONSIBLE ENGINEER. This can be traced through block B.	Responsibile Engineer
E.	Assign and enter ERM number. See block H. for parallel review designation.	Engineering Support
F.	Enter sheet sequence number (e.g., 1, 2, 3, etc.). Include all comment and supplemental sheets. This sheet count may change between initiation and issue.	Engineering Support
F1.	Enter on each sheet the total number of sheets.	Responsible Engineer
G.	Enter the scheduled issue date of the document being placed on review.	Responsible Engineer
H.	Determine need for parallel review to expedite processing. When parallel review is required, identify as A through B, C, D, etc. on the first review copy. Identify each copy by the appropriate alpha designation. See block E.	Responsible Engineer

Attachment 1 (Continued)

ENGINEERING REVIEW MEMORANDUM - FORM COMPLETION INSTRUCTIONS

Item		Completion Responsibility
I.	Enter as applicable 1. The Master Parts List (MPL) or Product Summary item number of the affected document. 2. The item number to which the document is a sublevel. 3. The symbol NA when there is no MPL or PS item number.	Engineering Support
J.	Enter the document number of the document being reviewed. Include group number/part number. For multiple document review, ascertain review areas and space accordingly.	Engineering Support
K.	Enter revision number/letter of document as it will be issued or applied.	Engineering Support
L.	Enter the applicable source code (e.g., Make: GMM, GMS, etc.; Buy: DB, GN, etc.; Software: SP, SI, etc.). Codes are identified on MPL.	Engineering Support
M.	Enter as applicable: (1) the operating plant; (2) requisition or fuel project; GENERAL USE: (3) system; (4) equipment; (5) none, NA.	Engineering Support
N.	Form NEO 632B is used for applying a replacing document to a project. Column 1 - Enter document number replacing for application. Column 2 - Enter document number being replaced for application. Column 3 - Identify project to which replacing document is being applied. Column 4 - Identify quantity of hardware items affected by replacing application. Enter NONE when there is no hardware affected. Enter NA for software.	Responsible Engineer

Attachment 1 (Continued)

ENGINEERING REVIEW MEMORANDUM - FORM COMPLETION INSTRUCTIONS

	Item	Completion Responsibility
	Column 5 - Enter status of all parts (on-site, on order, shipped, etc.) affected. Enter NA for software.	
	Column 6 - Indicate disposition of hardware affected. Show date PO or EI must be revised to meet required shipment dates. Enter NA for software-shipment dates. Enter NA for software.	
	Column 7 - Enter the EI, MR, or PO number affected. When these documents do not exist, enter NO PLACED. Enter NA for software.	
O.	Enter date ERM and review package is forwarded to the Responsible Engineer to begin review process.	Engineering Support
P.	Determine review dates based on SCHEDULE ISSUE DATE block G.	Responsible Engineer
Q.	Enter component number of reviewer and print name of reviewer.	Responsible Engineer
R.	Enter the appropriate AREA OF REVIEW when number 10, OTHER, is applicable. A reviewer may perform reviews in more than one area. Review applies to all documents listed, unless otherwise noted.	Responsible Engineer
S.	Sign and date to attest to review of all listed documents within scope of reviewer's responsibility and in the area of review specified.	Reviewer
T.	Enter YES or NO dependent upon comment or lack of comment.	Reviewer
U.	Use Form NEO 632A to enter comment; sign, and date. UNSIGNED COMMENTS MAY NOT BE ACKNOWLEDGED.	Reviewer
V.	Resolve each comment. Sign and date each resolution.	Responsible Engineer

Attachment 1 (Continued)

ENGINEERING REVIEW MEMORANDUM - FORM COMPLETION INSTRUCTIONS

Item	Completion Responsibility
W. Enter verification statement or reference, sign, and date. This will normally be after resolution of all comments: 1. If the full verification statement is in block W., a DRF reference is not required. 2. If verification and verification statement is in a DRF, reference the DRF number (see EOP 42-6.00).	Verifying Engineering
X. Enter NR, for not required, when full verification statement has been placed in block W. by Verifier. Enter DRF number when verification is in a DRF.	Responsible Engineer
Y. X the appropriate block and enter the appropriate Product Summary Section number, if applicable.	Responsible Engineer
X. X the appropriate block for document disposition.	Responsible Engineer
AA. Sign and date after reviews are complete and comments have been resolved.	Responsible Engineer
AB. Sign and date for system application.	Technical Project Engineer or Project Engineer, if applicable
AC. X the appropriate block and sign and date for: document coded I, E, or R (incomplete); deferred verification; post design freeze.	SBWR Program Manager
AD. Sign and date after Responsible Engineer has approved.	Working Group Manager
AE. Enter ERM issue date on all sheets and issue.	Configuration Management
AF. Sign and date for issue after comment incorporation by Drafting and Design Support.	Responsible Engineer

Attachment 1 (Continued)

ENGINEERING REVIEW MEMORANDUM - FORM COMPLETION INSTRUCTIONS

Item	Completion Responsibility
AG. Form NEO 632C is used for superseding, obsoleting or replacing a document for generic application. Column 1 - Enter the appropriate code to define the action being authorized. Column 2 - Enter document number being superseded, obsoleted or inactivated. Column 3 - Enter the group or part number. Column 4 - Enter document number (WA, FDDR, etc.) authorizing this action. Column 5 - Enter authorizing document issue date. Column 6 - Enter new or replacing document number Column 7 - Enter new or replacing document group or part number	Responsible Engineer

NOTES:

1. Instructions for the completion of ERMs involving Operation and Maintenance Instruction Manual review are addressed in EOP 70-5.00.

2. Instructions for the completion of ERMs involving ASME Code Effectivity Date Reconciliation are addressed in EOP 50-4.00.

3. Corrections:

   a. Issued ERMs may be revised and reissued to correct nontechnical, administrative data.

   b. Missing data, such as signatures, date, etc., can be added or the incorrect data can be corrected. A note shall be added to such ERMs to define the correction when revising the ERM.

   c. The Responsible Engineer and Responsible Manager shall sign and date the revised ERM before reissue and shall forward the revised ERM to Configuration Management for microfilming and return to ERM original file.

ATTACHMENT 2
ENGINEERING REVIEW MEMORANDUM (ERM) PROCEDURE
NOTES ON THE ERM PROCESS

(1) The first page of the ERM will identify the scope of the participating organization's review of the attached documents. Many cases will assign "Project Application". This means that the scope of the review and comments should cover all matters relative to the application of these documents to the SBWR Project, including all technical matters.

(2) All review comments should be made on the ERM comment sheets (i.e., pages 2 and 3 of the ERM). If additional comment sheets are required to accommodate all the comments, they should just make photocopies of the blank comment sheets provided with the ERM. Alternate sheets that clearly identifies the ERM number and clearly records comments, signatures, etc. is acceptable.

(3) All ERM review comments should provide explicit reference to which document and article of the document the comment is applicable (see example attached).

(4) In order to provide traceable records of the review process, the ERM comments must be clear, explicit, stand-alone statements, (for example, don't make unqualified statements like: "Rewrite this sentence" rather, make explicit statement like: "Rewrite this sentence to reflect equipment capabilities of 50 millisecond resolution.") (see example attached).

(5) Each and every comment entered into the ERM comment sheets must be individually numbered, signed, and dated (see example attached).

(6) All entries into the ERM must be done in black ink and all ERM comments must be printed legibly (see example attached).

(7) Once the participating organizations' reviews have been completed, the responsible reviewer must sign, date, and identify whether there are any review comments (i.e., "yes" or "no") on the applicable line in the lower right-hand corner of the first page of the ERM (see example attached).

(8) The completed ERM should then be returned to the originating organization for appropriate comment resolution and document update.

GENERAL ELECTRIC

ENGINEERING REVIEW MEMORANDUM

SUBJECT: REACTOR S.S.M HEAT BALANCE

ERM NO. DHH-SA6B

SHEET 1 OF

DATE ISSUED

ORIGINATOR	DATE	COMP	EXT	M/C
C. CEUS	10-6-86	191	6180	722

SCHEDULED ISSUE DATE: 8652

TO ENGRG FOR REVIEW DATE: 10/10/86

PARALLEL REVIEW: _____ THRU: _____

RESPONSIBLE ENGINEER	DATE	COMP	EXT	M/C
F PARADISO	10-7-86	446	6953	J54

DESIGN RECORD FILE NO: A11-00004

AUTHORITY

FWA# NXB29/235

J.O.# BT025

AREA OF REVIEW

1. INTERFACE COMPATIBILITY
2. PRODUCIBILITY
3. CODE COMPLIANCE
4. MATERIAL/PROCESS APPLICATION
5. INDEPENDENT DESIGN VERIFICATION
8. PROJECT APPLICATION
7. SYSTEM APPLICATION
8. QUALITY ASSURANCE
9. DOCUMENT QUALITY
10. OTHER _____

APPROVAL SIGNATURES

RESPONSIBLE ENGINEER DATE: F. PARADISO

ENGINEERING MANAGER DATE:

LEAD SYSTEM ENGR DATE:

FOR SYSTEM APPLICATION

SECTION MANAGER DATE:

☐ INCOMPLETE DOCUMENT
☐ DEFERRED VERIFICATION

RESPONSIBLE ENGINEER DATE:

FOR DOCUMENT ISSUE

VERIFICATION STATEMENT

VERIFICATION AND SUPPORTING DOCUMENTATION ARE CONTAINED IN DRF # A11-00004

AFFECTED

	YES	NO
NPL	☐	☒
PS	☐	☒
PS SECTION NO.	☐	
MMEI	☐	☒

SYSTEM ITEM NO OR SUB TO	DOCUMENT IDENTIFICATION NUMBER	GROUP OR PART NO.	REV NO.	SCE CODE	PROJECT/ APPLICATION/ USE	NEDO REVIEW DATE	REVIEW COMP	ASSIGNED REVIEWER	REVIEW	REVIEWER'S SIGNATURE	REVIEW COMPL DATE	COMMENTS Y/N
A11-5040	23A4562	N/A	1	SP	ABWR	8646	461	A.J. JAMES	7			
						8646	446	R.L. HUANG	5	RL Huang	11/21/86	Yes
						8646	442	S.A. HUEIK	6			
								HITACHI	6			
								TOSHIBA	6			

GENERAL ELECTRIC
ENGINEERING REVIEW MEMORANDUM

ERM NO. ___ SHEET 4 OF ___ DATE ISSUED ___

REVIEWER'S COMMENTS (SIGN AND DATE)	RESPONSIBLE ENGINEER'S RESOLUTION (SIGN & DATE)
BACKUP INFORMATION FOR HITACHI'S ABWR HEAT BALLANCE INPUT DATA.	
100% THERMAL POWER 100% CORE FLOW	
12/4/'86 K. Hirakoguchi	
NO. BACKUP INFORMATION	
1 Feedwater Enthalpy is led from the water enthalpy on the condition of 215.5°C (420°F) and 77.3 kg/cm²abs (1100 psi). These value were agree with GE, Hitachi, and Toshiba in ABWR Phase II study.	1) 397.6 BTU/LB / 1.8 = 220.889 ≈ 220.9 kcal/kg I agree. J.M. Paradiso 1/6/87
2 Feed Water Temperature is led from Hitachi's Turbine Cycle Heat Ballance. GE, Hitachi and Toshiba agreed with each other in ABWR Phase II study.	2) 420°F ⇒ 215.5556 °C = 215.6 °C J.M. Paradiso 1/6/87
3 Feed Water Flow is calculated from Heat Ballance Code (HEABA3). To lessen the error, GE's steam flow value must be revised from 7.72x10⁶ kg/hr to 7640x10³ kg/hr.	3) From HAPPY01 calc FW flow: 16807197 lb/hr × .45359237 = 7623617 kg/hr ⇒ 762.36 kg/hr [illegible] 1/6/87
4 We consider thermal loss in main steam line is small, so steam flow enthalpy is as same as steam enthalpy in the reactor vessel.	4) agree J.M. Paradiso 1/6/87
(CONTINUED)	

COMMENT SHEET

APPENDIX G

CONFORMANCE ASSESSMENT PROCEDURE

APPENDIX H
PRA DOCUMENTATION MAINTENANCE