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January 1985

PROGRAM PLAN FOR SHIPMENT, RECEIPT, AND  
STORAGE OF THE TMI-2 CORE

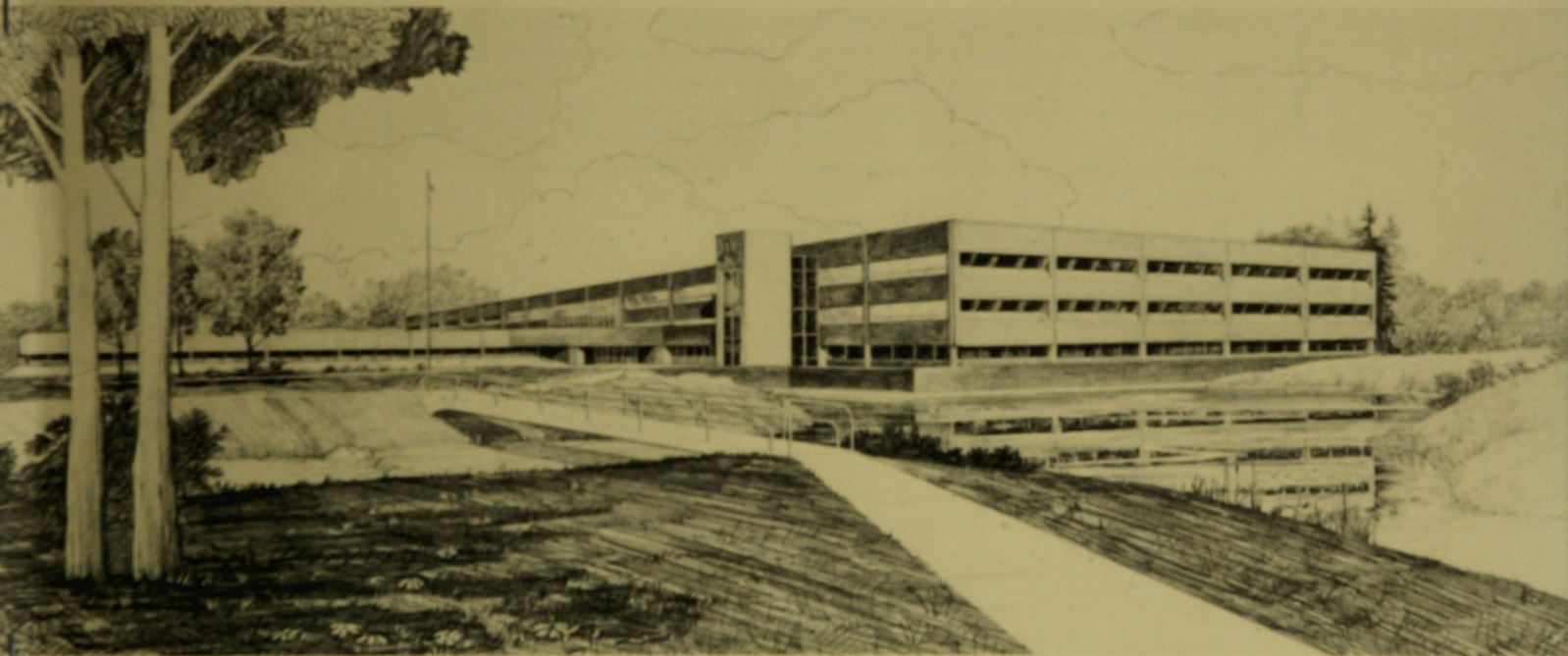
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Idaho National Engineering Laboratory  
Operated by the U.S. Department of Energy

Informal Report



Prepared for the  
U.S. DEPARTMENT OF ENERGY  
Under DOE Contract No. DE-AC07-76ID01570





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PROGRAM PLAN FOR SHIPMENT, RECEIPT,  
AND STORAGE OF THE TMI-2 CORE

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January 1985

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Prepared for the  
U.S. Department of Energy  
Idaho Operations Office  
Under DOE Contract No. DE-AC07-76ID01570



## ABSTRACT

This plan addresses the preparation and shipment of core debris from Three Mile Island Unit 2 (TMI-2) to the Idaho National Engineering Laboratory (INEL) and receipt and storage of that core debris. The Manager of the Nuclear Materials Evaluation Programs Division of EG&G Idaho, Inc. will manage two separate but integrated programs, one located at TMI (Part 1) and the other at INEL (Part 2). The Technical Integration Office (at TMI) is responsible for developing and implementing Part 1, TMI-2 Core Shipment Program. That portion of the plan establishes coordination between TMI and INEL (and others) for shipment of core debris, and it provides the coordination by which handling systems at both locations are designed, constructed, or modified to establish and maintain system compatibility. The Technical Support Branch (at INEL) is responsible for developing and implementing Part 2, TMI-2 Core Receipt and Storage. That portion of the plan details activities at INEL to prepare for and implement receipt and storage of the TMI-2 core.

The plan described herein is a revision of a previous document entitled Plan for Shipment, Storage, and Examination of TMI-2 Fuel. This revision was required to delineate changes, primarily in Part 2, Core Activities Program, of the previous document. At the request of the U.S. Department of Energy, that part of the earlier document related to core examination was reidentified in mid-FY-1984 as a separate trackable entity entitled "Core Sample Acquisition and Examination Project." The Core Sample Acquisition and Examination Project implements a separate and parallel document, and that part of the plan accordingly has been deleted from this document.



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PROGRAM PLAN FOR SHIPMENT, RECEIPT,  
AND STORAGE OF THE TMI-2 CORE

PROGRAMMATIC PERSPECTIVE

U.S. Department of Energy (DOE) research and development (R&D) programs will continue to provide solutions to problems arising from cleanup of the Three Mile Island Unit 2 (TMI-2) Nuclear Power Station. Generic information applicable to a broad spectrum of nuclear safety issues will result from investigating consequences of the TMI-2 accident. Accordingly, DOE has committed R&D funds to support a variety of TMI-2 efforts.<sup>a,b</sup> The TMI-2 Core Shipment and Core Activities Programs will enable General Public Utilities Nuclear Corp. (GPU Nuclear--owner/operator of TMI) and DOE to demonstrate the safe removal, transportation, receipt, and storage of damaged fuel and core components resulting from a nuclear accident involving severe core damage. Acquisition of those materials also provides unique opportunities to examine the effects of an actual loss-of-coolant accident on a pressurized water reactor. The purpose of this Program Plan for Shipment, Receipt, and Storage of the TMI-2 Core is to identify tasks and resources required to safely prepare, transport from TMI, receive at the Idaho National Engineering Laboratory (INEL), and store the TMI-2 core debris in a timely and cost effective manner.

DOE has defined program objectives for research and disposition of the TMI-2 core debris which will require close coordination of activities at INEL and TMI. Those objectives are as follows: (a) prepare for safe shipment, receipt, and storage of the core debris; (b) as soon as practicable after start of defueling, begin transporting and storing

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a. Memorandum from the President of the United States for the Secretary of Energy, "Decisions on Department of Energy Budget Appeal," 20 March 1981.

b. "Memorandum of Understanding between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy Concerning the Removal and Disposition of Solid Nuclear Wastes from Cleanup of the Three Mile Island Unit 2 Nuclear Plant," 15 July 1981.

canisters containing core debris at a rate that allows completion within the shortest economically feasible timeframe; (c) make available in a timely manner core debris for research; and (d) minimize costs consistent with the objectives and schedules of the program. This plan defines the management system and coordination needed for meeting those objectives.

This plan is divided into the following two parts: (a) Part 1, TMI-2 Core Shipment Program, directed by the Technical Integration Office at TMI, establishes coordination between TMI and INEL (and others) and provides coordination by which handling systems for core debris at both locations are designed, constructed, or modified for system compatibility; (b) Part 2, TMI-2 Core Receipt and Storage, directed by the Technical Support Branch at INEL, defines activities at INEL to prepare for and implement receipt and storage of the TMI-2 core. Overall implementation and management of activities at TMI and INEL will be directed by the Manager of the Nuclear Materials Evaluation Programs Division of EG&G Idaho, Inc. Figure 1 shows the functional organization and major activities in each part of the program.

The two-part approach used in this plan provides flexibility needed for managing the two programs. Differences in program objectives and the physical distance between TMI and INEL necessitate that each part be self-contained.

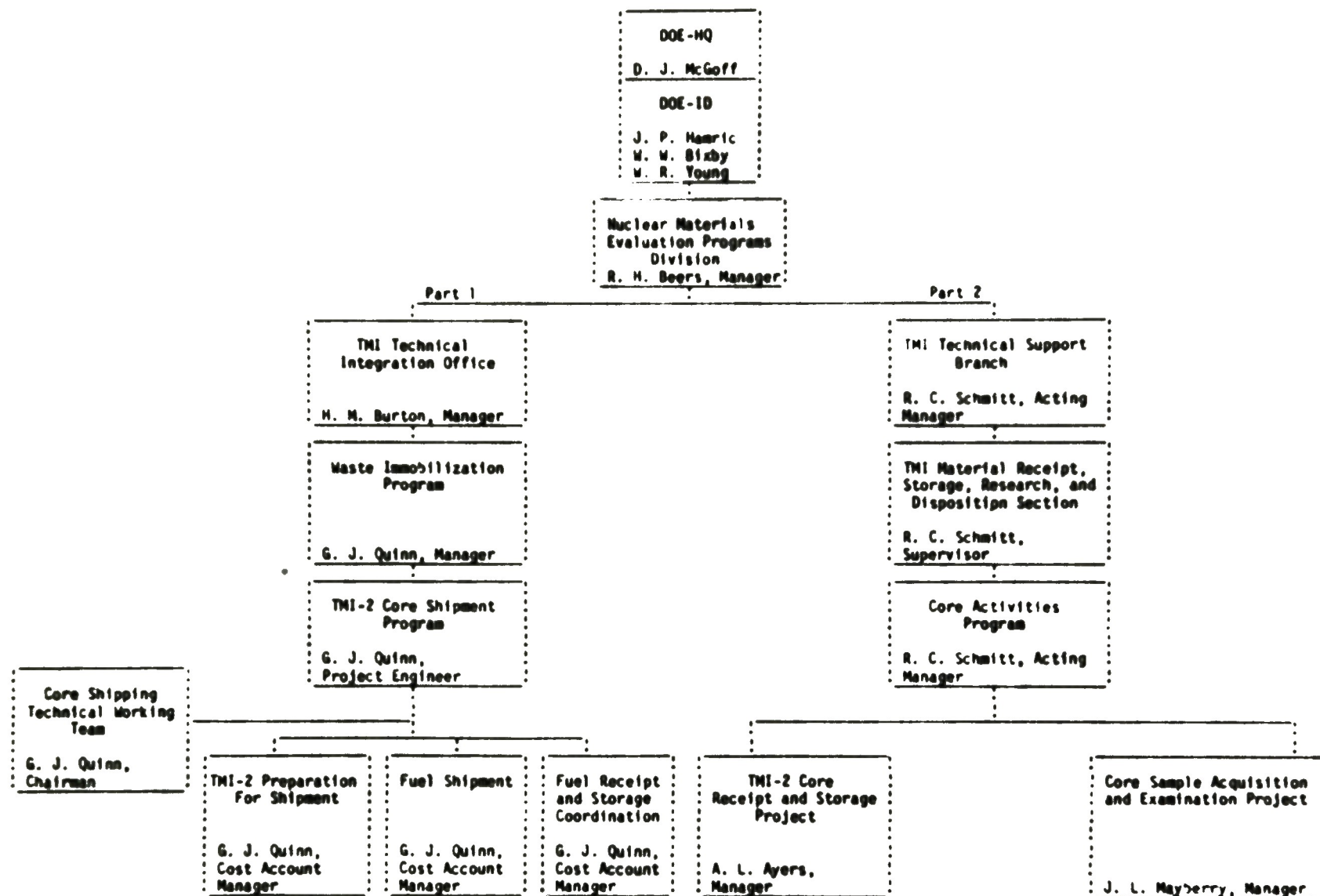


Figure 1. Functional organization for the two parts of the program for shipment, receipt, and storage of the TMI-2 core. Part 1, TMI-2 Core Shipment Program encompasses preparation and shipment of the core debris. Part 2, TMI-2 Core Receipt and Storage Project encompasses receipt and storage aspects of the program.





## PART 1, TMI-2 CORE SHIPMENT PROGRAM

### 1. EXECUTIVE SUMMARY

Removing the core debris from Three Mile Island Unit 2 (TMI-2) and transporting it to the Idaho National Engineering Laboratory (INEL) will require the participation of many organizations. The "Organizational Responsibilities and Interfaces" section of this plan defines responsibilities of major organizations involved with the program and describes the Core Shipping Technical Working Team which was formed to disseminate information and coordinate efforts of each organization with the remainder of the program. Current plans assign the following responsibilities for the preparation and shipment of core debris from TMI-2 to INEL:

- o General Public Utilities Nuclear Corp. (GPU Nuclear) will prepare core debris shipments in a safe manner to meet applicable federal and state regulations and comply with receiving and interim storage requirements at INEL
- o U.S. Department of Energy (DOE) will be the shipper of record and EG&G Idaho, Inc., on behalf of DOE, will manage the shipping program and procure and schedule the required shipping casks.

Part 1, TMI-2 Core Shipment Program is divided into the following four tasks: (a) Program Management, (b) TMI-2 Preparation for Shipment, (c) Fuel Shipment, and (d) Fuel Receipt and Storage Coordination. In addition, the Core Shipping Technical Working Team has been established to ensure the timely, efficient, and accurate exchange of information between all elements of the program. That team is comprised of personnel from each element within DOE and GPU Nuclear programs involved with shipping the TMI-2 core debris. The Program Management task provides the overall guidance, coordination, and organization for the program. The TMI-2 Preparation for Shipment task coordinates activities at TMI-2 associated with preparing the core debris for shipment, including core defueling

coordination, canister design coordination, and logistics/facilities modifications. The Fuel Shipment task similarly coordinates activities associated with the safe transportation of the core debris from TMI-2 to INEL, including cask supply, hazards identification, shipping approvals, and transportation support. The Fuel Receipt and Storage Coordination task ensures that all TMI and INEL requirements are met, technical information is efficiently exchanged, and equipment, facility modifications, and operations are compatible and completed in the timeframe required to receive the core debris on schedule.

The "Program Controls" section of this plan is designed and structured to implement emphasis by management on thorough planning; minimizing impacts from changes or modifications that may be required; maintaining work scope, cost, and schedule baselines; maintaining cost, schedule, procurement, configuration, and document controls; and quality, safety/environment, and safeguards/security controls.

According to the program schedule, shipment of core debris from TMI to INEL will begin as soon as practicable after initiation of core debris removal, with completion within the shortest economically feasible timeframe.



## 2. INTRODUCTION

### 2.1 Authority

TMI-2 presents opportunities to obtain information to enhance nuclear power plant safety and reliability which will be of generic benefit to nuclear power technology. Recognizing those opportunities, GPU Nuclear, Electric Power Research Institute, U.S. Nuclear Regulatory Commission (NRC), and DOE (collectively identified by the acronym GEND) established the TMI-2 Technical Information and Examination Program (TI&EP) and signed a Coordination Agreement implementing the program.<sup>1</sup> The Coordination Agreement identifies objectives to which the signatories subscribe, and it defines [in broad terms] methods to achieve objectives consistent with the other obligations of the signatories.

The TMI-2 TI&EP emphasizes the performance of generic research and development (R&D) programs. In March 1981, the Secretary of Energy wrote a memorandum to the President of the United States outlining proposed DOE initiatives that would expedite cleanup of TMI-2 and acquisition of generic R&D information from the damaged core during and after its removal.<sup>2</sup> The initiative identified DOE activities for removing, packaging, and shipping contaminated wastes; early access to the core to assess the extent of damage; and development of procedures to effect core debris removal, packaging, and shipment to a DOE site for storage and examination. The President's memorandum to the Secretary of Energy approved the DOE request to amend its civilian nuclear budget in FY-1982 to include R&D at TMI-2.<sup>3</sup>

### 2.2 Objective

The objective of the TMI-2 Core Shipment Program is to transport TMI-2 core debris safely from TMI to INEL, beginning as soon as practicable after initiation of defueling, with completion within the shortest economically feasible timeframe. To accomplish that objective, the program will ensure the following:

- o Each shipping package is prepared for safe transport using controls as necessary for hazards associated with the condition of the contents (fuel, debris, etc.)
- o Equipment and facilities are provided and personnel at TMI are available and properly trained to prepare safe shipments at a rate that will complete the shipments within the shortest economically feasible timeframe
- o Certified shipping casks and transportation services are procured to support the shipping operations, consistent with GPU Nuclear schedules and restraints
- o Coordination is provided to prepare for receipt of shipments at INEL
- o Quality control signoffs at TMI-2 are incorporated in procedures to prevent receipt of contaminated or otherwise hazardous canisters at INEL.

This plan (a) identifies responsibilities of each involved organization for planning and implementing the shipping program tasks; (b) describes the principal tasks of the TMI-2 Core Shipment Program; (c) identifies mechanisms for interaction between the organizations to establish interface controls, resolve concerns, and facilitate overall coordination; and (d) identifies major milestones.

### 3. ORGANIZATIONAL RESPONSIBILITIES AND INTERFACES

Transporting the Unit 2 core debris from TMI to INEL requires clear definition of organizational responsibilities and interfaces. This section defines responsibilities of the major organizations involved in the program and describes the mechanism by which coordination is established. Each organization has specific responsibilities which must be coordinated and implemented in a timely manner to minimize delays in shipping the core debris.

#### 3.1 Summary of Responsibilities

##### 3.1.1 GPU Nuclear

GPU Nuclear (owner/operator of TMI-2) and its contractor Bechtel Corporation (Bechtel) are responsible for planning and implementing the loading of core debris into canisters, preparing canisters for shipment, loading canisters into shipping casks, and preparing shipping casks for transport. Preparations for safe shipment include water removal [or addition] and other steps necessary for control of hazards during cask loading, decontamination, and shipping. Necessary shipping documentation also will be completed. Selection and licensing of loading methods and canisters are the responsibility of GPU Nuclear. Westinghouse Electric Corporation (Westinghouse) has been selected by GPU Nuclear as support contractor for defueling (fuel canister loading), and Babcock and Wilcox (B&W) as support contractor for the canister (design, safety analysis, and licensing).

##### 3.1.2 DOE/EG&G Idaho

Under current planning, DOE will be the shipper of record. EG&G Idaho, on behalf of DOE, will be responsible for managing the shipping program. The functional organization of the TMI-2 Core Shipment Program is highlighted in Figure 1-1. After extensive coordination/cooperation with GPU Nuclear, EG&G Idaho has procured the shipping casks. The cask supplier



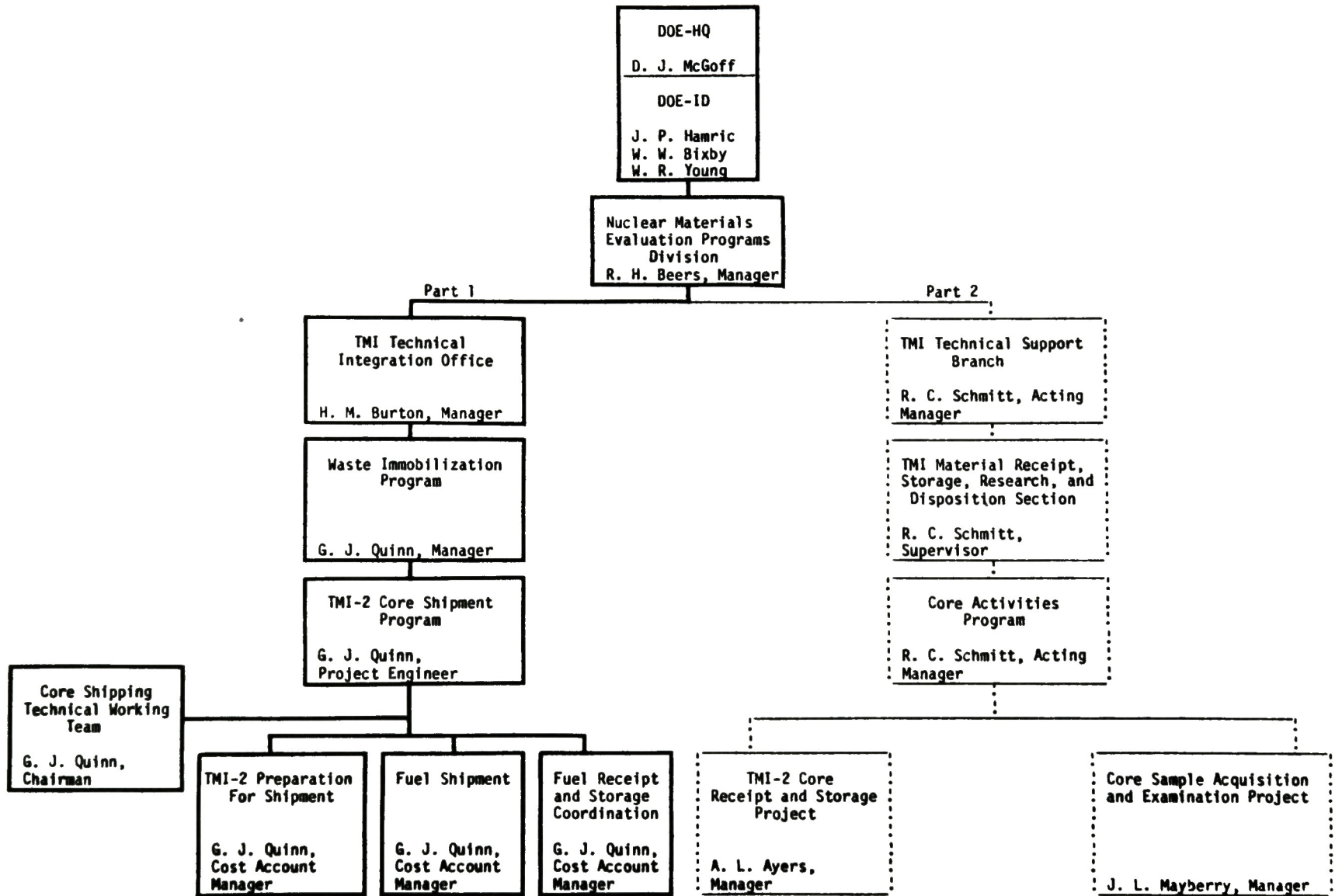


Figure 1-1. Functional organization chart highlighting Part 1, TMI-2 Core Shipment Program.

(Nuclear Packaging, Inc.) is responsible for preparing and submitting to NRC the Safety Analysis Report for Packaging (SARP) for the core debris shipments from TMI-2. An application will be made to obtain certification of the shipping package (the cask and its contents). The safety organization of the DOE Idaho Operations Office (DOE-ID) will be responsible for reviewing and approving the Safety Analysis Report (SAR) for transportation prepared by EG&G Idaho and assuring that all safety and environmental requirements of DOE Manual Chapters are satisfied. EG&G Idaho and other DOE contractors [i.e., Rockwell Hanford Operations (RHO) and Transportation Technology Center of Sandia National Laboratory (SNL TTC)] will provide technical support to the cask supplier for licensing submittals. SNL TTC will perform an independent review of the SARP for EG&G Idaho. The Technical Support Branch (TSB) of EG&G Idaho will make necessary preparations for receipt of core debris at INEL.

EG&G Idaho was responsible for providing GPU Nuclear with canister design requirements needed for receipt, storage, and examination of the core debris at INEL. EG&G Idaho also will participate in planning for loading of individual canisters identified for use in the Core Activities Program (as explained in Part 2, TMI-2 Core Receipt and Storage).

### 3.1.3 NRC

The TMI Programs Office of NRC may perform courtesy onsite preshipment inspections of shipping packages. The Office of Nuclear Materials Safety and Safeguards of NRC (the office that approves shipping containers) has been requested to certify the shipping package.

## 3.2 Program Tasks Coordination

Coordination is required between the separate tasks in the program because of the broad scope, number of organizations involved, and interfaces required. The Core Shipping Technical Working Team will be responsible for coordinating information between member organizations preparing for shipment of the TMI-2 core. The team will provide a focal

point for each program task, where activity status can be exchanged and potential problems identified for resolution in a timely manner. Table 1-1 identifies programmatic representation to the Core Shipping Technical Working Team.

TABLE 1-1. PROGRAMMATIC REPRESENTATION TO THE CORE SHIPPING TECHNICAL WORKING TEAM

Program Task	Responsible Organization
o Program Management	EG&G Idaho Technical Integration Office (TIO)
o Core Defueling Coordination	GPU Nuclear/Westinghouse
o Canister Design Coordination	GPU Nuclear/B&W
o TMI Facility Preparation	GPU Nuclear/Bechtel
o Cask Supply	EG&G Idaho TIO/Nuclear Packaging, Inc.
o Hazards Identification	RHO
o Shipping Approvals	DOE-ID and NRC
o Transportation Technology	SNL TTC
o Transportation Support	EG&G Idaho TIO & TSB
o INEL Facility Preparation	EG&G Idaho TSB



## 4. PROGRAM TASKS

Separate tasks of the TMI-2 Core Shipment Program are (a) Program Management, (b) TMI-2 Preparation for Shipment, (c) Fuel Shipment, and (d) Fuel Receipt and Storage Coordination. Figure 1-2 is a diagram of the Work Breakdown Structure (WBS) for those four tasks and their subtasks. The Fuel Receipt and Storage Coordination task is addressed in this part of the plan because it is a prerequisite for shipping the core debris. The plan for the TMI-2 Core Receipt and Storage activity was prepared by TSB at INEL and addresses receipt and storage of core debris. GPU Nuclear is preparing a complimentary program plan for its activities (e.g., defueling, loading, storing, and retrieving canisters, loading of casks, etc.). The mechanism for organizational interfaces and coordination is provided herein to ensure successful completion of the core debris shipments in a safe, timely, and cost effective manner. The following subsections describe tasks of the TMI-2 Core Shipment Program.

### 4.1 Program Management

#### 4.1.1 Overall Program Management

Transportation of the core debris from TMI-2 to INEL will be managed as an integrated effort to ensure all applicable requirements are considered and provisions for meeting those requirements are made in a timely manner. EG&G Idaho will provide program management for overall direction and coordination of transportation activities performed at TMI, INEL, and other DOE laboratories, and by contractors such as the cask supplier and transportation company.

#### 4.1.2 Core Shipping Technical Working Team

The Core Shipping Technical Working Team was formed with members from all major organizations involved in shipping the TMI-2 core debris. Regular informational meetings at TMI will be held to (a) update team

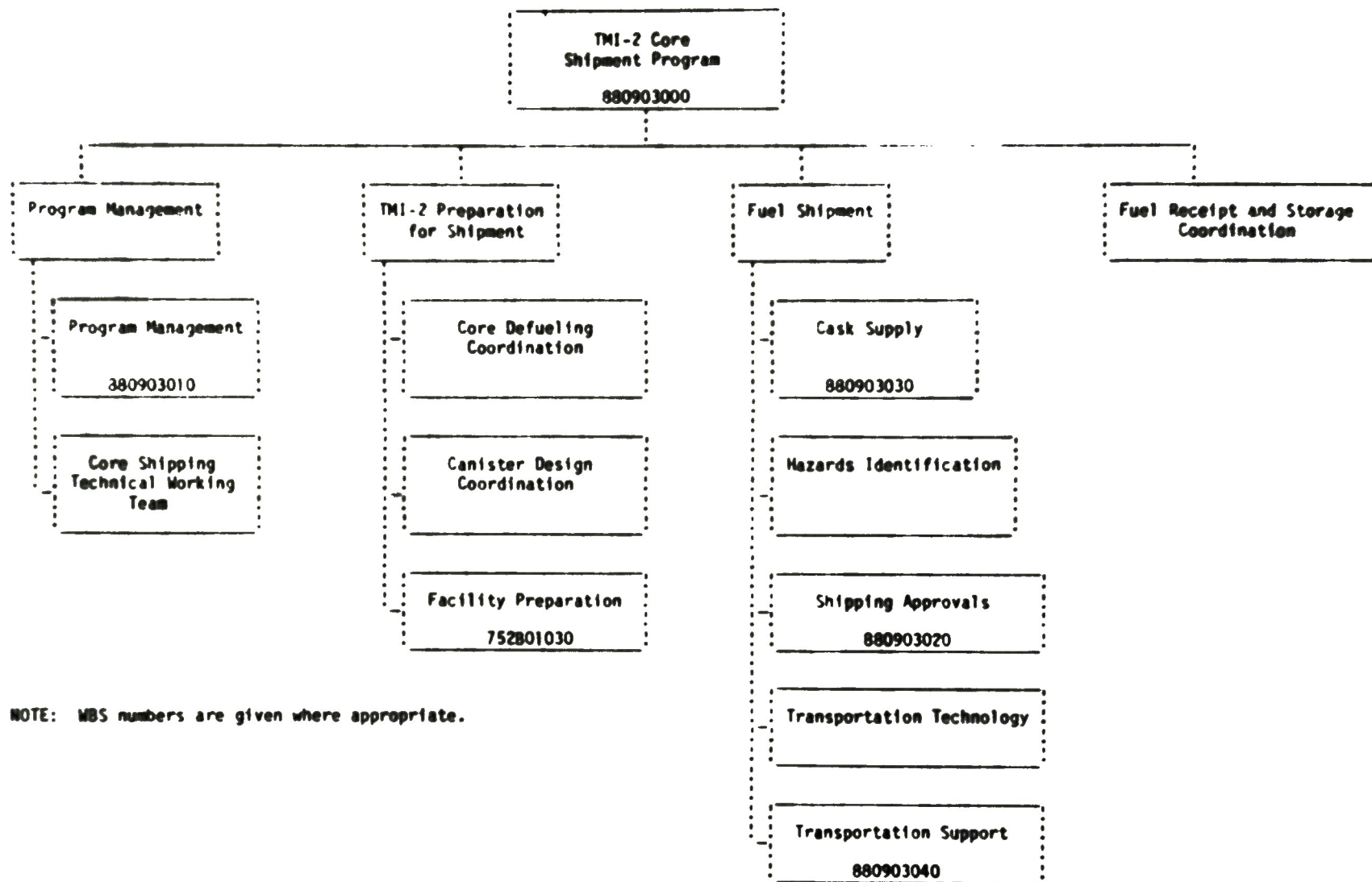


Figure 1-2. Work Breakdown Structure for the TMI-2 Core Shipment Program.

members on progress made within each area of activity, (b) identify for management resolution potential handling system incompatibilities that might delay the shipment schedule, and (c) function as a "clearing house" for identification of technical issues among organizations. Team members will coordinate program changes within their organizations to ensure that shipping system interfaces remain compatible with other organizations. However, implementation of suggested changes will be independent of the team.

The Core Shipping Technical Working Team will develop a Shipping System Description which will form the basis for coordinating interfaces as various handling systems are designed or modified. The team also will develop a detailed and integrated Schedule for Core Shipment Activities which will identify all restraints, interfaces, and milestones.

#### 4.2 TMI-2 Preparation for Shipment

Preparations for safe shipment of the core debris involves coordinating the efforts of several organizations. Defueling is the recovery activity that will generate canisters containing fuel and debris. Fuel canisters will be prepared for safe shipment and loaded into certified, spent fuel shipping casks. Logistics of canister preparation and procedures for cask loading in the TMI-2 Fuel Handling Building may be limiting and determine the rate at which canisters can be shipped. Facility modifications required for canister preparation and loading, as well as optional modifications to accelerate the shipping rate, will be determined and implemented appropriately.

##### 4.2.1 Core Defueling Coordination

The Core Defueling Coordination effort will be established to ensure that safety concerns for canisters containing core debris are addressed appropriately in the SAR for transportation being prepared by TSB of EG&G Idaho. The process selected for removing core debris from the TMI-2 reactor vessel and loading debris into fuel canisters will affect the type



and quantity of material in each canister. [Core debris consists of less than full length and full cross section assemblies, pellets, and fines.] Bounding conditions for safe shipment of a canister will depend on the type and quantity of material loaded in each type of canister.

#### 4.2.2 Canister Design Coordination

The Canister Design Coordination activity was established to ensure that the design effort will accommodate requirements needed for preparation, shipment, storage, and examination of TMI-2 core debris, and that design information is available for safety analyses supporting those activities. TMI-2 fuel canisters are designed to contain the core debris during transport to INEL, interim storage, and examination.

#### 4.2.3 Facility Preparation

This activity will provide analyses to determine required and cost effective facility modifications at TMI and INEL for achieving the shipping objectives. Loading facilities at TMI and receiving facilities at INEL will constrain turnaround time for the shipping cask. The turnaround time will be determined for various facility and cask configurations, and for staffing plan alternatives. The number of rail casks that can be accommodated will be determined based on achievable turnaround times.

GPU Nuclear will evaluate canister and cask handling capabilities in the TMI-2 Fuel Handling Building. Facility modifications may be required and implemented appropriately to achieve a safe, timely, and cost effective shipping rate. Those modifications will be funded by GPU Nuclear.

### 4.3 Fuel Shipment

Safe shipment of the TMI-2 core debris will be performed with spent fuel shipping casks. The number of casks will be determined based on procurement costs of casks and rate at which GPU Nuclear can fill canisters, perform necessary operations to meet the water content



requirement, and load canisters into casks. Hazards associated with core debris in the shipping package (cask and contents) will be identified. Hazard controls will be evaluated, tested, and implemented as necessary to ensure that conditions are safe for shipment. All documentation required for shipping approvals will be prepared. Shipments will be managed and coordinated to ensure adequate transportation support and achievement of program objectives.

#### 4.3.1 Cask Supply

Shipping alternatives will be analyzed by TIO of EG&G Idaho to determine the number of rail shipping casks required to complete shipment of the TMI-2 core debris to INEL on schedule. That analysis will include information by GPU Nuclear on defueling and residual water removal rates, cask turnaround time at TMI, and procurement costs of casks from potential suppliers. Two rail shipping casks have been procured by EG&G Idaho on behalf of DOE, and an option for two additional rail casks may be exercised, depending on economics and benefits of completing shipments in a shorter time period.

#### 4.3.2 Hazards Identification

Hazards associated with canisters containing core debris will be investigated by RHO to determine techniques and equipment for safely controlling those hazards. Safety controls will be tested to bound conditions for safe shipment.

#### 4.3.3 Shipping Approvals

Approval of the shipping cask will be obtained from DOE and also may be obtained from NRC. The SARP will identify safety concerns, appropriate precautions, and necessary preparation of fuel canisters and casks for shipping, thereby providing the basis for cask approval.

An SAR for transportation of core debris will be prepared per DOE Order 5481.1, Chapter II. A description of the SAR is given in Section 5.8.1 of this plan.

#### 4.3.4 Transportation Technology

SNL TTC will provide technical support to the cask supplier for licensing submittals. That support includes subjecting the cask (represented by a 1/4-scale model which has been appropriately instrumented) to a drop test to provide information on whether or not the cask will survive intact various hypothetical accident scenarios. Moreover, SNL TTC will evaluate the engineering structures designed to effect double containment of plutonium. That effort will necessitate reviewing the SARP in detail on behalf of Nuclear Packaging, preparatory to the latter submitting the SARP to NRC for licensing and approval of the cask.

#### 4.3.5 Transportation Support

Transportation of core debris from TMI-2 to INEL will require the support of several organizations. Those efforts will be coordinated by the Traffic and Receiving Branch of EG&G Idaho to ensure transportation services are provided as required (i.e., shipping casks and ancillary equipment are maintained, transportation vehicles provided, detailed shipping schedules met, and each shipment has necessary documentation, notifications, equipment, and personnel).

### 4.4 Fuel Receipt and Storage Coordination

Coordination of receipt and storage of core debris will ensure that all TMI and INEL requirements are considered and technical information is efficiently exchanged. Handling equipment, facility modifications, and operations at shipping and receiving locations must be compatible. Any required modifications will be completed in the timeframe required to meet program objectives. Part 2, TMI-2 Core Receipt and Storage provides descriptions of tasks involving receipt and storage of core debris at INEL.

## 5. PROGRAM CONTROLS

Control systems described in Reference 4 will govern the TMI-2 Core Shipment Program. Program controls specific to the TMI-2 Core Shipment Program are highlighted in this section.

### 5.1 Program Baseline

The approved baseline is the WBS as defined in this section. Detailed work packages will be developed and receive approval from the TI&EP Change Control Board (CCB). Any changes to the baseline will require CCB action.

Detailed work packages will contain the following information as a minimum:

- o Concise description of work to be performed.
- o Clear descriptions of project tasks, assumptions, specific tasks, and deliverables.
- o Detailed schedules, with milestones that can be evaluated relative to the established budget.
- o Cost estimates providing detailed labor and nonlabor allocations by accounting month for the current fiscal year. Detailed nonlabor allocations will define travel, direct purchases, computer, laboratory services, printing, technical publications, graphics, subcontracts, and technical functional support, by organization. A cost breakdown will be provided for every fiscal year.

### 5.2 Work Breakdown Structure

The WBS for the TMI-2 Core Shipment Program is shown in Figure 1-2 and will be controlled by the Program Manager and CCB action.



### 5.3 Cost and Schedule Control

The control of work scope, cost, and schedule is given in Reference 4. Significant change in scope or schedule by addition or deletion of work from the approved baseline is subject to CCB action. A management reserve will be maintained and controlled by CCB action.

### 5.4 Procurement Control

Procurement controls will be by standard EG&G Idaho company practices outlined in the EG&G Idaho Resource Manual and TIO Standard Practice Manual (TIO 1.2.2). Cost Account Managers will be responsible for accurately completing requisition packages, obtaining necessary approvals, knowing the status of material requisitions and subcontractor service contracts associated with their tasks, and identifying potential problems in time for corrective action. Subcontract administrators will ensure that legal, administrative, and regulatory restrictions are addressed appropriately (i.e., EEO, OSHA, Small Business, and Davis Bacon Act).

### 5.5 Configuration Control

Configuration control will be per company standard documentation. A system for program configuration control has been developed for TMI/TIO and is contained in Reference 4.

### 5.6 Documentation

Documents generated by the TMI-2 Core Shipment Program will serve administrative needs of TMI/TIO and technical needs of TIO. The following documents will be included:

- o A section of the Monthly Report prepared for the management of TMI/TIO and other organizations of EG&G Idaho and DOE-ID will highlight program accomplishments in the current month and activities for the coming month.



- o Technical reports will be prepared as identified during the life of the program per the requirements of Reference 4. Dissemination of program results will be pursued actively at major technical forums (e.g., American Nuclear Society and other international conferences). Release of information will be in accordance with approvals and limitations established in the TIO Standard Practice Manual.
- o Documents describing DOE funded design work will be reviewed and approved by EG&G Idaho. Formal reviews will be held at key design stages to verify that the design satisfies functional and operational requirements incorporated in design criteria. Additional informal reviews will be conducted, as appropriate, to control the design effort.

### 5.7 Quality

The Quality Division of EG&G Idaho will perform its normal reviews for shipment of the TMI-2 core to INEL. Reviews will include the following:

- o Review of GPU Nuclear/Bechtel activities requested by the program
- o Review of shipping cask documentation and Certificates of Compliance
- o Review of procurement activities associated with purchase of the shipping casks
- o Review of canister and cask quality assurance inspections and maintenance programs.

Quality activities of EG&G Idaho at TMI are described in the TMI/TIO Quality Program Plan. That plan invokes the EG&G Idaho Quality Manual which satisfies applicable requirements of ANSI/ASME NQA-A1; DOE 5480.1; and 10 CFR 71, Appendix E--Quality Assurance Criteria for Shipping Packages for Radioactive Material.

## 5.8 Safety/Environment

### 5.8.1 Safety

The responsibility for safety at TMI facilities rests with GPU Nuclear. The responsibility for safety in program activities undertaken by other subcontractors will be the responsibility of those subcontractors. As appropriate during contractual negotiations, and periodically thereafter, TIO will review safety procedures of the subcontractors. In this effort, TIO will obtain assistance of the Health and Safety Division of EG&G Idaho, if necessary. In its own operations, TIO will be guided by safety procedures as defined in Section 6 of the EG&G Idaho Resource Manual.

DOE will be responsible for shipping the core debris from TMI-2 to INEL. EG&G Idaho, the operations contractor for DOE, will be responsible for ensuring that all appropriate transportation regulations are satisfied for the safe shipment of core debris from TMI-2 to INEL.

Regulations governing radioactive material transportation in 10 CFR 71 (as revised 24 August 1983) have been reviewed and the following sections are applicable to TMI-2 core shipments:

- o 71.43 General standards for all packages
- o 71.55 General requirements for all fissile material packages
- o 71.61 Specific standards for a Fissile Class III shipment
- o 71.63 Special requirements for plutonium shipments
- o 71.71 Normal conditions of transport
- o 71.73 Hypothetical accident conditions.

Other shipping requirements applicable to TMI-2 core debris are found in Department of Transportation (DOT) 49 CFR 173. Section 173.24 describes standard requirements for all packages and limits contents such that there will be no flammable mixture of gases. Section 173.214 describes packaging specifications required for shipping zirconium metal that is in the form of finely divided particles.

In addition to the regulations stated in the Code of Federal Regulations, there are shipping requirements in DOE Order 5480.1A, Chapter III; ID Order 5480.1, Chapter III; and the EG&G Idaho Safety Manual. Shipments of TMI-2 core materials will have to meet NRC (10 CFR 71) and DOT (49 CFR 173) requirements except as exempted by DOE. Compliance with those regulations will ensure that standards of DOE Order 5480.1, Chapter III, are met, and specific DOE Certificates of Compliance will be obtained, as required. DOE packaging requirements are the same as those found in 10 CFR and 49 CFR.

ID Order 5480.1, Chapter III, requires that EG&G Idaho do the following:

- o Implement internal procedures ensuring that all offsite shipments of fissile and other radioactive materials are made in accordance with 49 CFR 100-199, International Atomic Energy Agency Shipping Regulations, and other regulations, as appropriate.
- o Provide training to certify that all personnel engaged in shipment activities are in compliance with offsite shipping regulations, as appropriate for "Hazardous Materials Shipping" and "Radioactive Shipper's Training." Provide recertification training annually.
- o Assure preparation of the SARP in application for a Certificate of Compliance from appropriate federal authorities.
- o Maintain a quality assurance program for new containers and an auditable inspection and maintenance program for all reusable offsite shipping containers.
- o Ensure that offsite shipping containers owned or approved by other organizations have had current maintenance and inspections, are appropriate for intended use, have current authorization for use, and approved documents have been reviewed by users.



Per DOE Order 5481.1, Chapter II (9)(d), an SAR for transport of nuclear material will be prepared, which includes the following:

- o A summary description of the shipping cask and canister
- o A summary description of the contents, including maximum radiological activity, water, and decay heat
- o Requirements for preparing a safe shipment and descriptions of any special procedures that may be required (e.g., inerting the canister)
- o Description of transportation route(s)
- o Documentation required for transport, including Form ID-F-54801.A, Rev. 11/82 (INEL Offsite Radioactive Material Shipment Record), or equivalent, and DOE/NRC Form 741 with the following supporting documentation: Radioactive Material Shipment and Receipt Record, Radioactive Material Shipment Checklist, Radioactive Waste Shipment and Disposal Form, Isotopic Percent Worksheet, Preload and Postload Vehicle Survey Records, Combustible Gas Worksheet, Vehicle Inspection Checklist, and a Straight Bill of Lading Short Form (Form EG&G-397), or equivalent
- o Criteria required for a safe shipment (e.g., acceptable control of combustible gas generation rate during shipment)
- o Analysis for the maximum credible accident during transport
- o Tiedown requirements.

#### 5.8.2 Environment

Reference 5 discusses environmental concerns regarding shipping TMI-2 core debris to INEL. A separate environmental document for transport is not required by the national Environmental Protection Agency or DOE-ID.



## 5.9 Safeguards/Security

EG&G Idaho, functioning as operations contractor for DOE, will accept title to the TMI-2 core debris on behalf of DOE outside the main gate of TMI. DOE will be the shipper of record. The purpose of this section is to identify safeguards and security requirements for shipment of the core debris.

### 5.9.1 Safeguards

Shipment of the TMI-2 core debris requires that transfer of each container be documented on DOE/NRC Form 741 or equivalent. Information provided will include an estimated net weight and estimated quantity of uranium per container. The quantity of uranium will be based on the best practical estimate. Quantities assigned for U-235 and plutonium will be based on average factors predicted for the final core inventory, as derived from burnup calculations.

The Safeguards and Materials Management Branch of EG&G Idaho requires the following information (which should be on or attached to DOE/NRC Form 741) to meet shipping accountability or safeguards requirements:

- o Gross weight of each container
- o Net weight of material in each container
- o Description of contents of each container (e.g., whole fuel rods, damaged fuel rods, structural material, slag, residue, etc.)
- o Estimated total quantity (in grams) of uranium and plutonium per container
- o Estimated quantities (in grams) of U-235, Pu-239, and Pu-241 per container

- o Percent enrichment of U-235 and Pu-241 after burnup
- o Individual identification number for each container.

### 5.9.2 Security

Physical protection of TMI-2 core debris will comply with DOE Order 5632.2. The Safeguards and Security Division of EG&G Idaho requires the following for rail transport:

- o All routes will be approved rail routes for radioactive shipments.
- o The carrier will inform the Traffic and Receiving Branch of EG&G Idaho of intended routes and pertinent routing information that could impact security or safety.
- o Before the shipment is tendered to the carrier, the shipper will check both the package and transport vehicle to ensure that no conditions exist that could compromise security of the equipment.
- o The shipping container will be checked by the Traffic Coordinator of EG&G Idaho to verify that all labels were affixed properly by GPU Nuclear and all tiedowns are secured properly to prevent shifting enroute.
- o The following documents will be checked by the Traffic Coordinator to verify that they are complete: (a) Bill of Lading, (b) Radioactive Shipping Record (similar to DOE form 5480.1A), and (c) Vehicle Inspection List. [All documents will be completed properly and signed off by the responsible parties.]
- o Notifications will be made by the Traffic Coordinator to the consignee and the Warning Communications Center of DOE-ID.

## 6. BUDGET

The TMI-2 Core Shipment Program assumes that transport of the core debris begins as soon as practicable after initiation of defueling, with completion within the shortest economically feasible timeframe. The baseline program budget has been developed to accommodate that direction to the extent practicable. The program budget will be maintained current in the Master Funding Plan.

## **7. SCHEDULE AND DELIVERABLES**

### **7.1 Summary Schedule**

A Critical Path Method (CPM) network schedule has been developed from schedules prepared by each member of the Core Shipping Technical Working Team. The CPM network schedule is in sufficient detail that all significant activities, interfaces, and restraints necessary to complete the program are clearly identified. The schedule will be kept current and reviewed monthly in the shipping coordination meetings.

### **7.2 Deliverables**

Deliverables for the TMI-2 Core Shipment Program are the following:

- o Canister**
  - INEL Wet Storage Study Report
- o Cask**
  - SARP
  - Manufacturing drawings
  - Cask delivered to TMI
  - Decontamination procedures or precautions
  - Operation and Maintenance Manual
- o Hazards Identifications**
  - Final report on evaluation of special safety issues associated with handling the TMI-2 core debris
- o TMI Facility Preparation**
  - Completed logistic studies
- o Transportation**
  - SAR for transportation
  - Shipping schedule



- o Core Shipping Technical Working Team
  - Shipping System Description
  - CPM network Schedule for Core Shipment Activities.

## 8. REFERENCES

1. "Coordination Agreement, TMI Unit 2 Information and Examination Program," 26 March 1980.
2. Memorandum for the President of the United States from James B. Edwards, Secretary of Energy, "Resolution of Remaining Civilian Nuclear Program Policy and Budget Issues for FY 1982," 2 March 1981.
3. Memorandum for the Secretary of Energy from the President of the United States, "Decisions on Department of Energy Budget Appeal," 20 March 1981.
4. Program Management Plan for the U.S. Department of Energy TMI/TIO Programs, EG&G Idaho, Inc., May 1983.
5. Final Programmatic Environmental Impact Statement related to decontamination and disposal of radioactive wastes resulting from March 28, 1979, accident Three Mile Island Nuclear Station, Unit 2, NUREG-0683, March 1981.



## PART 2, TMI-2 CORE RECEIPT AND STORAGE

### 1. EXECUTIVE SUMMARY

Objectives of the TMI-2 Core Receipt and Storage Project are to receive and store core debris from Three Mile Island Unit 2 (TMI-2) safely at the Idaho National Engineering Laboratory (INEL). Interagency procedures for acceptance of the core debris are contained in the Memorandum of Understanding between the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE).<sup>1</sup> DOE will accept custody of the core debris at TMI and transport it to DOE facilities. DOE will be the shipper of record. INEL will receive most of the core debris shipments for research and interim storage in the Water Pit of Test Area North Building 607 (TAN-607). Core debris shipments will be prepared by General Public Utilities Nuclear Corp. (GPU Nuclear--owner/operator of TMI) in a safe manner to meet applicable federal and state regulations and comply with receiving and interim storage requirements of INEL. Shipments presently are scheduled to leave TMI as soon as practical after defueling operations begin, with completion of shipments in the shortest, economically feasible timeframe.

Planning and technical support activities include participating in the Core Shipping Technical Working Team. The role of that group is to (a) ensure timely completion of tasks related to preparations for defueling, transportation, receipt, and storage of the TMI-2 core debris and (b) identify potential concerns.

Facility preparations at INEL for receipt, storage, and examination of the TMI-2 core debris will rely on technical expertise in the Thermal Fuels Behavior Programs Division and other support organizations of EG&G Idaho, Inc. Existing remote-handling facilities at INEL will be modified, as required, to prepare for cask receipt; canister unloading, handling, and storage; and designated examinations of the core debris. The TMI-2 core debris will be stored in the Water Pit of TAN-607. Safety analyses, a significant effort in preparing for core receipt, will be provided by the Health and Safety Division of EG&G Idaho.



## 2. INTRODUCTION

The TMI-2 Core Receipt and Storage Project is responsible for preparing for, receiving, and storing the TMI-2 core debris at INEL. The project is one of the activities under the TMI Material Receipt, Storage, Research, and Disposition Section. The TMI-2 Core Receipt and Storage Project is under the planning and budget umbrella of the Core Activities Program. The Core Activities Program and Data Acquisition Program together constitute the TMI-2 Technical Information and Examination Program (TI&EP)/Data Acquisition Program (DAP). DAP is managed for DOE by the TMI Technical Integration Office (TMI/TIO) of EG&G Idaho. The purpose of DAP is to gather data on all aspects of the TMI-2 accident and recovery process to advance nuclear power technology and safety. The Core Activities Program is managed for DOE by the Technical Support Branch of EG&G Idaho at INEL. The purpose of the Core Activities Program portion of TI&EP is to (a) plan and implement the offsite<sup>a</sup> receipt, storage, and examination of core debris from TMI-2 and (b) perform analyses for interpreting the TMI-2 accident and correlating data with other severe accident data. The Core Activities Program also provides technical support for onsite data acquisition, specific examinations performed before and during defueling operations, and examination of samples transported to INEL and other laboratories for remote handling (offsite examination). At DOE direction, a separate trackable entity, the Core Sample Acquisition and Examination Project, was established under the planning and funding umbrella of the Core Activities Program. However, its assigned tasks and responsibilities are addressed in a separate project plan, Management Plan for the Core Sample Acquisition and Examination Project. Hence, no further discussion of that project is included in this document.

This portion of the document describes the plan by which receipt and storage of the TMI-2 core debris will be accomplished in an efficient, timely, and cost effective manner. It outlines INEL responsibilities for

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a. In this document "offsite" and "onsite" refer to the TMI site.

receipt and storage of core debris. Interfaces with other organizations, approximate chronological sequence of events, and key milestones are included. It also provides a plan for staffing, organizing, and managing tasks at INEL and coordinating related tasks at TMI or in other programs.

## 2.1 Authority

Interagency procedures for accepting the core debris are contained in Reference 1. Funding and guidance for the work conducted at INEL by EG&G Idaho are provided under Work Package Proposal and Authorization Number 6GE502.

## 2.2 Objective

Objectives of the TMI-2 Core Receipt and Storage Project are to receive and store the TMI-2 core debris safely and in a timely, cost effective manner. The scope of the project includes the following:

- o Preparing and updating the TMI-2 Core Receipt and Storage Project Plan<sup>2</sup>
- o Preparing and implementing the Capital Equipment Project plan associated with equipment tasks for this project
- o Providing personnel, facilities, equipment, and safety and operating documentation for receipt, handling, and storage of TMI-2 core debris and components at INEL
- o Providing management, coordination, and technical direction for receipt, storage, and reporting activities.

In support of the TMI-2 Core Receipt and Storage Project, this document identifies (a) responsibilities and authorities for planning and implementing project tasks; (b) mechanisms for interaction between project management, performing organizations, and related programs to facilitate

interface control, identification and resolution of potential problems, and overall coordination; (c) principal tasks of the project at INEL; (d) project controls; and (e) key events and milestones.

### 3. ORGANIZATIONAL RESPONSIBILITIES AND INTERFACES

Removal, transportation, receipt, and storage of the TMI-2 core debris are responsibilities involving participation of many organizations. Clear definition of organizational responsibilities and interfaces is essential to the successful integration and timely completion of tasks necessary to complete those activities. This section identifies responsibilities of major organizations involved in the TMI-2 Core Receipt and Storage Project and provides mechanisms for coordinating project activities.

#### 3.1 Summary of Responsibilities

EG&G Idaho, as operating contractor for DOE, will be responsible for managing the transportation, receipt, and storage of core debris at INEL. DOE will be the shipper of record. EG&G Idaho will make necessary preparations for receipt and storage of core debris and components at INEL. Work at INEL will be conducted under the Technical Support Branch with the Core Activities Program being the funding source.

Relative to the work scope of the project, the Project Manager is responsible to the supervisor of the TMI Material Receipt, Storage, Research, and Disposition Section. The Project Manager has responsibility for planning, cost, schedule, and technical performance. He has authority to direct all aspects of the project within the work scope and budget stipulated in this plan. The Project Manager is responsible for establishing technical requirements of project work packages and interfaces between work packages. He monitors compliance with established technical requirements and assesses the impact of changes to those requirements. The Project Manager also is responsible for the quality and safety of all projects and plans, as well as preparation and approval of documentation. Each Work Package Manager is responsible to the Project Manager for technical, cost, and schedule performance, and has authority to implement work in his respective area. The functional organization of the TMI-2 Core Receipt and Storage Project is highlighted in Figure 2-1.



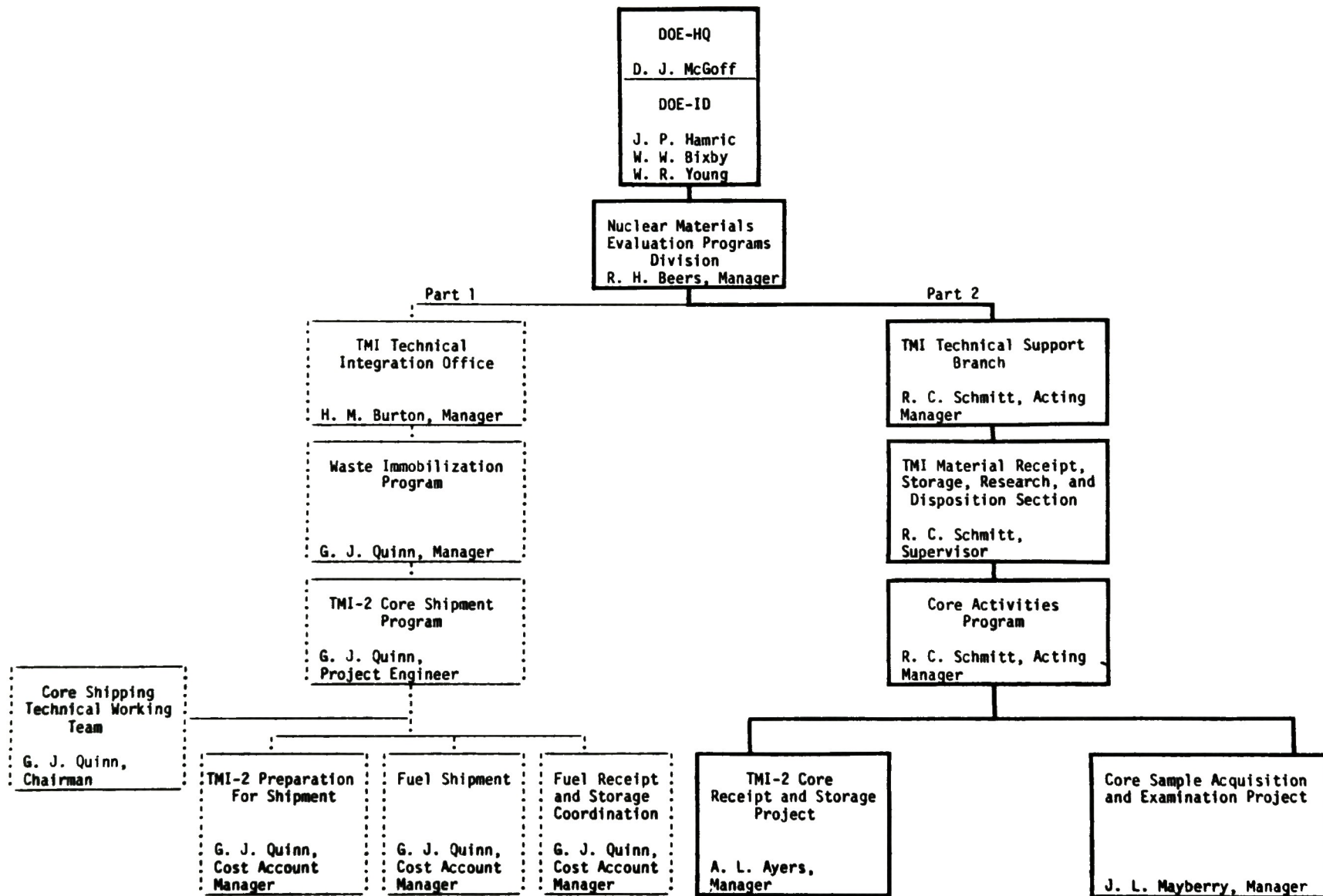


Figure 2-1. Functional organization chart highlighting Part 2, TMI-2 Core Receipt and Storage.

The TMI Programs Office of NRC may perform onsite preshipment inspections to verify that the core debris shipments comply with applicable regulations. Ownership of the core debris shipment will transfer to DOE at the TMI site boundary.

### 3.2 Program Interfaces

Because of the broad scope of the TMI-2 Core Receipt and Storage Project, number of organizations involved, and interactions required to accomplish objectives, the Core Shipping Technical Working Team will provide focal points where information is exchanged and potential concerns identified and resolved in a timely manner. It is recognized that the TMI-2 Core Receipt and Storage Project must have strong interfaces with other organizations and other TMI-2 recovery-related activities. Interfaces are essential because the plan outlined herein crosses presently established areas of responsibility which are sources of information, data, or criteria needed to meet project objectives. Continued interface with GPU Nuclear and its subcontractors and with TMI/TIO is essential for planning and implementing safe shipments, including hazards control during transportation and completion of necessary documentation. Principal interface functions of the program and anticipated support are shown in Figure 2-2.

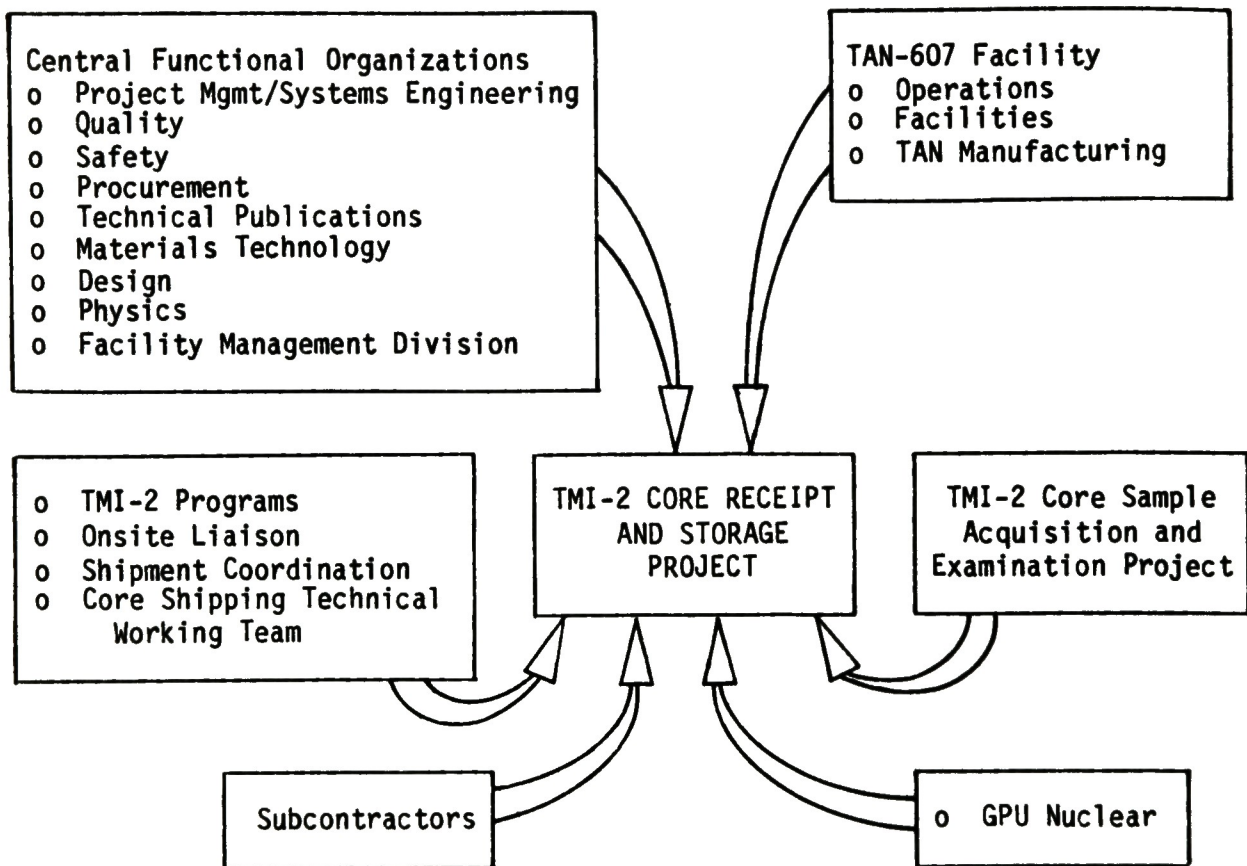


Figure 2-2. Program interfaces for the TMI-2 Core Receipt and Storage Project.

#### 4. PROGRAM TASKS

Tasks of the TMI-2 Core Receipt and Storage Project include (a) Project Management; (b) Preparations for Core Receipt and Storage, including equipment projects; and (c) Core Receipt and Storage Operations. Receipt and storage operations will begin after initiation of shipping of the TMI-2 core debris from TMI. Before that, dry runs and training exercises will be conducted at INEL using actual equipment without fuel. Final disposition of the core debris will occur when a commercial high-level waste repository becomes available.

The Work Breakdown Structure (WBS) identifies and separates program tasks and subtasks into readily manageable categories which, in total, comprise the TMI-2 Core Receipt and Storage Project. The WBS provides increased clarity of task dependencies and relationships and corresponds to the organization implied in the title of this document. Subtasks, work packages, and work package activities are logically organized according to their relationship to tasks as shown in the project WBS of FY-1985 (Reference 2) and described in the following subsections.

##### 4.1 Project Management

The TMI-2 Core Receipt and Storage Project is managed as an integrated effort to ensure that all applicable requirements for receipt and storage of the core debris are considered and provisions for meeting those requirements are made in a timely manner per its project plan. Project Management provides the overall direction and coordination of project activities performed at INEL, other DOE laboratories, and by subcontractors.

The management task for the TMI-2 Core Receipt and Storage Project directs and controls all phases of the project from its inception to completion, including negotiations with DOE to establish project requirements and criteria. Authorization of work, control of budget and schedule requirements, monitoring and reporting project performance, and liaison with TMI/TIO are elements of Project Management. The task includes



project management, technical support, coordination with other programs, and preparation of planning documentation. Project tasks are defined and planned under DOE direction and described in revisions of the project plan.

The Technical Support Branch (TSB) of the Nuclear Materials Evaluation Programs Division (NMEPD) of EG&G Idaho conducts day-to-day management of the Core Activities Program, of which the TMI-2 Core Receipt and Storage Project is a part. The Manager of the TMI-2 Core Receipt and Storage Project is responsible for coordinating and managing INEL activities supporting the TMI-2 core programs.

#### 4.2 Preparations for Core Receipt

This activity provides engineering, technical support, and project control to upgrade existing equipment and furnish necessary equipment for receipt and storage of the TMI-2 core debris. FY-1985 tasks include handling sequence diagrams, conceptual planning, functional and operational requirements, budget, and schedule monitoring for canister handling and venting equipment, pool transfer truck, cask handling and support equipment, and fuel storage rack. Studies and analyses also are provided for safe receipt and handling of fuel canisters.

Work packages on conceptual design and finalized capital equipment are prepared, as required, to effect needed modification or upgrade of the Hot Shop crane, cask unloading stand, pool crane, pool truck, and remote handling and radiation monitoring systems. The storage rack for fuel canisters is designed and procured, along with cask handling and support equipment, canister handling equipment, and canister venting/dewatering equipment.

Actual equipment purchases/refurbishments are done from capital equipment accounts. Final design specifications and procurement actions also are done from those accounts. Coordination and management controls from equipment work packages will be provided to accomplish preparation of facilities in a timely and cost effective manner. Adequate design files

are emphasized because of project longevity. Upgrades to the TAN-607 Hot Shop facility will provide safe handling and storage of the TMI-2 core debris in the Water Pit of TAN-607.

Preparations for receipt, including storage rack and pool truck, along with all handling equipment, will be completed for receipt of fuel canisters before the canisters leave TMI.

#### 4.2.1 Safety and Support Documents

During FY-1984, work began on the Safety Analysis Report (SAR) for the TAN-607 Complex and revision of the Operational Safety Requirements Document (OSRD) for the TAN-607 Hot Shop. The SAR for the TAN-607 Complex and revised OSRD, both of which received approval from DOE-ID in early FY-1985, partially accommodate planned receipt and storage of core debris from TMI. However, three additional safety documents [i.e., Safety Assessment Document (SAD) for Receipt and Storage of TMI-2 Fuel Debris in TAN-607, Safety Analysis Report for Transport of TMI-2 Fuel Debris From TMI to INEL, and Independent Criticality Analysis of TMI-2 Fuel Debris Canisters] are required in FY-1985 to complete major safety evaluations preparatory to acceptance of the core debris.

#### 4.3 Core Receipt and Storage Operations

TMI-2 fuel canisters will be transported to INEL via railroad, beginning as soon as practicable after the start of defueling at TMI-2. Plans for receipt of core debris are based on using two rail casks (each containing seven canisters) every 90 days. Rail casks will be received at the Central Facilities Area (CFA) of INEL, and each cask transferred to a roadway transporter for movement from CFA to the TAN-607 facility.

Receipt of canisters at the TAN-607 Hot Shop will consist of bringing the transporter and cask into the Hot Shop, verifying the documentation and radiological survey, unloading the cask from the transporter, and removing the canister from the cask. Venting the cask/canister system will be

performed, if required. The canister will be moved to a storage rack module, and the module placed in the TAN-607 Water Pit. Then the transporter and cask will be prepared and released for return to TMI.

In FY-1985, the emphasis in the Core Receipt and Storage Operations task will be preparing for a dry run. The scope of the dry run is as follows:

- o Receive a shipping cask by rail transport at CFA
- o Transport the cask by truck to the TAN-607 Hot Shop; vent and open the cask and interior cask container
- o Install up to six dummy fuel canisters in the cask
- o Transfer the canisters to a storage module (six-pack configuration)
- o Transfer the module to the Water Pit, placing the module on the load distribution platform
- o Remove the loaded module from the Water Pit, remove the six fuel canisters from the module, dewater and decontaminate the fuel canisters
- o Close the shipping cask and return it by truck to CFA
- o Load the cask on the railroad car
- o Prepare for shipment of the cask to TMI.

The FY-1985 part of this task will develop requirements, prepare operating procedures, complete safety documents, perform some equipment trials, and so forth, preparatory to conducting the dry run during the first part of FY-1986.



## 5. PROGRAM CONTROLS

### 5.1 Program Baseline

The approved baseline is the WBS as defined in work scopes, costs, and schedules of approved work packages. Detailed work packages, costs, and schedules are developed from the Core Activities Program and receive approval from the Change Control Board (CCB) and TSB of NMEPD. Any changes to the baseline require further CCB action, per the Management Plan for the TSB.<sup>3</sup>

Detailed work packages for each cost account will contain the following information, as a minimum:

- o Concise description of work to be performed.
- o Clear definition of project tasks, assumptions, specific tasks, and deliverables.
- o Establishment of detailed schedules, with milestones that can be evaluated relative to the established budget.
- o Establishment of cost estimates providing detailed labor and nonlabor allocations by accounting month for the current fiscal year. Detailed labor and nonlabor allocations will define travel, direct purchases, computer, laboratory services, printing, technical publications, graphics, subcontracts, and technical functional support, by organization. That breakdown will be provided every fiscal year.

### 5.2 Work Breakdown Structure

The WBS for the TMI-2 Core Receipt and Storage Project (Reference 2) is an organized definition of work to be accomplished. The WBS is an end-product-oriented organization of tasks consisting of facility



preparations, receipt and storage operations, research, and project management. The WBS outlines work necessary to accomplish project objectives, the hierarchy of work to be performed, and interrelationships between the two. The WBS is a "living document" and will be changed during the life of the project.

### 5.3 Cost and Schedule Control

Work scope, cost, and schedule controls will be as stated in Reference 3. Significant change in scope, schedule, or addition/deletion of work from the baseline is subject to CCB action. A management reserve is maintained in the Program Office of DOE-ID for the purpose of funding approved CCB actions (Reference 3).

### 5.4 Procurement Control

Procurement controls follow standard company practices outlined in the EG&G Idaho Resource Manual. The Cost Account Managers are responsible for completing requisition packages, obtaining necessary approvals, knowing the status of material requisitions and subcontractor service contracts associated with their tasks, and assuring identification of concerns in time for corrective action. Subcontract Administrators ensure that legal, administrative, and regulatory restrictions are addressed appropriately (e.g., EEO, OSHA, Small Business, and Davis Bacon Act).

### 5.5 Configuration Control

Configuration control is per company standard documentation. Document Change Notices, Document Revision Requests, and Facility Change Forms are used to control configuration of engineering requirements, Safety Analysis Reports, Operational Safety Requirements Documents, Engineering Evaluations, design specifications, project plans, and facilities. Project configuration control is described in Reference 3.

## 5.6 Reporting and Review

Documents generated by this program (and its receipt and storage project) serve (a) administrative needs of TSB and (b) technical needs of persons working in the program.

All products (reports, calculations, etc.) are approved by the Manager of TSB. Work Package Managers apprise the Manager of the TMI-2 Core Receipt and Storage Project of the status of their tasks and submit written summaries for inclusion in the monthly status report. That report summarizes accomplishments, expenditures (at the work package level), and concerns for the Manager of TSB. The Manager of TSB reworks that status report into a monthly report for management of NMEPD, other organizations of EG&G Idaho, and DOE-ID. The monthly report highlights work accomplished in the current month and work scheduled for the coming month. The monthly report summarizes costs at Level 4 of the WBS.

Technical reports are prepared for the project per requirements of Reference 3. Presentations to technical societies and organizations and publication of project results in technical and scientific journals are pursued actively.

All design work is reviewed and approved by EG&G Idaho. Formal design reviews are held at key stages to verify that the design satisfies criteria, and functional and operational requirements. Additional informal design reviews are conducted, as appropriate, to control the design effort.

## 5.7 Documentation

Project documentation is per standard company documentation, in accordance with Reference 3, and configuration control requirements. A program documentation list is prepared stating title, brief statement of purpose, identification of performing organizations, identification of review and approval organizations, and preparation/review/approval schedules for each document.

## 5.8 Quality

Quality assurance requirements for the TMI-2 Core Receipt and Storage Project is coordinated with the Quality Division of EG&G Idaho. Requirements are in accordance with the EG&G Idaho Quality Manual, which satisfies requirements of ANSI/ASME NQA-1-1979 (Quality Assurance Program Requirements for Nuclear Power Plants).

## 5.9 Safety/Environment

Several types of safety documents are needed for receipt, storage, and examination of TMI-2 core debris at INEL. The documents include (a) the SAR for the TAN-607 Complex, (b) SAD for Receipt and Storage of TMI-2 Fuel Debris in TAN-607, (c) Independent Criticality Analysis of TMI Fuel Debris Canisters, (d) revision of the OSRD for the TAN-607 Hot Shop, and (e) Detailed Operating Procedures (DOPs) for all activities related to receipt and storage of fuel debris. All project documents will be prepared and approved before receipt of the first shipment of core debris at INEL.

### 5.9.1 Safety

A safety assessment of the receipt and storage of core debris will be developed as part of preparation of the Final Safety Analysis Report for the TAN Hot Shop. Safety concerns addressed include (a) criticality; (b) safe storage; (c) safe control of gas generation in each canister; (d) safe handling of each canister after receipt; and (e) safe recovery from an accident involving a canister and/or its contents, should such occur. The project also must adhere to INEL guidelines for receiving irradiated nuclear fuel. Besides discussing those concerns, the safety assessment addresses safety issues related to receipt of fuel canisters at TAN-607, unloading canisters from shipping casks, and placement of canisters in the Water Pit.



The existing OSRD for the TAN-607 Hot Shop will be revised, providing detail on how the facility will be operated safely during implementation of the TMI-2 Core Receipt and Storage Project. Moreover, the revision will include caveats that will accommodate similar research and development activities possibly pursued in the complex in the future.

The Health and Safety Division is responsible for conducting and preparing an independent criticality analysis of TMI-2 fuel debris canisters from TMI to INEL and storage of same canisters in the Water Pit of TAN-607. In the latter instances, that criticality analysis provides much of the information necessary for preparing the Safety Assessment Document for Receipt and Storage of TMI-2 Fuel Debris in TAN-607 (viz., it is the basis for the hypothesized pool draining accident).

DOPs will be developed specifying how each operation in loading, unloading, sampling, containing, storing, and examining TMI-2 core debris will occur. As additional needs are identified, new DOPs will be written, or existing ones revised. In the near term, DOPs that will be finalized are those related to receiving, unloading, and storing each fuel canister.

#### 5.9.2 Environment

The environmental synopsis, included as part of the Safety Assessment Document for Receipt and Storage of TMI-2 Fuel Debris in TAN-607, identifies limits of possible environmental effects and defines major environmental concerns associated with the project. Because project activities are pursued mostly within facilities at INEL (the only exception being transportation of TMI-2 core debris in shielded casks between INEL facilities or to other laboratories), the need to address potential effects on natural environments of INEL is not warranted. Those issues are discussed fully in the Safety Analysis Report for LOFT and the existing Safety Analysis Report for the TAN-607 Complex. Details of potential environmental effects within facilities are developed in scenarios included in the Final Safety Analysis Report for the TAN Hot Shop.



## **5.10 Safeguards/Security**

Safeguard and security requirements for TMI-2 core activities at INEL are as prescribed by established requirements for INEL facilities and programs operated or conducted by EG&G Idaho. Where appropriate, operational and facility documentation addresses those areas of concern.

### **5.10.1 Safeguards**

Accountability for fissile and special nuclear materials is as prescribed for INEL under established requirements administered by the Safeguards and Materials Management Branch of the Safeguards and Security Division. Those requirements are in accordance with the DOE Order 5630 series.

### **5.10.2 Security**

Physical security of facilities and contents is maintained or provided as prescribed for INEL facilities by established requirements and performing organizations. Requirements in accordance with the DOE Order 5632 series are administered by the Security Branch of the Safeguards and Security Division.

## 6. BUDGET

The project plan for the TMI-2 Core Receipt and Storage Project has been prepared assuming shipments of core debris begin as soon as practicable after start of TMI-2 defueling. Costs and tasks are currently being finalized. Funding requirements are within the Master Funding Plan submitted to, and approved by DOE, in FY-1984.

### 6.1 Resource Allocation

Resource allocation will be by approved work package or subcontract, and in accordance with established WBS and DOE direction.

## 7. SCHEDULE AND DELIVERABLES

Project schedules, milestones, key events, and deliverables are subject to change during evaluation and progress of the project, according to DOE direction.

### 7.1 Key Events

Key events for the TMI-2 Core Receipt and Storage Project include (a) receipt of final canister design specifications (January 1985), (b) delivery of six prototype rack modules (September 1985), (c) completion of all core receipt and storage equipment except for the vent system and production racks (September 1985), (d) completion of preparations for the dry run (September 1985), (e) performance of dry run (1st quarter of FY-1986), (f) readiness to receive TMI-2 core shipments (March 1986), (g) completion of safety analyses for receipt and storage of TMI-2 fuel (September 1985).

### 7.2 Deliverables

Deliverables from the Core Receipt and Storage Project include:

- o Safety analyses documents
- o Equipment for receipt and storage
- o Dry run for receipt and storage operations
- o Core receipt and storage operations
- o Safe storage of TMI-2 canisters in the TAN-607 Water Pit for 30 years.

## 8. REFERENCES

1. "Memorandum of Understanding between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy Concerning the Removal and Disposition of Solid Nuclear Wastes from Cleanup of the Three Mile Island Unit 2 Nuclear Plant," 15 July 1981.
2. A. L. (Ron) Ayers, Jr., Core Activities Program TMI-2 Core Receipt and Storage Project Plan, EGG-TMI-6744, December 1984.
3. Management Plan for the Technical Support Branch of the Nuclear Materials Programs Division of EG&G Idaho, Inc., EGG-TMI-6504, Rev. 1, August 1984.





