

April 16, 1996

NOTE TO: Don Lanham
Information and Records Management Branch
Office of Information Resources Management

FROM: Debbie Jackson *Debbie*
Electrical, Materials & Mechanical Engineering Branch
Division of Engineering Technology
Office of Research

SUBJECT: MARBLE HILL AND MIDLAND ANNEALING DEMONSTRATION PROJECT
(ADP) DOCUMENTS FOR THE PUBLIC DOCUMENT ROOM

Attached is the second set of copies of documents which are required to be in the NRC's Public Document Room (PDR).

Thank you for your assistance.

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ANNEALING DEMONSTRATION PROJECT LOG - MARBLE HILL (4/95 - 9/95 p.1)

<u>DATE</u>	<u>DOC TYPE</u>	<u>PROP</u>	<u>TO</u>	<u>FROM</u>	<u>SUBJECT</u>
4/28/95	Final Report	No	Distribution	Cooperheat	Proof of Principle Testing
6/18/95	MeetingSum	No	Distribution	Marsha Gamberoni/NRC	Palisades Meeting Summary
6/19/95	Fax	No	Mike Mayfield/NRC	Jim Nakos/SNL	Preliminary ADP Instrument Plan
6/21/95	Mtg Notice	No	Distribution	Ray Art/ASME	ADP Steering Committee Meeting
6/23/95	Letter	No	Mike Mayfield/NRC	ASME Steering Committee	Reactor Vessel Annealing Steering Comm
6/28/95	Fax	No	Mike Mayfield/NRC	Don Seeger/Westinghouse	ADP Engineering Items
7/9/95	Memo	No	J.Hannon, et.al./NRC	Marsha Gamberoni/NRC	Trip Report to Palisades
7/19/95	Note	No	Dave Morrison/NRC	Mike Mayfield/NRC	Leak Detection for Annealing Heating Sys
7/20/95	Agenda	No		ASME	Draft Agenda for 7/20/95 Meeting
7/20/95	MtgMinutes	No	Steering Committee		Marble Hill Steering Comm Meeting 7/20
7/28/95	Fax	No	Gil Millman/NRC	Ray Art/ASME	Draft minutes of 7/20 ADP Meeting
7/28/95	Fax	No	Gil Millman/NRC	Ray Art/ASME	ADP Announcement of 8/30/95 Meeting
8/2/95	Memo	No	Larry Shao/NRC	Gil Millman/NRC	Highlights of 7/20/95 ADP Meeting
8/8/96	Letter	No	Bill Pennel/ORNL	Jim Nakos/DOE @ SNL	Transmitting Drawings
8/16/95	Fax	No	Distribution	Ray Art/ASME	Agenda for 8/30/95 ADP Meeting
8/24/95	Fax	No	John Warren/DOE	Gil Millman/NRC	List of items requested by NRC
8/24/95	Fax	No	List	Ray Art/ASME	Personnel List for Marble Hill Tour
8/24/95	Fax	No	G.Millman & S.Malik	Gary Rochau/DOE @ SNL	Data needed for NRC Thermal Stress
8/25/95	Fax	No	Gil Millman	Gary Rochau	Use of Cameras during visit to Marble Hill
8/25/95	Fax	No	Shah Malik/NRC	Gary Rochau	Use of Cameras during visit to Marble Hill
8/30/95	Slide Pres	No	ADP Steering Comm		Project Status
9/95	Draft Report	No		Oak Ridge National Lab	Review of Marble Hill Instrumentation

ANNEALING DEMONSTRATION PROJECT LOG - MARBLE HILL/MIDLAND - (5/12/95-9/7/95)

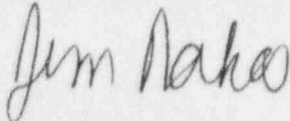
<u>DATE</u>	<u>DOC TYPE</u>	<u>PROP</u>	<u>TO</u>	<u>FROM</u>	<u>SUBJECT</u>
9/7/95	Letter	No	MPR Steering Comm	Jim Nakos/DOE @ SNL	Info Package for ADP & MPR SOW
8/4/95	Letter	No	Dr. Terry Lash/DOE	J. Taylor/NRC-EDO	MOU for ADP
7/11/95	Slide Pres	No	NRC RPV Workshop	John Warren/DOE	DOE ADP Projects
6/23/95	Note	No	File	Mike Mayfield/NRC	Comments on ADP Instrument Plan
6/19/95	FAX	No	Mike Mayfield/NRC	Jim Nakos/DOE @ SNL	Preliminary Instrument Plan
5/26/95	Press Rel	No	Mike Mayfield/Public	Jim Nakos/DOE @ SNL	DOE ADP Info
5/12/95	Memo	No	Jim Taylor/NRC-EDO	D. Morrison. et. al./NRC	Summary of 4/25/95 DOE ADP Meeting
* * *	* * *	* * *	P A C K A G E	C O N T A I N S	* * * * * * * * * * * * *
7/27/95	ASME Corr	No	ASME - Owen Hedden	NRC-Keith Wichman	RPV Annealing
6/95	Magazine	No	Public	Nuclear Engr. Inter	Annealing Demonstration Projects (ADP)
6/15/95	Slide Pres	No		MPR - Alex Zarechnak	MPR Annealing Demonstration Team
6/15/95	Slide Pres	No		EPRI - J. Gilman	Industry Perspectives of ADP
6/15/95	Slide Pres	No		Dennis Harrison	DOE Annealing Programs
6/15/95	Slide Pres	No		John Warren	DOE Annealing Programs
5/20/95	DOE SOW	No		DOE	SOW & Background Information
5/19/95	GL 92-01	No	Licensees	NRC	Reactor Vessel Structural Integrity
5/15/95	Article	No		Inside NRC	Pressurized Thermal Shock Information

Sandia National Laboratories

Albuquerque, New Mexico 87185-0741

date: September 7, 1995

to: MPR Team Steering Committee Members



from: Jim Nakos, DOE's LWR Technology Center @ Sandia National Laboratories,
Co-chairman of MPR Team Steering Committee

subject: Information Package Regarding DOE's Annealing Program and MPR Team Statement of Work

Enclosed please find a copy of information regarding the overall DOE Annealing Program and a copy of the Statement of Work (SOW) and Background Information Package from the original Sandia request for proposal for the Annealing Demonstration Project (ADP). Several other references are included for background information. This was an action item from the August 22, 1995 Steering Committee meeting. This is for informational purposes only, no action is required.

Distribution:

MPR Associates	Bob Steele (Co-chairman)
B&W Nuclear Technologies	Larry Stanek
Consumers Power Co.	Jack Hanson w/o enclosures, by Fax
EPRI	Bob Carter
ESEERCO (Con. Edison)	Bill Monti
GPU Nuclear	Henry Shipman
NRC	Gil Millman
Tennessee Valley Authority	Terry Woods

Copy to:

DOE-HQ	John Warren w/o enclosure, by Fax
MS0741	Jim Nakos w/original/PLI_ANL.02

DOE ANNEALING DEMONSTRATION PROJECTS

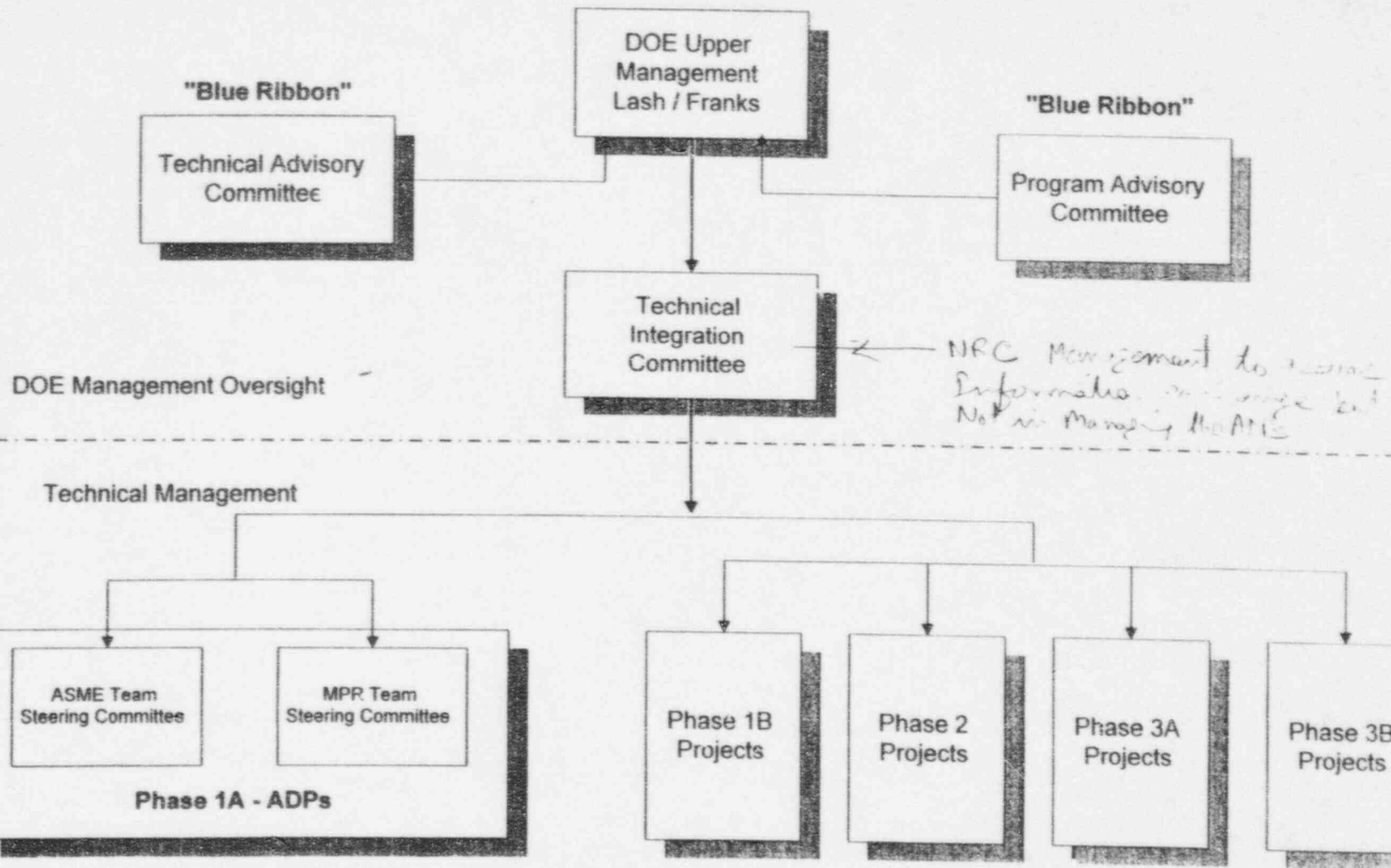
JOHN WARREN, *Proj. Manager*

U.S. DEPARTMENT OF ENERGY
OFFICE OF NUCLEAR ENERGY NE-50

PRESENTATION AT THE
NRC WORKSHOP ON RPV INTEGRITY ISSUES

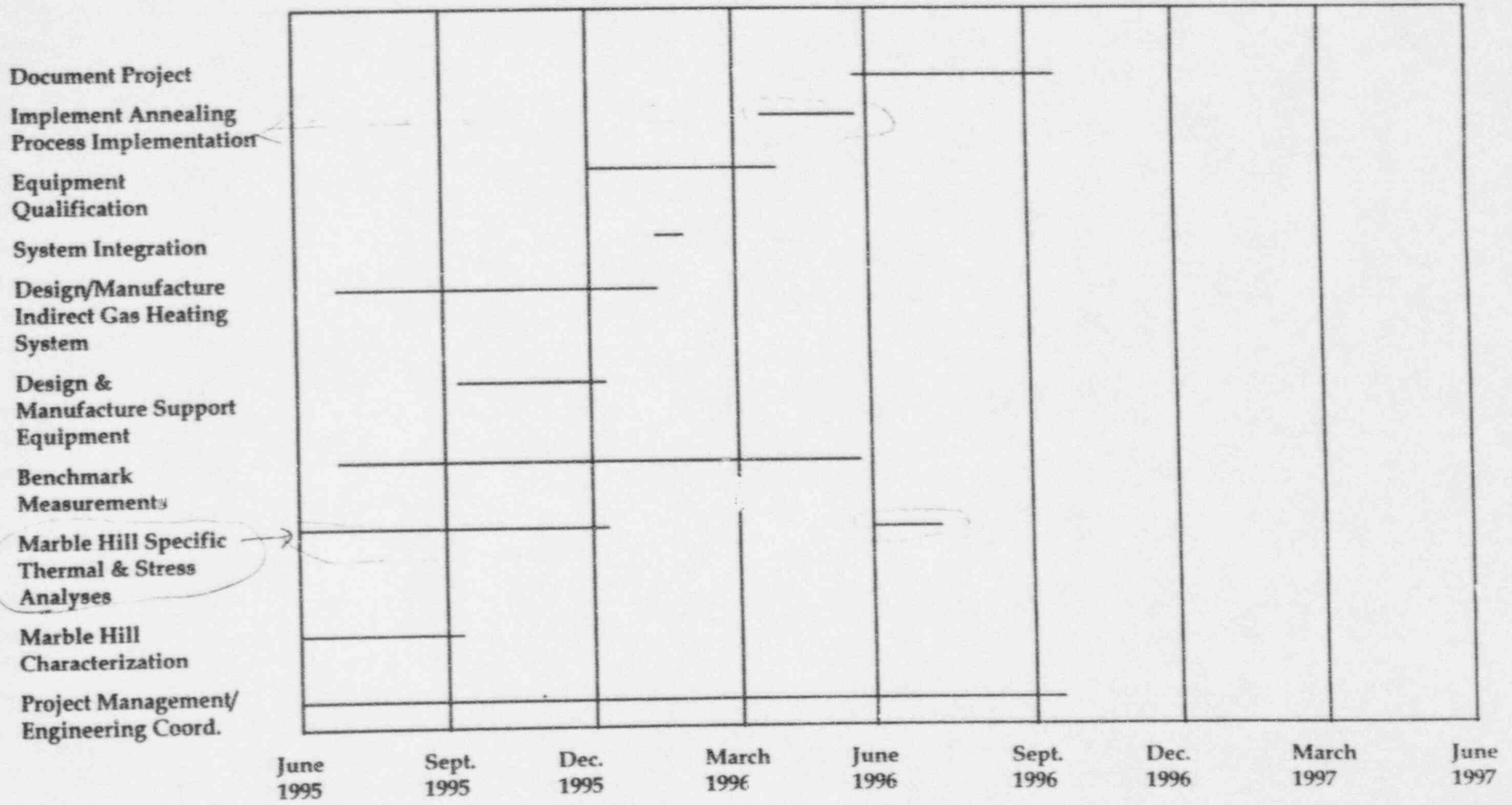
JULY 11, 1995

DOE ANNEALING PROGRAMS MANAGEMENT OVERSIGHT STRUCTURE



ASME-DOE/SNL-INDUSTRY REACTOR PRESSURE VESSEL ANNEALING DEMONSTRATION

ASME SCHEDULE



PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs) OVERVIEW:

- **DOE ANNEALING PROGRAMS/MANAGEMENT APPROACH**
- **DOE ADPs APPROACH/STRATEGY**
- **OVERALL ADPs DESCRIPTION**
- **ADPs OBJECTIVES**
- **ADPs CONTRACT TASKS**
- **ADPs STATUS**
- **SUMMARY**

DOE ANNEALING PROGRAMS

- **PHASE 1A: ANNEALING DEMONSTRATION PROJECTS - EVALUATE FEASIBILITY OF OVERALL SYSTEM AND COMPONENT THERMAL/STRESS RESPONSE [5/95-1/97]**
- **PHASE 1B: ANNEALING OPTIMIZATION PROJECTS- EVALUATE MATERIAL PROPERTIES BEFORE AND AFTER ANNEALING, INCLUDING PROPERTY RECOVERY AND RE-EMBRITTEMENT RATES [9/93-9/97]**
 - **ANNEALING AND RE-EMBRITTEMENT RATE STUDIES**
 - **DEVELOPMENT OF RECOVERY CODES/ADVANCED TESTING TECHNIQUES**
- **PHASE 2: SUPPORT DEVELOPMENT OF REGULATORY (REG) REQUIREMENTS USING EXPERIMENTAL AND ANALYTICAL DATA [8/95-5/97]**
 - **ASSIST IN FINALIZATION OF ANNEALING RULE AND REG GUIDE AND ANY FURTHER CHANGES NEEDED TO REFLECT PHASE 1A & 1B RESULTS**
 - **DEVELOP ALLOWABLE MATERIAL AND COMPONENT LIMITS AND ASSIST WITH INCLUDING THEM IN PROPER CODES & STDS. AND REG DOCUMENTS**

- **PHASE 3A: SUPPORT THE RPV ANNEAL OF THE FIRST U.S. COMMERCIAL OPERATING PLANT, INCLUDING REGULATORY REVIEW AND APPROVAL STEPS NEEDED FOR UNIT RESTART [6/95-8/98]**

- **PRIMARY GOAL: GAIN REGULATORY AND COMMERCIAL ACCEPTANCE**
 - **CONDUCT GENERIC RPV ACTIVITIES APPLICABLE TO MANY PLANTS**
 - **USE BOTH DOMESTIC AND INTERNATIONAL EXPERIENCE AND EXPERTISE**
 - **USE DOE NATIONAL LABORATORIES TO RESOLVE IMPORTANT ANNEALING ISSUES**

- **PHASE 3B: ASSIST WITH THE DEVELOPMENT OF THE POST-ANNEALING OPERABILITY REQUIREMENTS, CRITERIA, AND INSPECTIONS, INCLUDING THE FOLLOWING AREAS [10/95-3/02]**

- **RPV INSPECTIONS AND SURVEILLANCE PROGRAMS**
- **REQUALIFICATION STEPS AND CRITERIA**
- **OPERATIONAL CHANGES**
- **RE-EMBRITTEMENT PREDICTIONS**

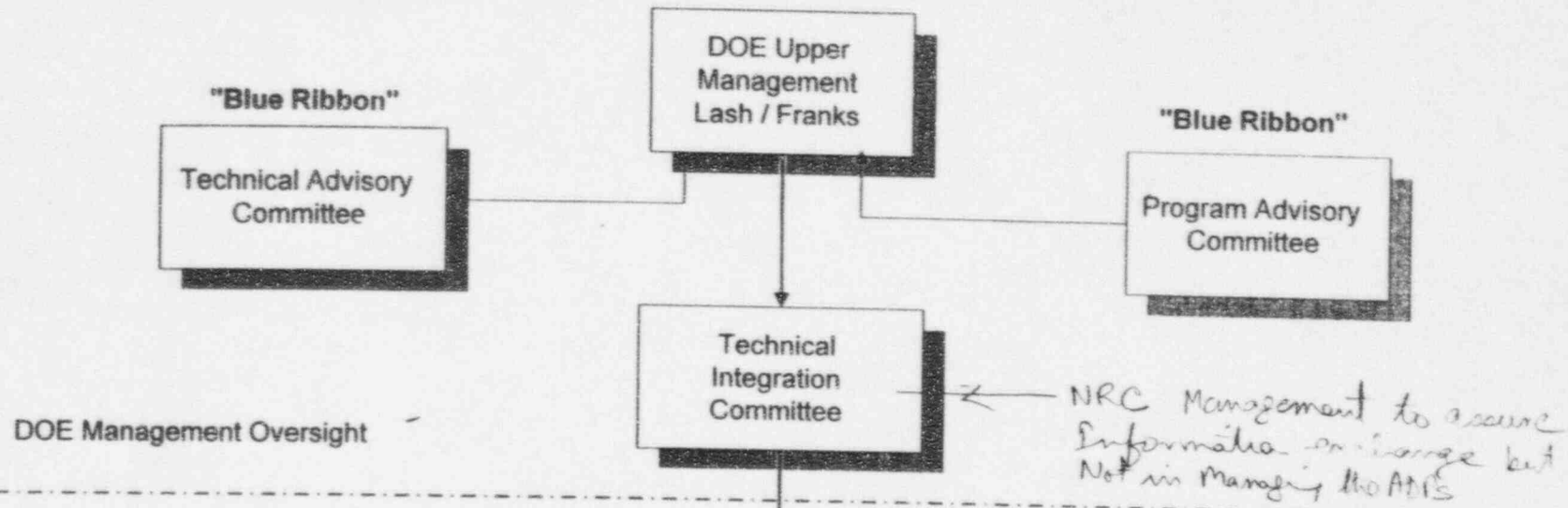
DOE ANNEALING PROGRAMS MANAGEMENT STRUCTURE

- **SEVERAL HIGH-LEVEL "BLUE RIBBON" AND TECHNICAL COMMITTEES ARE BEING ESTABLISHED TO ENSURE A SOUND TECHNICAL APPROACH AND BROAD EXPERIENCE BASE**
 - **"BLUE RIBBON" TECHNICAL ADVISORY COMMITTEE**
 - **"BLUE RIBBON" PROGRAM ADVISORY COMMITTEE**
 - **TECHNICAL INTEGRATION COMMITTEE**
 - **ASME TEAM ADP STEERING COMMITTEE**
 - **MPR TEAM ADP STEERING COMMITTEE**

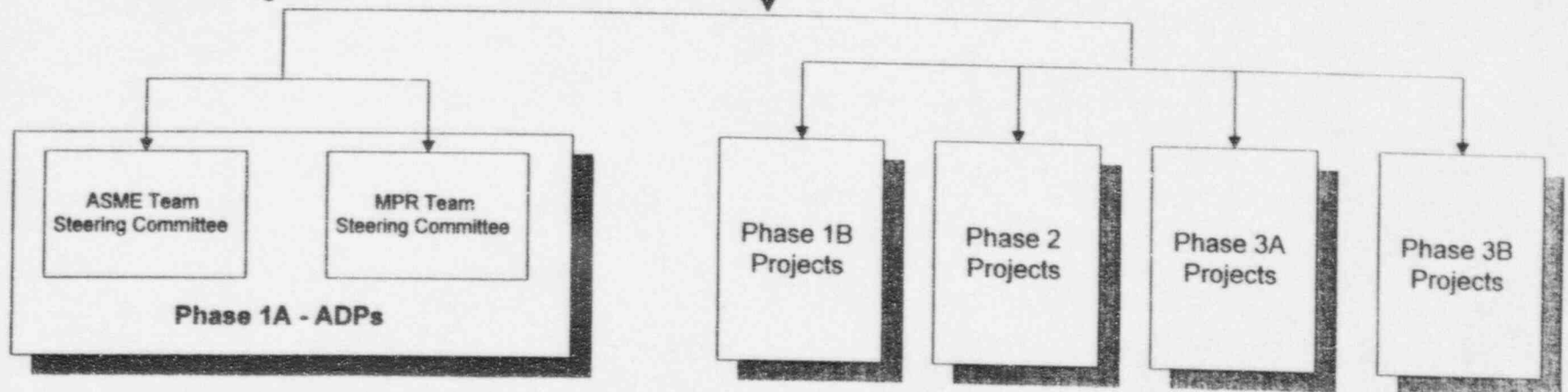
- **THESE COMMITTEES WILL PROVIDE:**
 - **SOUND RECOMMENDATIONS TO SENIOR DOE MANAGEMENT FOR RESOLVING KEY TECHNICAL AND POLICY ISSUES**
 - **FORUM FOR GENERIC PARTICIPATION OF KEY STAKEHOLDERS**
 - **INTERNATIONAL PARTICIPATION AND AWARENESS**
 - **TECHNICAL COORDINATION/INTEGRATION OF ADPs AND LATER ANNEALING PHASES**

- **COMMITTEE CHARTERS AND MEMBERSHIP ROSTERS TO BE ISSUED SOON BY DOE**

DOE ANNEALING PROGRAMS MANAGEMENT OVERSIGHT STRUCTURE



Technical Management



PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs) DOE APPROACH/STRATEGY:

- OBTAIN COMMITMENT/PARTICIPATION FROM KEY STAKEHOLDERS:
 - UTILITIES (DOMESTIC AND INTERNATIONAL)
 - ELECTRIC POWER RESEARCH INSTITUTE (EPRI)
 - REGULATORY (NRC) AND CODE GROUPS (E.G., ASME, ASTM)
 - NUCLEAR STEAM SYSTEM SUPPLY DESIGNERS AND OWNERS GROUPS
 - OTHER INTERESTED DOMESTIC AND INTERNATIONAL GROUPS
- SIGNIFICANT INDUSTRY INTEREST/COST-SHARE COMMITMENT REQUIRED
- SUPPORT TWO HEATER TECHNOLOGIES (ELECTRIC RESISTANCE AND INDIRECT GAS-FIRED)
for greater success to develop commercial viability.

PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs) OVERALL DESCRIPTION:

- DOE'S LWR TECHNOLOGY CENTER AT SANDIA AWARDED TWO COST-SHARE ADPs CONTRACTS
 - ASME CENTER FOR R&TD
 - MPR ASSOCIATES

- PURPOSE OF CONTRACTS IS TO EVALUATE THE FEASIBILITY OF ANNEALING U.S. RPVs USING UNIRRADIATED SITES:
 - ASME'S SITE (MARBLE HILL) - 5/96 ANNEAL
 - WESTINGHOUSE 4-LOOP PLANT
 - CE FABRICATED RPV
 - NOZZLE-SUPPORTED RPV
 - MPR'S SITE (MIDLAND) - 10/96 ANNEAL
 - BABCOCK & WILCOX (B&W) 2-LOOP PLANT
 - B&W FABRICATED RPV
 - SKIRT-SUPPORTED RPV

- MAJOR REACTOR SYSTEMS AND COMPONENTS MOSTLY IN PLACE

- ALL ADPs CONTRACT ACTIVITIES TO BE COMPLETED 1/97

PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs) OBJECTIVES:

- **ASSESS RPV DIMENSIONAL STABILITY DURING/AFTER ANNEAL**
- **VERIFY LACK OF DAMAGE ON KEY COMPONENTS (E.G., RCS PIPING, CONCRETE REACTOR CAVITY WALL, ETC.)**
- **INSTRUMENT AND GATHER DATA TO CONDUCT/VERIFY ANNEAL**
- **DEVELOP AND VERIFY 3-DIMENSIONAL THERMAL/STRESS MODEL**
- **VERIFY PROCESS ASPECTS (HEATERS, SUPPORT SYSTEMS, ETC.)**
- **PROVIDE INPUT FOR RESOLVING SOME REGULATORY CONCERNS (E.G., STRESS/STRAIN LEVELS).**
- **PROVIDE REALISTIC COST DATA REGARDING HEATER, MODELLING, ETC.**
- **ALARA INSIGHTS**

PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs) CONTRACT TASKS:

- **TASK 1: ASSEMBLE TEAM AND MANAGE PROJECT**
- **TASK 2: SELECT AND CHARACTERIZE SITE WHERE THE ADPs WILL TAKE PLACE**
- **TASK 3: PROVIDE A THERMAL/STRESS ANALYSIS MODEL TO PREDICT THE RESPONSE OF THE RPV, RCS PIPING AND CONCRETE REACTOR CAVITY WALL & *Insulation***
- **TASK 4: DEFINE AND INSTALL INSTRUMENTATION AND ASSEMBLE DATA ACQUISITION SYSTEM TO OBTAIN EXPERIMENTAL DATA**
- **TASK 5: PREPARE EQUIPMENT AND PERFORM RPV ANNEAL**
- **TASK 6: REDUCE AND ANALYZE TEST DATA AND REPORT ALL RESULTS**

**PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs)
STATUS:**

- "REQUEST FOR PROPOSALS" ISSUED IN 5/94
- TWO PROPOSALS EVALUATED AND DOE CHOSE TO SUPPORT BOTH
- BOTH CONTRACTS AWARDED IN 5/95
- BOTH BIDDERS TO SECURE COST-SHARE 90 DAYS AFTER CONTRACT AWARD
 - ASME TEAM HAS MET THIS REQUIREMENT AND INITIATED ADP WORK
 - MPR STILL SOLICITING COST SHARE COMMITMENTS

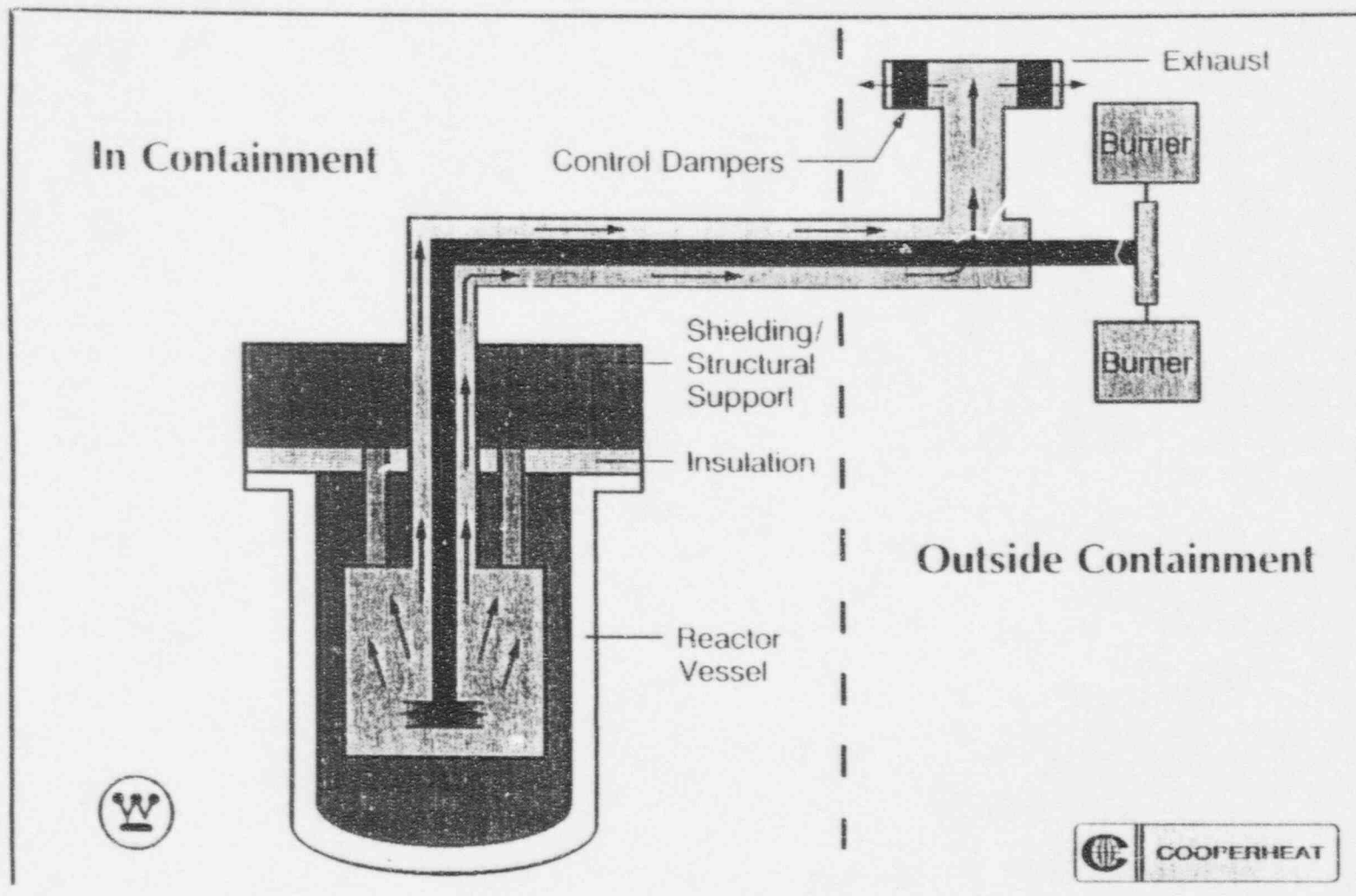
PHASE 1A: ANNEALING DEMONSTRATION PROJECTS (ADPs) SUMMARY:

- **ANNEALING PROVIDES A VALUABLE OPTION TO RESTORE MATERIAL PROPERTIES OF THOSE RPVs MOST SUSCEPTIBLE TO EMBRITTLEMENT CAUSED BY NEUTRON IRRADIATION**
- **DOE HAS A THREE PHASE, MULTI-YEAR COOPERATIVE EFFORT UNDERWAY TO SHOW THE COMMERCIAL VIABILITY OF ANNEALING IN THE U.S. WHICH ENTAILS OBTAINING COMMITMENT FROM KEY STAKEHOLDERS**
 - **THE FIRST PHASES (ADPs, PHASE 1B) INITIATED WITH MANY KEY STAKEHOLDERS PARTICIPATING**
- **ADPs WILL PROVIDE A WEALTH OF MODELING, EXPERIMENTAL, AND PROCESS INFORMATION DIRECTLY APPLICABLE TO THE FIRST AND SUBSEQUENT COMMERCIAL ANNEALS**
- **SIGNIFICANT NRC AND INDUSTRY COOPERATION AND INTEREST AS WELL AS INDUSTRY COST-SHARE COMMITMENTS WILL BE ESSENTIAL TO THE SUCCESS OF THE ADPs AS WELL AS THE OVERALL DOE ANNEALING EFFORT**

MPR Annealing Demonstration Team

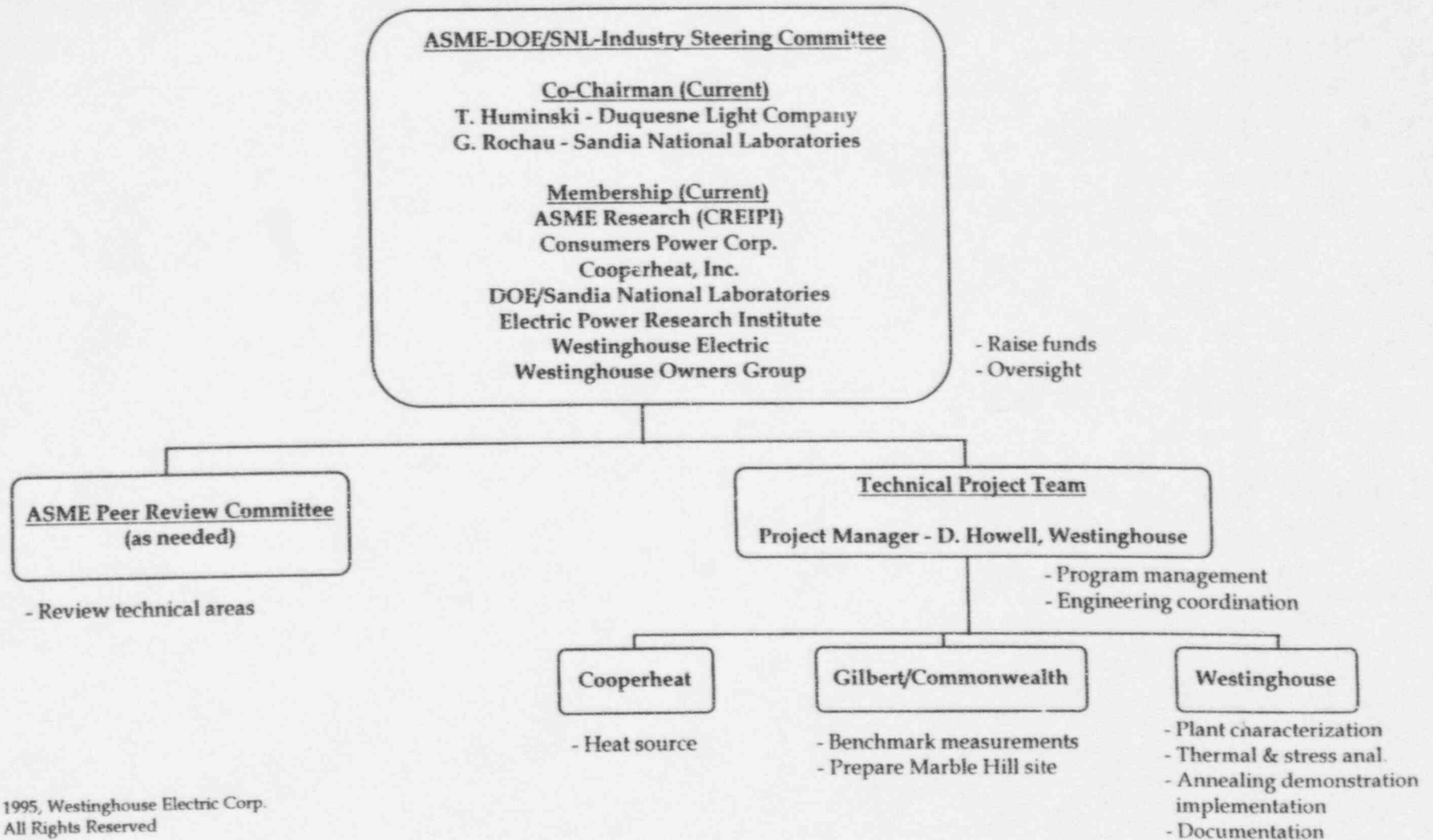
<u>Organization</u>	<u>Experience</u>	<u>Responsibility</u>
MPR Associates	More than 30 years of commercial nuclear power plant engineering; evaluated Russian RV annealing technology for U.S. NRC	Project Management and Stress Analysis
MOHT-OTJIG RM	Performed 13 successful annealings of commercial nuclear power plant reactor vessels	Electric annealing furnace design, fabrication, and operation
B&W Nuclear Technologies	Reactor vessel design and fabrication, routine outage support, component upgrades	Instrumentation and preparation of Midland RV for annealing
Consumers Power	Nuclear plant operations	Midland RV available for annealing demonstration

ASME-DOE/SNL-INDUSTRY REACTOR PRESSURE VESSEL ANNEALING DEMONSTRATION INDIRECT GAS HEATING SYSTEM



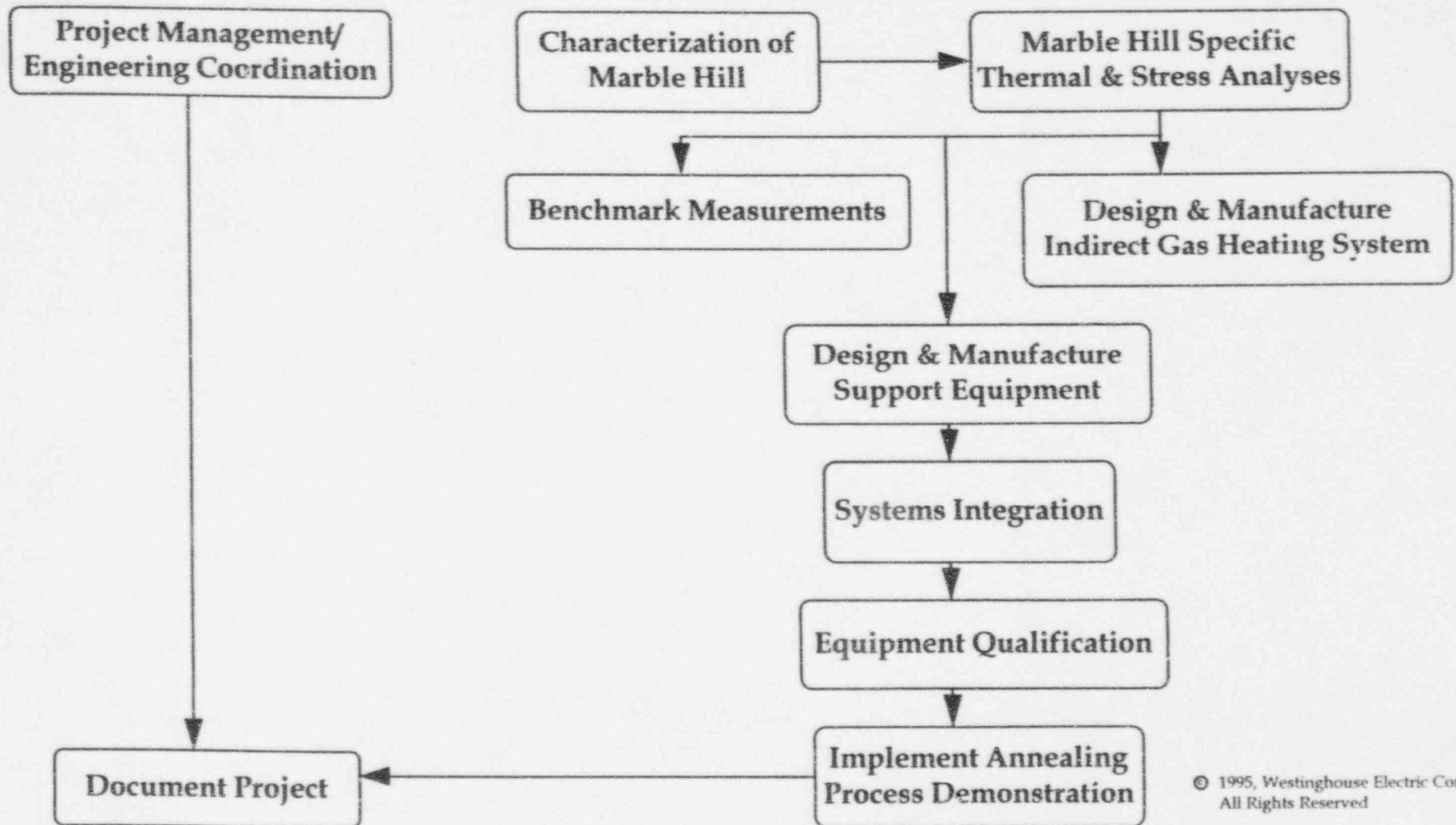
ASME-DOE/SNL-INDUSTRY REACTOR PRESSURE VESSEL ANNEALING DEMONSTRATION

ASME TEAM



ASME-DOE/SNL-INDUSTRY REACTOR PRESSURE VESSEL ANNEALING DEMONSTRATION

TASK STRUCTURE



ASME-DOE/SNL-INDUSTRY REACTOR PRESSURE VESSEL ANNEALING DEMONSTRATION

MARBLE HILL

- **Westinghouse 4-loop PWR design**
- **65% complete**
- **Located in southern Indiana**
- **Condition**
 - **Reactor Pressure Vessel**
 - **Reactor Coolant System (RCS) Piping and Permanent Supports**
 - **Reactor Cavity Walls and Insulation**
 - **Steam Generator, Pressurizer, and Supports**
 - **Reactor Coolant Pump Casings and Supports**
 - **Thimble Tube Penetrations**