

Reissued-
TIME CHANGE

JAN 29 1987

MEMORANDUM FOR: Themis P. Speis, Director
Division of Safety Review and Oversight, NRR

FROM: Brian Sheron, Deputy Director
Division of Safety Review and Oversight, NRR

SUBJECT: FORTHCOMING MEETING WITH INDUSTRY STEERING COMMITTEE
FOR PLANT LIFE EXTENSION

On Thursday, February 5, 1987, a meeting will be held with The Industry Steering Committee for Plant Life Extension to discuss the status of both the industry and NRC programs in this area. The meeting will be held in Room P-118 from ~~1:30~~ p.m. to ~~4:00~~ p.m. The agenda is attached.

~~1:30~~

~~4:00~~
3:30

Original signed by
Brian W. Sheron

Brian Sheron, Deputy Director
Division of Safety Review and Oversight
Office of Nuclear Reactor Regulation

cc: V. Stello
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NRR Division Directors
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L. Shao, RES
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AGENDA
MEETING WITH INDUSTRY STEERING COMMITTEE
FOR PLANT LIFE EXTENSION

February 5, 1987
1:00 PM to 3:30 PM
P118

1:00	Introductory Remarks	B. Sheron
1:05	Industry Program	Industry Steering Committee
2:00	Development of Proposed Policy on License Renewal	B. Sheron
2:30	NRC Aging Research	L. Shao
3:00	Discussion	All
3:30	Adjourn	

NRC - NUPLEX STEERING COMMITTEE

NUCLEAR UTILITY PLANT LIFE EXTENSION

SECOND INFORMATION EXCHANGE MEETING

FEBRUARY 5, 1987

ATTENDEES:

	NAME	AFFILIATION	TEL. No
	Jim Vora	EB / DES / RES	(301) 445-7714
	Donald Cleary	EIB/DSRO/NRR	492-8547
	Jerry Jackson	NRC/NRR/DSRO/EIB	492-8544
	Charles Serpan	NRC/RES/DES	443-7907
	Jim Richardson	NRC/RES/DES	443-7855
	LARRY SHAD	NRC/RES/DES	443-7908
	JOSEPH MARTUCE	TERA CORPORATION	(301) 654-8460
	RICHARD BLACK	TERA	654-8460
	TED MICHAELS	NRR/DPL-B/PPSS	492-8251
0	D. F. SULLIVAN	NRC/DES/RES	37712
1	Albert Millman	NRC/DES/RES	37713
2	Wynon H. Randall	NRC/DES/RES	37711
3	Robert L. Baer	NRC/IE/DEFER.	24780
4	JOHN P. JANKOVICH	NRC/NRR/DHFT	24894
15	R T BOSNAH	NRC/NRR/BRO	301-442-4336
6	John J. CAREY	EPRI	415-855-2105

FEBRUARY 5, 1987

NAME	AFFILIATION	TEL. No
Ed Gray	EPRI	(415) 855-2085
Shelley Owrutsky	GROVE	(301) 258-2727
Dennis Harrison	DOE	301-353-2881
William Clark	HEC/ET	442-7657
ASHOK THADANI	NRC / PWEB	492-4553
LOUIS DELGEORGE	COMMONWEALTH EDISON	312-294-3106
Brian Sharon		
Theris Speis		
Eric Beckjord		
Berry Neils	Western States Power	
Daniel Hostetler	VERCO	
Don Edwards	Yankee Atomic	

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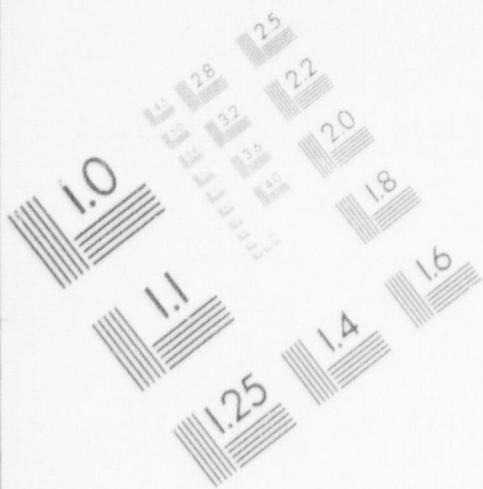
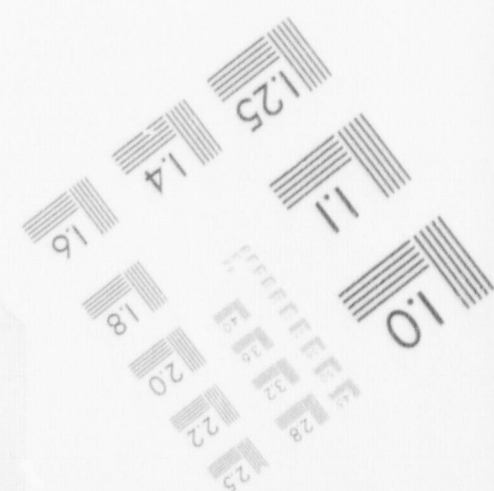
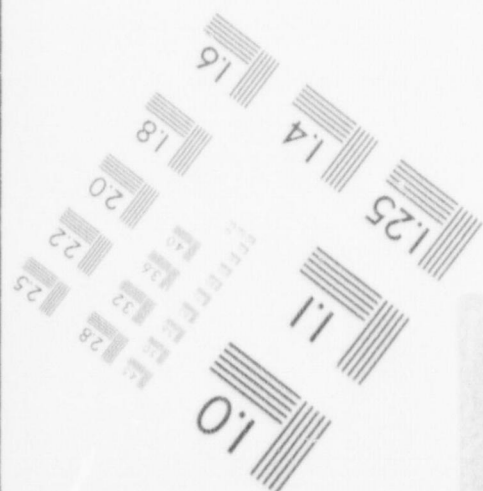
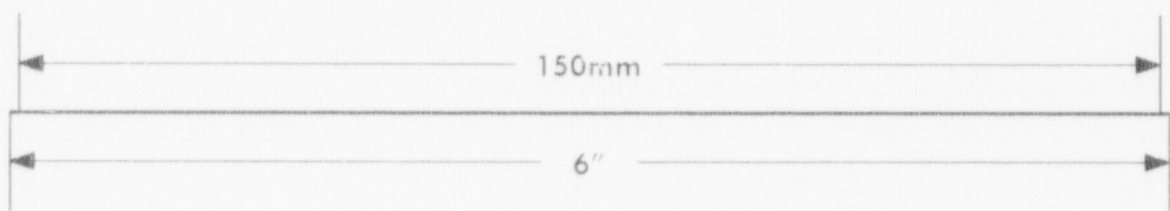
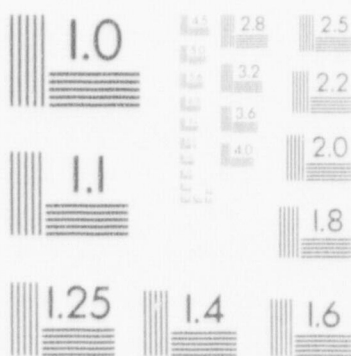
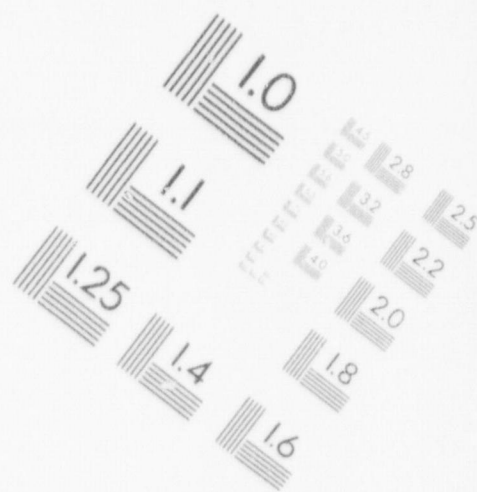
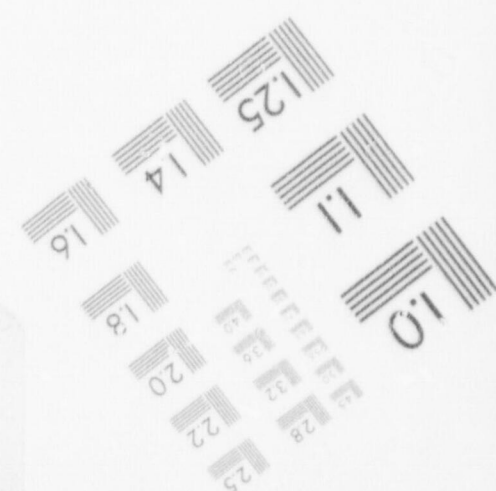


IMAGE EVALUATION
TEST TARGET (MT-3)





NUCLEAR PLANT LIFE EXTENSION

MEETING WITH NRC

FEBRUARY 5, 1987

G. NEILS	CHAIRMAN, NUPLEX (NORTHERN STATES POWER)
D. HOSTETLER	VICE CHAIRMAN, NUPLEX (VIRGINIA POWER)
L. DEL GEORGE	CHAIRMAN, TECHNICAL SUBCOMMITTEE (COMMONWEALTH EDISON)
D. EDWARDS	CHAIRMAN, LICENSING SUBCOMMITTEE (YANKEE ATOMIC)
E. MERRICK	CHAIRMAN, CODES AND STANDARDS SUBCOMMITTEE (TVA)

INTRODUCTION

INDUSTRY LIFE EXTENSION ORGANIZATIONS

● NUMARC - EXECUTIVE OVERSIGHT

● NUPLEX STEERING COMMITTEE - OVERALL INDUSTRY COORDINATION AND INTERFACE WITH NRC

- TECHNICAL SUBCOMMITTEE

- LICENSING SUBCOMMITTEE

- CODES AND STANDARDS SUBCOMMITTEE

● OWNERS GROUPS (B&W, BWR, CE, W)

● EPRI

● DOE

● CONTRACTORS

NUPLEX STEERING COMMITTEE

WHAT'S CHANGED - WHY LIFE EXTENSION ?

● THE MID - 1940'S TO MID 1970'S CONDITIONS

- REGULAR AND PREDICTABLE LOAD GROWTH (7% - 9% PER YEAR)
- SYSTEM GENERATION CAPACITY DOUBLING-TIME: 8 TO 10 YEARS
- UNITS > 20 YEARS AGE REGULARLY < 20% OF EXISTING CAPACITY
- OLDER UNITS REPLACED BY SMALL ADDITION TO NEXT NEW UNIT SIZE
- ECONOMY OF SIZE AND TECHNOLOGY TO OFFSET RISING COSTS
- ECONOMICS DROVE RETIREMENT OF 20-25 YEAR AGE UNITS
- NEW CAPACITY PLANNING CYCLE 6 - 8 YEARS
- RESERVE CAPACITY MARGIN 12% to 15%

● THE MID - 1970'S TO MID - 1980'S

- NO GROWTH, SLOW GROWTH IN LOAD DEMAND
- NO NEW UNITS PLANNED AFTER 1973
- COMPLETED UNITS INITIATED PRIOR TO 1973 CREATED > 40% RESERVE
- NO ECONOMIC OFFSET TO BALANCE DRAMATICALLY INCREASING COSTS
- PLANNING CYCLE GREW TO 12 - 14 YEARS
- FUTURE LOAD/CAPACITY DEMAND UNPREDICTABLE
- NEW UNITS PLANNED UNTIL EXCESS RESERVE CAPACITY CONSUMED
- EACH YEAR, CAPACITY > 20 YEARS AGE IS BECOMING GREATER FRACTION OF
TOTAL GENERATION CAPACITY

● THE AGING NUCLEAR UNITS

- DEPRECIATED BOOK VALUE INCREASING EACH YEAR
- COST OF BACKFITS EXCEEDS ANNUAL DEPRECIATION
- MAINTAINED IN SAFE MATERIAL CONDITION

● LIFE EXTENSION BECOMING INCREASINGLY IMPORTANT

- EXTEND LIFE TO REDUCE RATE IMPACT OF DEPRECIATION EXPENSE
- AVOID INVESTMENT RISK FOR REPLACEMENT COST
- LEVELIZE CAPITAL BURDEN OF CONCURRENT NEW CAPACITY FOR REPLACEMENT

AND GROWTH

- SPREAD DECOMMISSION COST OVER 60 - 70 YEARS LIFE CYCLE

NUPLEX OBJECTIVES

- COORDINATE INDUSTRY, DOE, EPRI PROGRAM EFFORTS
- DEVELOP GENERIC UTILITY ASSISTANCE
- SEEK REGULATORY POLICY, FRAMEWORK, PROCESS
 - RELEVANT TO "LIFE AFTER 40" ONLY
 - IN PLACE ON TIME TO MEET INDUSTRY NEED
 - NOT UNDULY ONERUS
 - REASONABLE APPLICATION PROCESS TIME
 - COMPATIBLE WITH UTILITY PLANNING CYCLE LEAD TIME
- PROVIDE A FOCUS FOR RAPIDLY GROWING INDUSTRY INTEREST AND PARTICIPATION/
PREVENT UNDUE BURDEN ON NRC

NUPLEX 5-YEAR PROGRAM PLAN

CODES AND STANDARDS

Codes and Standards Subcommittee

Charter

- Act as a link between the Steering Committee and various organizations working on codes and standards for life extension
- Monitor the activities of code and standards organizations that may affect life extension
- Assure that issues developed in industry sponsored studies and methods developments are appropriately considered in amended codes and standards
- Communicate the Steering Committee's recommendations

Codes and Standards Subcommittee

Membership and Responsibilities

- Subcommittee membership should be represented by a cross-section of knowledge. These should include metallurgy and materials, mechanical, electrical, civil/structural disciplines.
- Voting membership of the subcommittee will be restricted to utility employees.
- Consultants may attend on an as-needed basis, either as requested by the Subcommittee or as designated by a utility as their representative.
- The Chairman will represent the Steering Committee as a member of the National Board of Codes and Standards.
- Individual Subcommittee members will represent the Steering Committee on designated codes and Standards Organizations, working groups, and task forces.
- The Subcommittee representatives will identify the specific actions before Codes and Standards Committees to the Chairman and propose utility positions regarding these actions for subsequent presentation to the Subcommittee and to the Steering Committee.
- After the Steering Committee has approved a position, the Subcommittee representative will convey these approved positions to the respective organization for incorporation. Other utility representatives on various Codes and Standards organizations will be advised of these positions.
- The Subcommittee Chairman assures, via his voting rights on the National Board, that these positions have been adequately implemented.

Codes and Standards Subcommittee

Deliverables

- Progress/Status Reports
- Position Papers; contents include:
 - the reason for the need for a Code or Standard revision
 - whether the need is primarily to satisfy regulatory issues, as contrasted with a reliability issue, or whether it addresses both
 - whether the need is procedural(i.e, a paper process) or is directly related to material conditions
 - what has been proposed; and by whom
 - the knowledge base from which the methods can be validated
 - what sort of evidence will be required to show conformance
 - the state of the art for providing the required evidence
 - how the proposed code or standard is intended to be used by utilities
 - how it is to be enforced; where and when it will be applicable
 - assessment with respect to the backfit rule philosophy; if possible, a realistic cost-benefit analysis should be performed
 - consequences of not developing a proposed code or standard

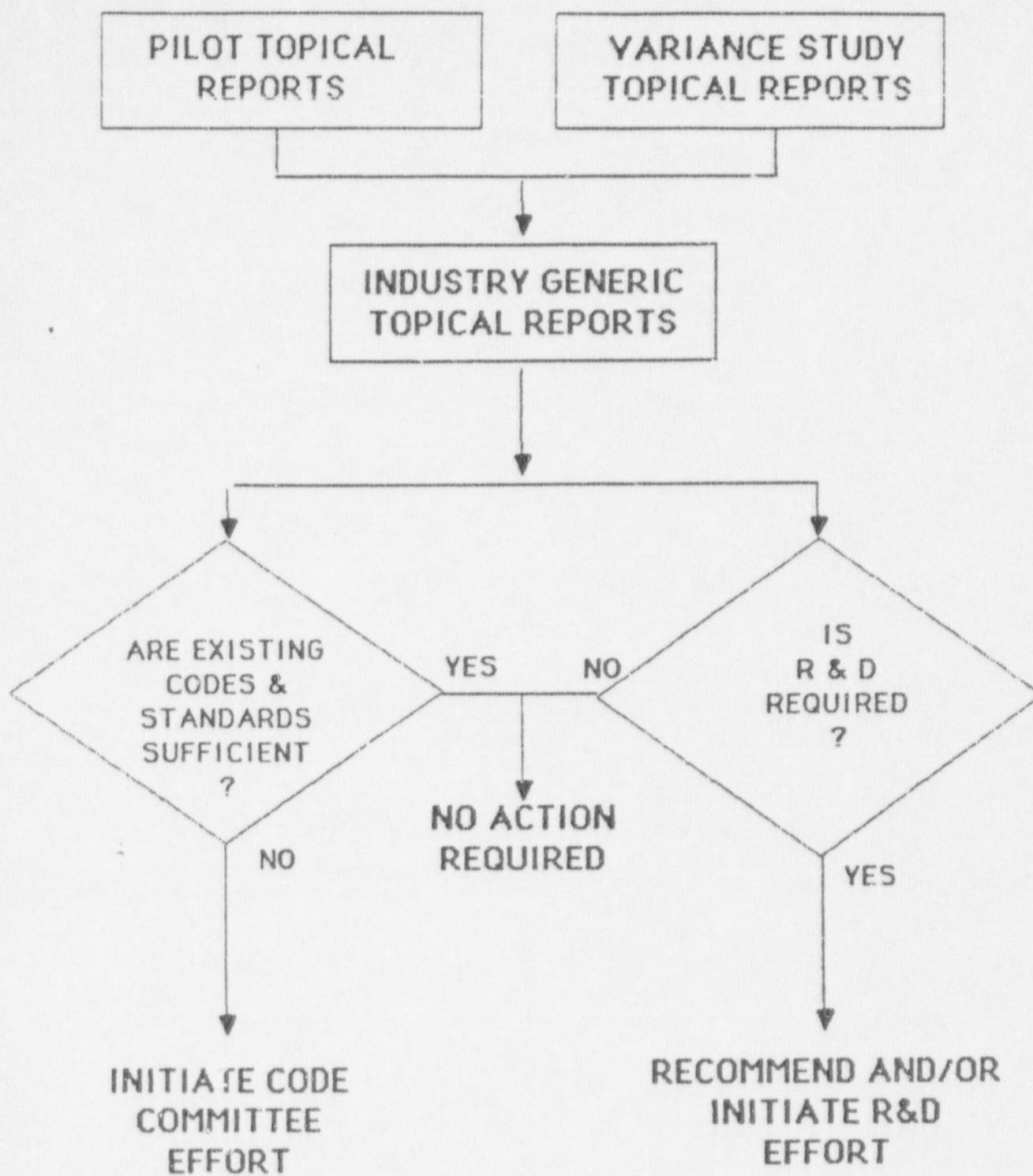


Figure 1

REGULATORY APPROACH

THEME: CONTINUATION OF SAFE/RELIABLE PERFORMANCE

- 40 YEAR LICENSE TERM DERIVED FROM AUTHORIZATION PERIOD
- RENEWAL NEED NOT BE A WATERSHED EVENT
 - NO DIRECT TIE TO SAFETY OR ENVIRONMENTAL IMPACT
 - FOCUSED REVIEW TO CONFIRM ADEQUACY
- SCOPE NECESSARILY LIMITED - ENABLES PROPOSED TIMETABLE
- ALLOW ECONOMIC DECISION ON LIFE EXTENSION

KEY ELEMENTS OF INDUSTRY POSITION

PRICIPLES

RENEWAL PROCESS DEALS WITH A KNOWN ENTITY

FOCUS ON AGE-RELATED DEGRADATION OF SAFETY-RELATED EQUIPMENT

MAINTENANCE OF THE EXISTING LEVELS OF SAFETY

MAINTENANCE OF THE EXISTING LICENSE/DESIGN BASIS

FLEXIBILITY NEEDED

MANIFESTATION

ENVIRONMENTAL ASSESSMENTS ARE ADEQUATE

PROCESS LOOKS LIKE AN AMENDMENT

RENEWAL PROCESS WILL DEAL WITH A KNOWN ENTITY

- PLANT DESIGN
+
OPERATING STAFF
+
CORPORATE MANAGEMENT } → PERFORMANCE
- PERFORMANCE OVER TIME → OPERATING HISTORY
(OPERATING DATA)
- OPERATING DATA ENABLES EVALUATION OF AGE-RELATED DEGRADATION
- OPERATING HISTORY CAN AID JUDGEMENT
 - STAFF CONFIDENCE IN LICENSEE
 - DEGREE OF DOCUMENTATION
 - VARIABILITY IN APPROACH
- RENEWAL APPLICATION IS NOT A HYPOTHETICAL PROPOSAL

FOCUS ON AGE-RELATED DEGRADATION OF SAFETY-RELATED EQUIPMENT

- LOGICAL CRITERION FOR PLEX
 - DOES (ITEM) HAVE SIGNIFICANT IMPACT ON OVERALL PLANT SAFETY
 - DOES MECHANISM BECOME OF CONCERN ONLY IN EXTENDED OPERATION
- SHOWING OF ADEQUACY OF EXISTING MONITORING AND MAINTENANCE PROGRAMS
- USE OF OPERATING DATA
- USE OF PROBABILISTIC TECHNIQUES

EXISTING LEVELS OF SAFETY WILL BE MAINTAINED
AND
EXISTING LICENSING/DESIGN BASIS WILL BE MAINTAINED

(I.E. THE STANDARD FOR JUDGEMENT SHOULD NOT CHANGE)

- EACH PLANT SATISFIES THE REGULATIONS
 - UNIQUE DESIGN
 - UNIQUE TIMING OF SUBSEQUENT REQUIREMENTS
 - "NEW" SAFETY INFORMATION HAS BEEN INCORPORATED
 - FLEXIBILITY NECESSARY TO ACCOMMODATE DIFFERENCES
- BACKFIT RULE IS PART OF THE BODY OF REGULATIONS
 - DOES NOT PREVENT BACKFITS
 - GUIDES DECISIONS ON APPLICABILITY
- PERFORMANCE OF MATURE PLANTS HAS NOT BEEN DECREASED WITH AGE

ENVIRONMENTAL ASSESSMENTS (EA'S) ARE ADEQUATE

- RENEWAL APPLICATION WOULD PROMPT AN E.A.
 - STAFF EXPERIENCED IN PREPARATION
 - SAME PROCESS FOR ALL LICENSE AMENDMENTS
- E.A. COULD DISCLOSE ANY SIGNIFICANT IMPACTS
 - RELATED TO PREVIOUS ENVIRONMENTAL STUDIES
 - DETERMINE IF IMPACTS ARE BEYOND MITIGATION
 - EFFECTS LIKELY TO BE SIGNIFICANT
 - TYPICALLY CONSISTANT WITH PROJECTIONS
- OVERALL PROCESS SIMILAR TO AMENDMENT
 - RENEWAL TREATED UNDER AMENDMENT PROCEDURES
(50.90 - 50.92)

TASKS FOR LICENSING SUB-COMMITTEE IN 1987

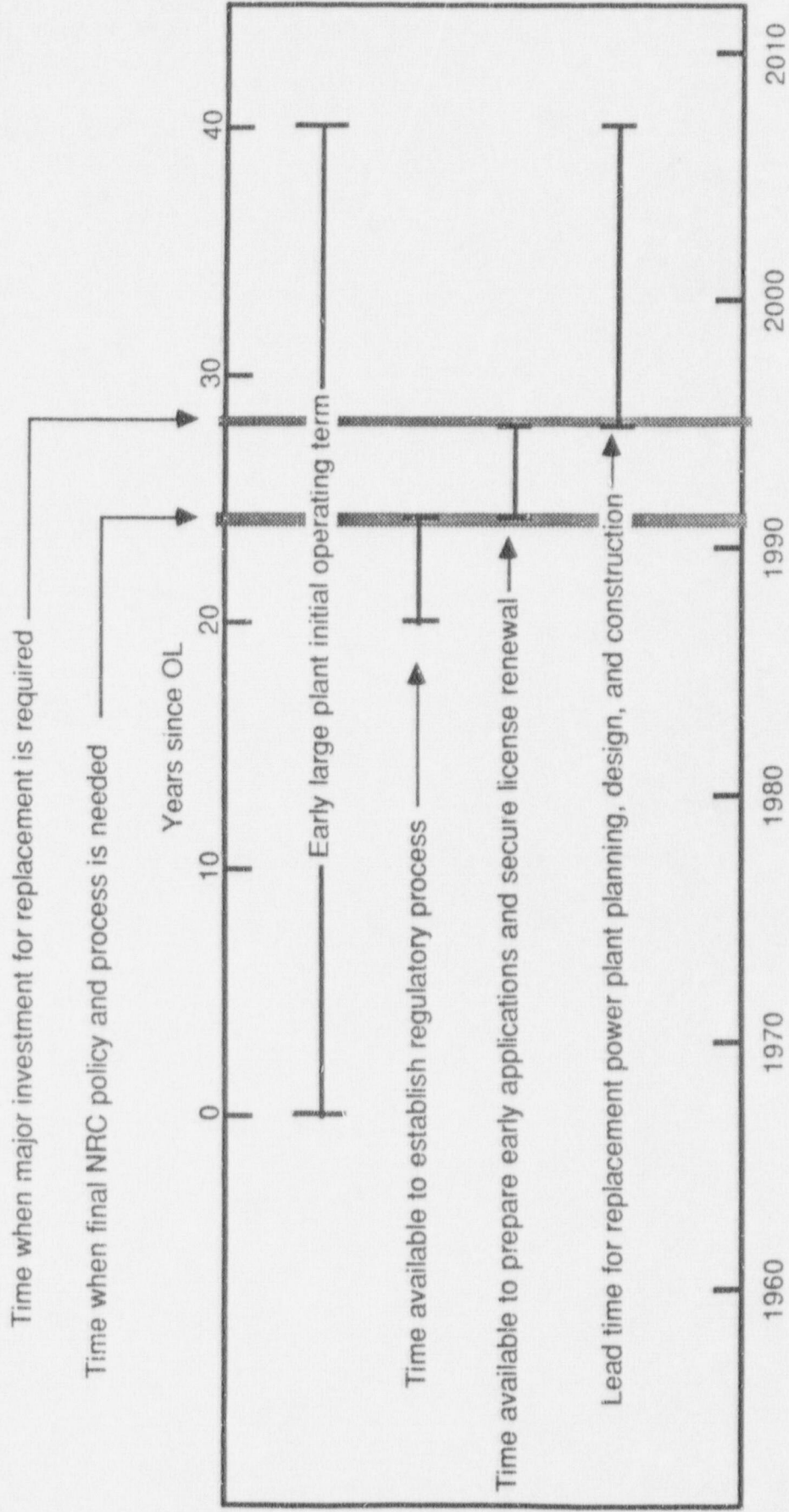
- RESPONSE TO COMMENTS BY OTHERS
- POLICY WHITE PAPER
 - DISTILLATION OF DOCUMENT TO DATE
 - AVAILABLE FOR USE BY OTHERS
- MONITORING AND SUPPORT OF CP/OL APPLICATIONS
- LISTING OF POTENTIAL REGULATION CHANGES
 - FEW IN NUMBER - BASED ON PREMISE OF APPLICABILITY OF AMENDMENT PROCESS
 - DRAFT OF RULEMAKING PETITIONS 10 CFR 51.20(B)(2)

SUMMARY

NUPLEX PROGRAM

- IN ORDER TO PLAN FOR FUTURE POWER NEEDS, SOME OWNERS WILL NEED LICENSE RENEWAL IN HAND BY 1995.
- FIRM NRC POLICY AND PROCESS FOR LICENSE RENEWAL ARE NEEDED IN 1991 TO SUPPORT PREPARATION, REVIEW, AND APPROVAL OF THE FIRST APPLICATIONS.
- NRC'S RECENT EFFORTS TO ACCELERATE DEVELOPMENT OF LICENSE RENEWAL POLICY ARE APPRECIATED BY THE INDUSTRY.
- NUPLEX STEERING COMMITTEE EFFORTS FOCUS ON **GENERIC** ACTIVITIES SO OWNERS CAN USE COMMON TECHNIQUES FOR LIFE EXTENSION EVALUATIONS.
- A GENERIC APPROACH IS ALSO DESIREABLE FOR REGULATORY REVIEW BY NRC.
- THE DEVELOPMENT OF AN EFFICIENT AND STABLE LICENSE RENEWAL PROCESS WILL BE OF BENEFIT TO BOTH THE INDUSTRY AND THE NRC
- THEREFORE, WE BELIEVE THAT CLOSE INTERACTION BETWEEN NUPLEX AND NRC IS ESSENTIAL.
- THE NUPLEX APPROACH DRAWS HEAVILY ON THE RECOMMENDATIONS OF THE AIF/NESP STUDY ON THE REGULATORY ASPECTS OF LIFE EXTENSION.

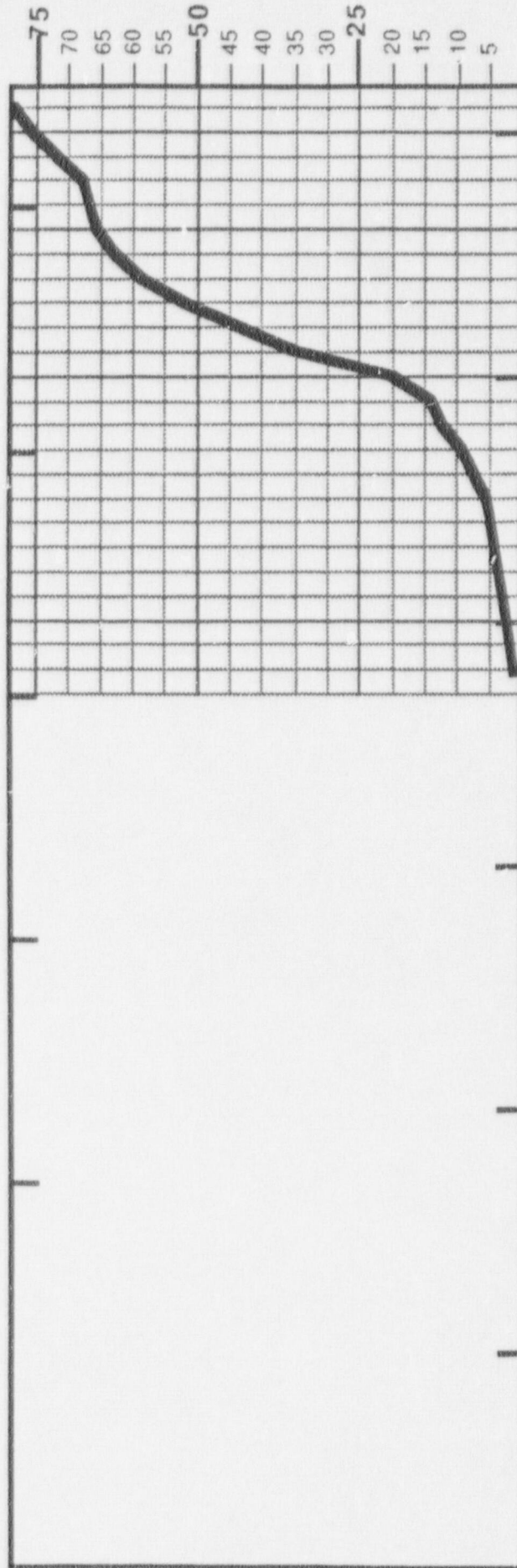
LIFE EXTENSION AND LICENSE RENEWAL TIMING



Calendar Year

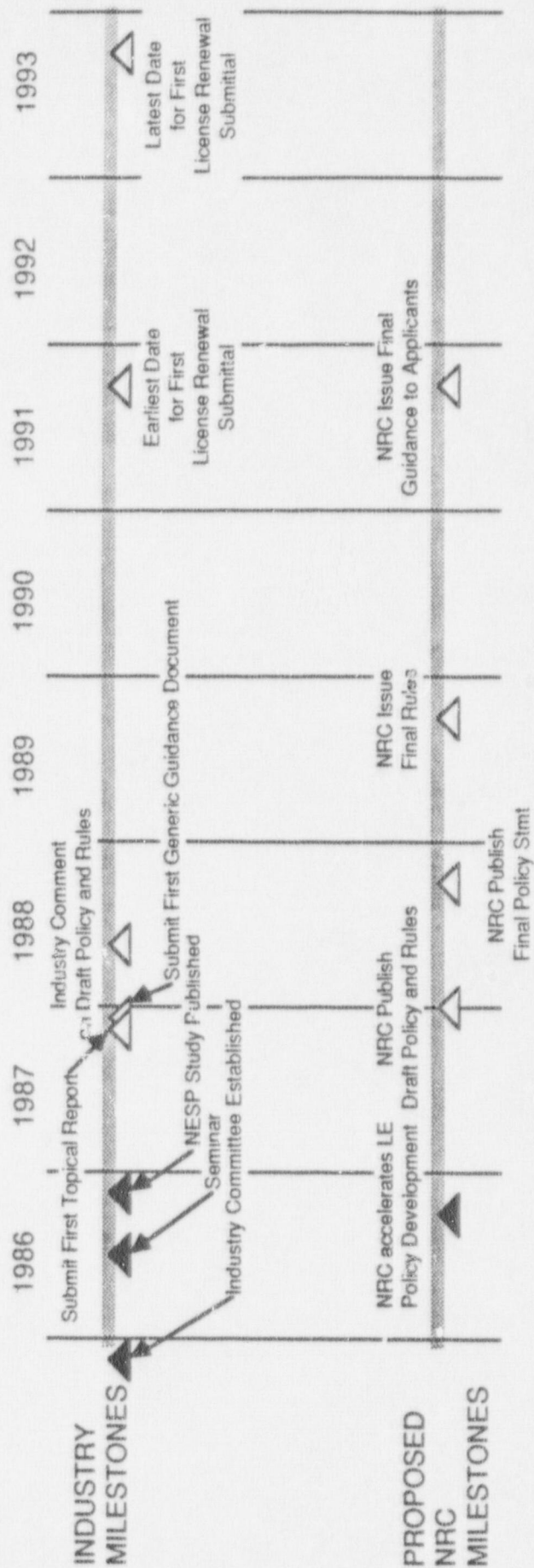
SLIDE 2

OVERLAY
NUMBER OF REACTORS
WITHIN 12 YEARS OF
OL EXPIRATION
(ASSUMING CP-OL EXTENSION)



SLIDE 2-1

MILESTONES



Completed Milestone
 Future Milestone

OVERVIEW OF PLANNED STEERING COMMITTEE ACTIVITIES

1. TECHNICAL SUBCOMMITTEE ACTIVITIES
 - EXISTING PILOT STUDIES
 - VARIANCE STUDIES
 - INDUSTRY TOPICAL REPORTS AND NRC ITERATION
 - IDENTIFY AND MONITOR RESOLUTION OF TECHNOLOGY ISSUES
 - PLANNING AND INFORMATION SYSTEMS
 - DECISIONMAKING TOOLS
 - GENERIC METHODOLOGIES
2. CODES AND STANDARDS SUBCOMMITTEE ACTIVITIES
 - LIAISON WITH CODES AND STANDARDS COMMITTEES
 - LIAISON WITH STEERING COMMITTEE SUBCOMMITTEES
3. LICENSING SUBCOMMITTEE ACTIVITIES
 - TIMING ISSUES AND SCHEDULES
 - GUIDANCE DOCUMENTS
 - REGULATORY POLICY POSITIONS

EXAMPLE #1 OF INTERACTIVE TASKS

DEVELOP INDUSTRY TOPICAL REPORTS

PURPOSES:

- PROVIDE LIFE ASSESSMENT METHODOLOGY AND DATA TO ALL UTILITIES INTERESTED IN PLANT LIFE EXTENSION
- PROVIDE LIFE ASSESSMENT METHODOLOGY FOR SAFETY RELATED ITEMS WHICH, AFTER ITERATION WITH NRC, WILL PROVIDE FOR GENERIC TREATMENT OF SUCH ITEMS

TASK WORK ELEMENTS/MILESTONES:

- A. PROTOTYPE ITRs WHICH WILL HELP IN DEFINING THE DEVELOPMENT AND REVIEW PROCESS FOR ASSESSING SPECIFIC TECHNICAL ISSUES. INITIAL ITRs WILL ADDRESS:
 - LARGE DRY CONTAINMENT
 - PWR REACTOR VESSEL
 - BWR REACTOR VESSEL
- B. INTERACTION WITH NRC ON REVIEW OF ITRs
- C. DEVELOPMENT OF REMAINING ITRs

EXAMPLE #2 OF INTERACTIVE TASKS

GENERIC GUIDES FOR LIFE EXTENSION TO EVALUATE SAFETY AND ENVIRONMENTAL IMPACT

PURPOSE

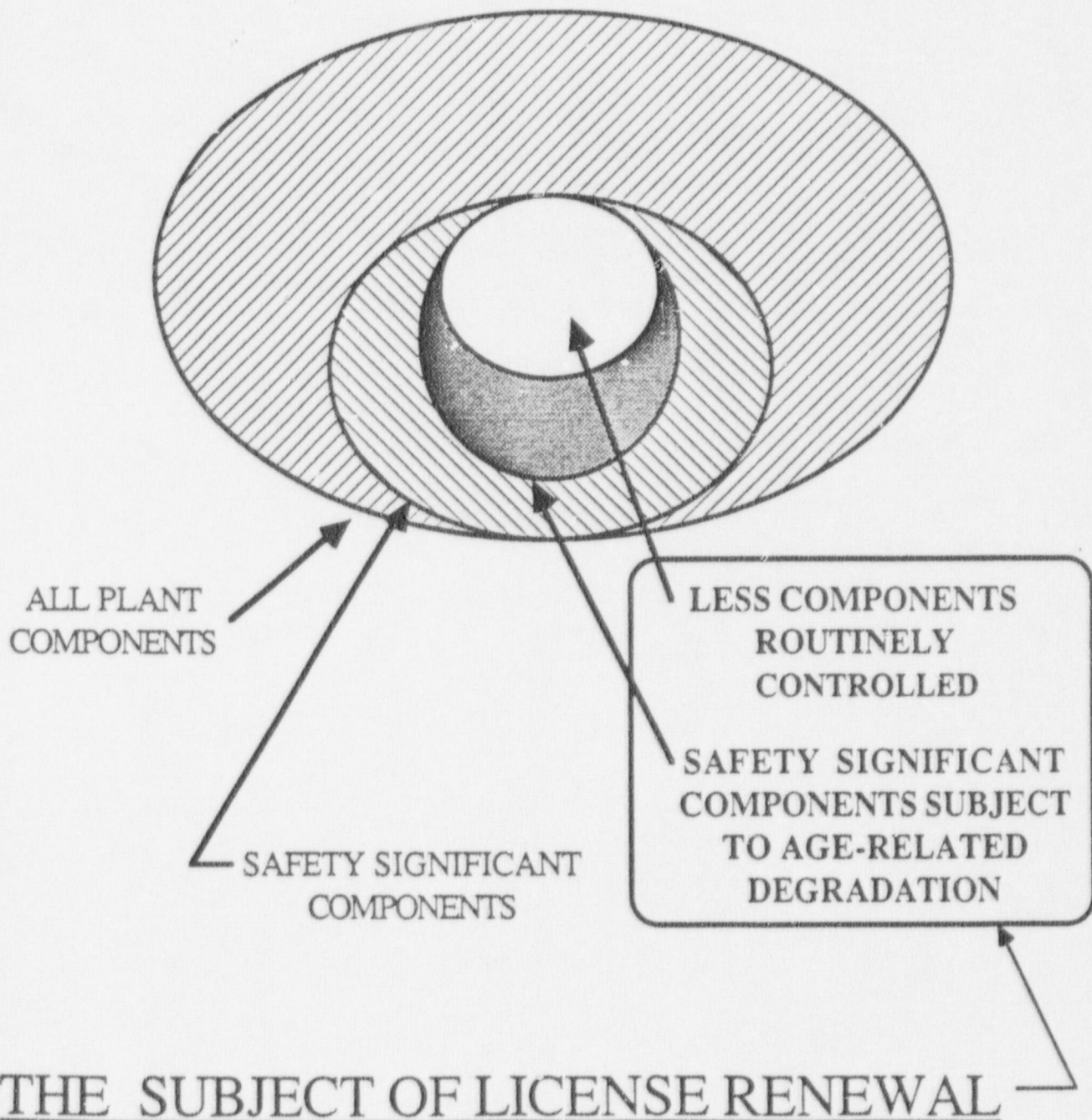
- PROVIDE GUIDES/METHODOLOGY FOR UTILITIES TO USE FOR THEIR OWN EVALUATIONS AND TO PRESENT THEIR JUSTIFICATION FOR PLANT LIFE EXTENSION TO NRC.

TASK WORK ELEMENTS/MILESTONES

- A. DEVELOP A PROTOTYPE GENERIC GUIDE TO TEST THE PROCESS
 - SCREENING CRITERIA (1987 ACTIVITY)
- B. INTERACTION WITH NRC ON REVIEW OF GENERIC GUIDE
- C. DEVELOP OTHER GENERIC GUIDES WHICH MAY INCLUDE SUCH ISSUES AS:
 - CONTENT OF A "LICENSE RENEWAL APPLICATION"
 - OPERATIONAL PERFORMANCE REPORT
 - ENVIRONMENTAL REPORT

AS APPROPRIATE

COMPONENTS WHICH ARE THE SUBJECT OF LICENSE RENEWAL



MEETING WITH INDUSTRY STEERING COMMITTEE
FOR PLANT LIFE EXTENSION

AGING - LIFE EXTENSION RESEARCH

MATERIALS, ENGINEERING BRANCHES

DES/RES

FEBRUARY 5, 1987

NRC HEADQUARTERS, BETHESDA, MD

C. Z. SERPAN, JR.

REACTOR VESSELS

AGING

- O MAJOR ELEMENTS UNDER STUDY
- O MANY BASES ALREADY GOOD FOR 40 YEARS
- O TECHNICAL AREAS
 - PRESSURIZED THERMAL SHOCK
 - FRACTURE TOUGHNESS AND EMBRITTLEMENT
 - FRACTURE MECHANICS PREDICTION
AND EVALUATION METHODS
 - SURVEILLANCE DOSIMETRY
 - CRACK GROWTH

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL ISSUES
- O EMBRITTLEMENT AND DOSIMETRY > 40 YEARS
- O VESSEL ANNEALING
- O VESSEL REPLACEMENT
- O CORE INTERNALS EMBRITTLEMENT
- O CRD NOZZLE CRACKING

PIPING

AGING

- O MAJOR ELEMENTS UNDER STUDY
- O MANY BASES ALREADY GOOD FOR 40 YEARS
- O TECHNICAL AREAS
 - PIPE FRACTURE ANALYSIS AND TEST
 - CRACKING OF BWR STAINLESS
STEEL PIPES
 - WATER CHEMISTRY
 - PIPE WALL THINNING

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL ISSUES
- O AGING OF CAST STAINLESS STEEL
- O FATIGUE DESIGN LIFE REMAINING

STEAM GENERATORS

AGING

- O SURRY PROGRAM ONLY PARTIAL ANSWER
- O LOW PROBABILITY OF ALL GENERATORS REACHING 40 YEARS
- O WATER CHEMISTRY CONTROL
- O TECHNICAL AREAS
 - INTEGRITY OF DEGRADED TUBES
 - NDE ECT RELIABILITY
 - IN-SERVICE INSPECTION PLAN

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL AREAS
- O WATER CHEMISTRY
- O IMPROVED NDE RELIABILITY

NONDESTRUCTIVE EXAMINATION

AGING

- O MAJOR ELEMENTS UNDER STUDY
- O IMPROVEMENTS IN DETECTION AND SIZING RELIABILITY
IN UT AND A/E FOR 40 YEAR LIFE
- O UT OF OVERLAYS
- O TECHNICAL AREAS
ACCURATE DETECTION AND SIZING OF FLAWS IN:
 - CARBON STEEL VESSELS, NOZZLES AND PIPING
 - WROUGHT AND CAST STAINLESS STEEL COMPONENTS
 - BIMETALLIC JOINTS

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL AREAS
- O NDE METHOD FOR MATERIAL PROPERTIES
- O UT OF STAINLESS STEEL PIPE AND COMPONENTS
AND NOZZLES
- O UT OF STAINLESS CLADDING

CONCRETE STRUCTURES

AGING

- O INTRODUCTORY PROGRAM FORMULATED
- O REWORK AND INSPECTION REQUIREMENTS
FOR AGED CONCRETE STRUCTURES
- O TECHNICAL AREAS
 - REBAR REINFORCEMENT CORROSION
 - CHEMICAL REACTIONS WITHIN CONCRETE
 - MICROCRACKING DUE TO THERMAL AND CYCLIC LOADING
 - RADIATION EFFECTS ON CONCRETE DEGRADATION
 - DEGRADATION OF STRUCTURAL STIFFNESS
 - EFFECTS OF MAINTENANCE ON THE ABOVE

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL ISSUES
- O DEGREE OF STRENGTH DEGRADATION BEYOND 40 YEARS
- O SHIFT OF SEISMIC RESPONSE FREQUENCY
- O CONTAINMENT RETENTION CAPABILITIES
- O DECREASE IN STRUCTURAL MARGINS
- O MAINTENANCE AND REPAIR REQUIREMENTS

UTILIZATION OF RESEARCH RESULTS
(MAJOR ELEMENTS)

0 SUPPORT NRR IN RESOLUTION OF GENERIC ISSUES
0 SUPPORT NRR IN THE DEVELOPMENT OF POLICY, GUIDES, AND REVIEW
PROCEDURES FOR LIFE EXTENSION/LICENSE RENEWAL
0 SUPPORT IE - PLANT PERFORMANCE INDICATOR PROGRAM
0 SUPPORT NRR - MAINTENANCE AND SURVEILLANCE PROGRAM
0 SUPPORT IE/REGIONS - INSPECTION, SAFETY SYSTEM FUNCTIONAL PROGRAM
0 SUPPORT THE DEVELOPMENT OF ASME AND IEEE CODES AND STANDARDS
0 SUPPORT RES - OPERATIONAL SAFETY RELIABILITY RESEARCH PROGRAM
0 - PROBABILISTIC EVALUATION OF TECHNICAL SPECIFICATIONS
PROGRAM

0
0
0

U.S. NRC Program for Nuclear Plant Aging Research

(COMPONENTS AND SYSTEMS)

SECOND INFORMATION EXCHANGE MEETING

WITH

NUPLEX STEERING COMMITTEE

NUCLEAR UTILITY PLANT LIFE EXTENSION

FEBRUARY 5, 1987

J. P. VORA

EB/DES/RES

← Aging →

"Life
Extension"

40

Major Safety Issues

- Will aging of safety systems, structures and components result in (I) common mode failures? (II) catastrophic failures?
 - Reducing defense-in-depth
 - Leading to an accident
 - Rendering the redundant, but aged, safety systems/equipment needed in accident mitigation inoperable
- How to assure operational readiness of aged safety systems and components?
 - During forty years design life
 - During extended life

BROAD TECHNICAL SAFETY ISSUES FOR AGING AND LIFE EXTENSION PROGRAMS

	AGING ISSUE	LIFE EXTENSION ISSUE
	X	X

1. WHAT STRUCTURES, SYSTEMS, AND COMPONENTS ARE SUSCEPTIBLE TO AGING EFFECTS THAT COULD ADVERSELY AFFECT PUBLIC HEALTH AND SAFETY? WHICH OF THESE STRUCTURES, SYSTEMS, AND COMPONENTS ARE RENEWABLE (BY MAINTENANCE, REFURBISHMENT, REPLACEMENT, ETC.)
2. WHAT ARE THE DEGRADATION PROCESSES OF MATERIALS, COMPONENTS, AND STRUCTURES WHICH COULD, IF UNCHECKED (IMPROPERLY MAINTAINED AND/OR NOT REPLACED), AFFECT SAFETY DURING NORMAL DESIGN LIFE AND EXTENDED LIFE?
3. HOW CAN OPERATIONAL READINESS OF AGED STRUCTURES, SYSTEMS, AND COMPONENTS BE ASSURED DURING 40-YEAR DESIGN LIFE AND EXTENDED LIFE?

	X	X
	X	X

BROAD TECHNICAL SAFETY ISSUES FOR AGING AND LIFE EXTENSION PROGRAMS (CONT.)

	AGING ISSUE	LIFE EXTENSION ISSUE
4. ARE CURRENTLY AVAILABLE EXAMINATIONS AND TEST METHODS ADEQUATE TO IDENTIFY ALL RELEVANT AGING MECHANISMS BEFORE SAFETY IS AFFECTED? IF NOT, WHAT EFFORTS ARE UNDERWAY TO IMPROVE THEM?	X	X
5. WHAT CRITERIA ARE REQUIRED TO EVALUATE RESIDUAL LIFE OF COMPONENTS AND STRUCTURES? WHAT SUPPORTING EVIDENCE (DATA, ANALYSES, INSPECTIONS, ETC.) WILL BE NEEDED? WHAT KIND OF INDEPENDENT NRC EFFORT IS REQUIRED IN CONSIDERATION OF PLANT-LIFE EXTENSION?		X
6. HOW SHOULD STRUCTURES, SYSTEMS, AND COMPONENTS BE SELECTED FOR COMPREHENSIVE AGING ASSESSMENTS AND RESIDUAL LIFE EVALUATIONS? WHICH STRUCTURES, SYSTEMS, AND COMPONENTS SHOULD BE SELECTED?	X	X

BROAD TECHNICAL SAFETY ISSUES FOR AGING AND LIFE EXTENSION PROGRAMS (CONT.)

	AGING ISSUE	LIFE EXTENSION ISSUE
7. HOW EFFECTIVE ARE CURRENT PROGRAMS FOR MITIGATING AGING (E.G., MAINTENANCE, REPLACEMENT, AND REPAIR)?	X	X
8. WHAT KINDS OF RELIABILITY ASSURANCE AND MAINTENANCE PROGRAMS WILL BE NEEDED DURING EXTENDED LIFE?		X
9. WHAT ADDITIONAL CHANGES WILL BE NEEDED IN CODES AND STANDARDS TO SUPPORT RELICENSING, BEYOND THOSE CHANGES ALREADY IN PROGRESS? WHAT SCHEDULE SHOULD BE FOLLOWED?		X
10. WHAT KINDS OF RECORDS AND OTHER DOCUMENTATION ARE NEEDED TO SUPPORT LIFE EXTENSION?		X
11. WILL LICENSE RENEWALS BE BASED ON CURRENT LICENSING CRITERIA, THE LICENSING CRITERIA IN PLACE WHEN THE PLANT WAS BUILT, OR ON SOME OTHER SET OF CRITERIA?		X
12. WHAT ROLE SHOULD PLANT PERFORMANCE HAVE IN REGULATORY DECISIONS?	X	X

Program Goals

- To identify and characterize aging and service wear effects which, if unchecked could cause degradation of structures, components, and systems and thereby impair plant safety
- To identify methods of inspection, surveillance and monitoring, or of evaluating residual life of structures, components, and systems, which will assure timely detection of significant aging effects prior to loss of safety function
- To evaluate the effectiveness of storage, maintenance, repair, and replacement practices in mitigating the effects of aging and diminishing the rate and extent of degradation caused by aging and service wear

COMPONENTS

ORNL

0	MOTOR OPERATED VALVES	0	CHECK VALVES
0	AUXILIARY FEEDWATER PUMPS	0	POWER OPERATED RELIEF VALVES
0	SOLENOID OPERATED VALVES		(PH. 1)

BNL

0	ELECTRIC MOTORS	0	CHARGERS/INVERTERS
0	CIRCUIT BREAKERS AND RELAYS		
0	MOTOR CONTROL CENTERS		

PNL

0	SNUBBERS	0	DIESEL GENERATORS	0	ROOM COOLERS (PH.1)
---	----------	---	-------------------	---	---------------------

INEL

0	BATTERIES
0	CABLES, CONNECTORS, PRESSURE-TEMP.-LEVEL SENSORS, PENETRATIONS (PRELIMINARY EVALUATION, AS PART OF REACTOR PROTECTION SYSTEMS)

Systems/Support Systems

- **Reactor Protection System [INEL]**
- **Class 1E Electrical Distribution Systems [INEL]**
- **High Pressure ECCS [INEL]**
- **RHR/Low Pressure ECCS [BNL]**
- **Service Water System [PNL]**
- **Component Cooling Water System [BNL]**
- **AUX. Feedwater System [ORNL]**

RECOMMENDATIONS FOR ADDITIONAL COMPONENTS

0	HEAT EXCHANGERS
0	COMPRESSORS
0	TRANSFORMERS (POWER, CURRENT, POTENTIAL)
0	ACCUMULATORS
0	ELECTRICAL PENETRATIONS
0	SURGE ARRESTERS (LOW VOLTAGE)
0	TERMINAL BLOCKS
0	AIR OPERATED VALVES
0	CONTROL ROD DRIVE MECHANISMS
0	ISOLATION CONDENSER (BWR)
0	MAIN STEAM ISOLATION VALVES
0	PURGE AND VENT VALVES
0	SAFETY AND RELIEF VALVES

RECOMMENDATIONS FOR ADDITIONAL SYSTEMS

- 0 RECIRCULATION PUMP TRIP ACTUATION INSTRUMENTATION (BWR)
- 0 REACTOR CORE ISOLATION COOLING SYSTEM
- 0 STANDBY LIQUID CONTROL SYSTEM (BWR)
- 0 CONTAINMENT ISOLATION
- 0 CONTAINMENT COOLING SYSTEMS

SPECIAL TOPICS

- 0 RISK AND SYSTEM ORIENTED IDENTIFICATION OF AGING EFFECTS
- EVALUATION OF SYSTEMS LEVEL AGING EFFECTS FROM OPERATING EXPERIENCE
- RISK EVALUATION OF AGING PHENOMENON
- 0 SHIPPINGPORT AGING EVALUATION
- 0 RESIDUAL LIFE ASSESSMENT OF COMPONENTS
- 0 AN HYBRID APPROACH TO QUANTIFICATION OF AGING

NRC Research Plan for Residual Life Assessment of Components

- Identify and rank major components according to their relevance to plant safety
- Identify degradation sites and life limiting processes for each major component
- Assess the adequacy of inspection and residual life assessment methods
- Prepare plan to determine residual life of major components

MAJOR COMPONENTS FOR PWR

1. REACTOR PRESSURE VESSEL
2. CONTAINMENT AND BASEMAT
3. REACTOR COOLANT PIPING AND SAFE-ENDS
4. STEAM GENERATORS
5. REACTOR COOLANT PUMP BODY
6. PRESSURIZER
7. CONTROL ROD DRIVE MECHANISMS
8. CABLES AND CONNECTORS
9. EMERGENCY DIESEL GENERATORS
10. RPV INTERNALS
11. RPV SUPPORTS AND BIOLOGICAL SHIELD

MAJOR COMPONENTS FOR BWR

1. CONTAINMENT AND BASEMAT
2. REACTOR PRESSURE VESSEL
3. RECIRCULATION PIPING, SAFE ENDS, AND SAFETY SYSTEM PIPING
4. RECIRCULATION PUMP BODY
5. CONTROL ROD DRIVE MECHANISMS
6. CABLES AND CONNECTORS
7. EMERGENCY DIESEL GENERATORS
8. RPV INTERNALS
9. REACTOR PEDESTAL
10. BIOLOGICAL SHIELD

The NSP Monticello Pilot Plant Study

- 1983-84 NSP Management Determines that Life Extension Feasibility Study Should be Made for Nuclear Generating Plants
- 1984 NSP Requests Proposals from Engineering Consultants to Manage Nuclear Plant Life Extension Study
- Fall 1984 Multiple Dynamics in Conjunction with General Electric Company Selected for Life Extension Study
- Spring 1985 EPRI Co-Funding
- Spring 1985 DOE/Sandia Co-Funding
- Summer 1985 First EPRI/DOE/NSP/Virginia Power Workshop in Detroit
- ASME Section XI Life Extension Working Group Activities
- IEEE Life Extension Working Group Activities
- Boiling Water Reactor Owners Group Life Extension Committee Activities
- BWROG, Sandia/DOE, EPRI, NSP PLEX Project Review Committee Activities
- February 1986 NSP Submits Applications for "40-Year" Operating Licenses for Monticello and Prairie Island Nuclear Generating Plants
- Summer 1986 PLEX Management Plan Development for Follow-on Work Following Pilot Study
- Spring 1987

Anticipate Completion of Phase I of Monticello Pilot Life Extension Study. Issue of EPRI/DOE Project Report

- Early 1987

NSP to Initiate Phase I Life Extension Study for Prairie Island Nuclear Generating Plant

MULTIPLE DYNAMICS CORPORATION
PROJECT INSTRUCTION

SUBJECT: MONTICELLO PLANT LIFE EXTENSION PROGRAM	DATE ISSUED June 1986	DOC. NO. NSPE-11-2868
	REVISION: 2	PAGE 3

2. OBJECTIVES

The Life Extension Program consists of two sets of objectives. The first set constitutes the overall generic utility objectives and the second set defines the plant specific objectives.

(a) Generic Utility Objectives

- . Extend plant life a fixed number of years
- . Life extension must be based on cost/benefit
- . Assure that current licensed plant life objectives are met
- . Improve overall plant availability
- . Enhance and improve the cost-effectiveness of current preventive maintenance and inspection programs
- . Develop the data base for licensing justification to amend the plant license
- . Identification of early corrective actions
- . Maximize generic program application
- . Coordination of BWR/PWR and other life extension activities
- . Prepare and issue a comprehensive BWR Life Extension Program work book
- . Prepare and conduct a plant life extension workshop to transfer technology to industry, EPRI, DOE and other interested parties
- . Determine components, parameters, technologies and strategies that require further and future research, development and investigation

MULTIPLE DYNAMICS CORPORATION
PROJECT INSTRUCTION

SUBJECT: MONTICELLO PLANT LIFE EXTENSION PROGRAM	DATE ISSUED June 1986	DOC. NO. NSPE-11-2868
	REVISION: 2	PAGE 4

(b) Plant Specific Objectives

- . Implementation of a workable life extension program
- . Identify life threatening components and parameters
- . Develop methods and procedures for life-long program updating and maintenance
- . Provide recommendations and procedures for enhanced monitoring, surveillance, inspection and sampling/testing as required and appropriate
- . Identify potential improvements for life enhancement through operational changes, modifications
- . Develop a comprehensive life extension strategy through application of the Plant Cycle Management Chart
- . Provide adequate plant personnel training in administration of the program
- . Conduct a cost/benefit analysis for plant unique application at Monticello

The end result of the Plant Life Extension Program for Monticello will demonstrate a feasible, cost-effective method for extending the useful life of the plant and provide an adequate long-term data base to support regulatory relicensing or license modification.

MULTIPLE DYNAMICS CORPORATION
PROJECT INSTRUCTION

SUBJECT: MONTICELLO PLANT LIFE EXTENSION PROGRAM	DATE ISSUED June 1986	DOC. NO. NSPE-11-2868
	REVISION: 2	PAGE 5

3. ORGANIZATION

The joint project team consists of personnel from NSP and MDC. Overall project management is provided by NSP (D. Musolf). The project directors are Mr. L. Nolan for NSP and Mr. F. Gregor for MDC. The project team is supported by individuals and organizations as shown on Figure 1.

MDC is under contract to NSP and will be responsible for conducting the work scope as defined in Section 4, including technical direction, review and approval of the GE work scope activities which are Monticello plant specific. NSP will maintain commercial and Quality Assurance responsibilities for the GE contract.

Mr. D. Musolf (NSP) will maintain communications with EPRI, Sandia (DOE), the BWR Owners Group, and the PWR Life Extension Program (VEPCO). Mr. Musolf will also coordinate purchase orders and contracts with NSP, monitor the NSP budget, and maintain NSP administrative functions.

Mr. F. Gregor will direct MDC, GE and any other special consultant project activities including project planning, coordination of technical guidance, review and approval. Mr. Gregor will also assist Mr. Musolf as required in maintaining communications and technical interchange with EPRI, Sandia (DOE), the BWROG, and with the PWR program.

MULTIPLE DYNAMICS CORPORATION
PROJECT INSTRUCTION

SUBJECT: MONTICELLO PLANT LIFE EXTENSION PROGRAM	DATE ISSUED June 1986	DOC. NO. NSPE-11-2868
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Mr. L. Nolan will coordinate, where necessary, NSP project activities including technical direction, review, approval, and assistance with plant records, surveillance, maintenance and testing activities as required by the program.

Mr. D. Lehnert will coordinate, review and approve the MDC project team activities including technical direction.

To facilitate ready plant access for document/records retrieval, inspections and walkdowns as necessary, MDC will maintain a liaison office at the Monticello site. Mr. L. Nolan (NSP) will coordinate the MDC liaison activities.

Project Administration, including cost and schedule control, progress reporting and quality assurance will be maintained by MDC through Mr. M. Anton.

General Electric (GE) will contribute as a special consultant for the specific work scope described in Reference (13).

A contingency has been established for the use of other special consultants where certain expertise is desired or necessary based on recommendations from MDC and approval by NSP. Such services may include metallurgical investigations, special testing and analytical assistance.

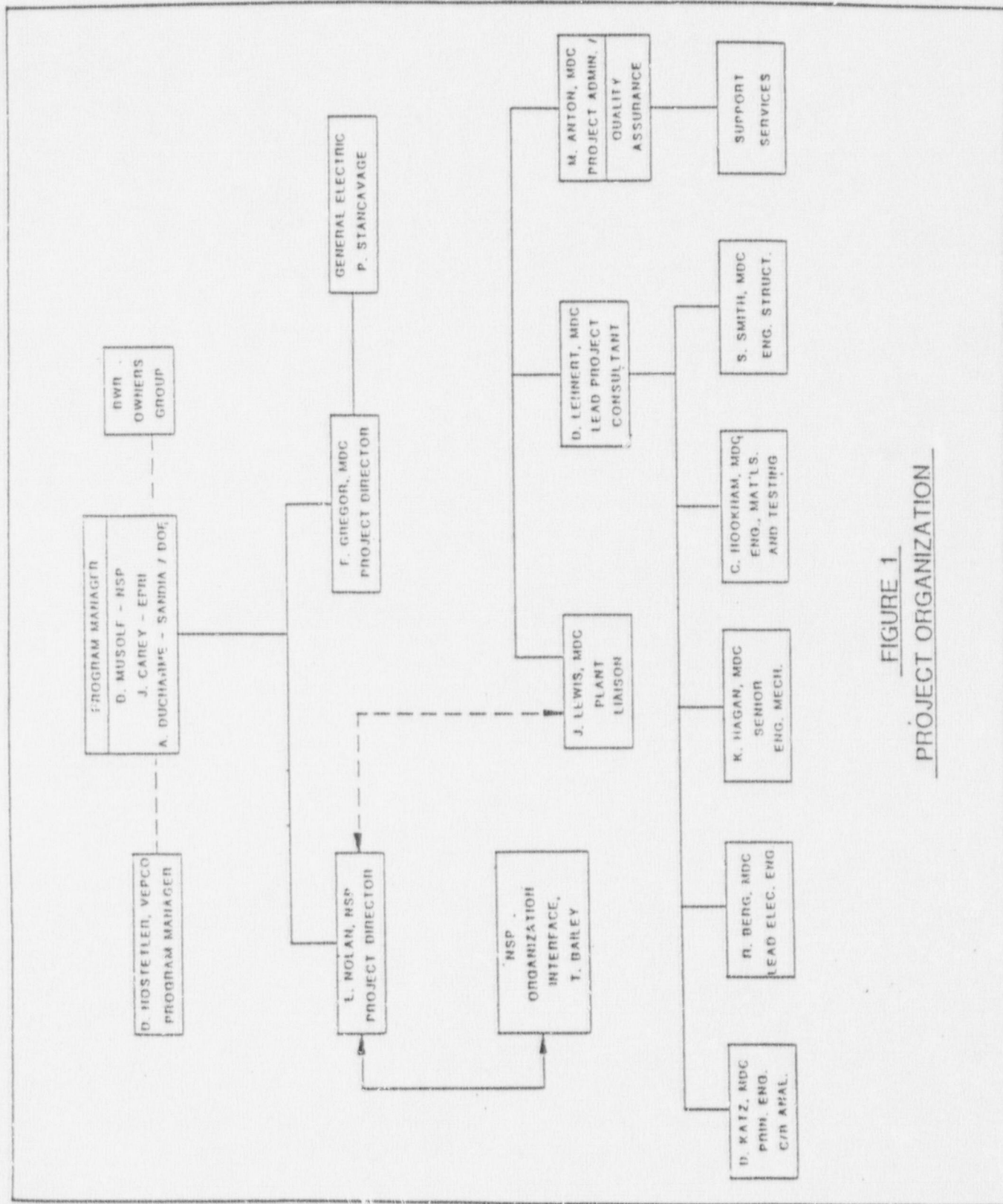


FIGURE 1
PROJECT ORGANIZATION

MONTICELLO PLANT LIFE EXTENSION PROGRAM FINANCIAL STATUS REPORT

Authorized Expenditures

<u>Company</u>	<u>Work</u>	<u>Purch Ord & Amount</u>
General Electric	Preparation of Project Topical Reports	
	- Corrosion	D76959MQ \$212,300
	- Reactor Internals	D76959MQ-1 \$ 33,700
	- Control Rod Drives	
	TOTAL THIS PURCHASE ORDER	----- \$246,000
	Participation in Owner Group Activities	E04361MQ \$ 15,000
	GENERAL ELECTRIC TOTAL	----- \$261,000
Multiple Dynamics Corporation	Plant Life Extension Program Management, Project Topical Reports, Non-Critical Component Assessment, Mini-Project Topical Reports	D64167MQ \$190,000
		D64167MQ-2 \$473,845
		D64167MQ-3 \$329,000
	TOTAL FOR THIS PURCHASE ORDER	----- \$992,845
	Computerized Follow-on Activities List and Plant Life Extension Program White Paper	E03182MQ \$ 15,300
	In-Plant Testing Program	D92498MQ \$ 94,800
	MDC TOTAL	----- \$1,102,645
	PROJECT TOTAL AUTHORIZATION	----- \$1,363,645

Commitments for Funding from Other Groups

<u>Organization</u>	<u>Amount Authorized</u>
EPRI RP2643-2	\$150,000
RP2643-2 Amendment 1	\$175,000
BOE/Sandia 64-3638	\$ 75,000
*64-3638 Amendment 1	\$ 90,000
TOTAL FUNDING ASSISTANCE	\$490,000

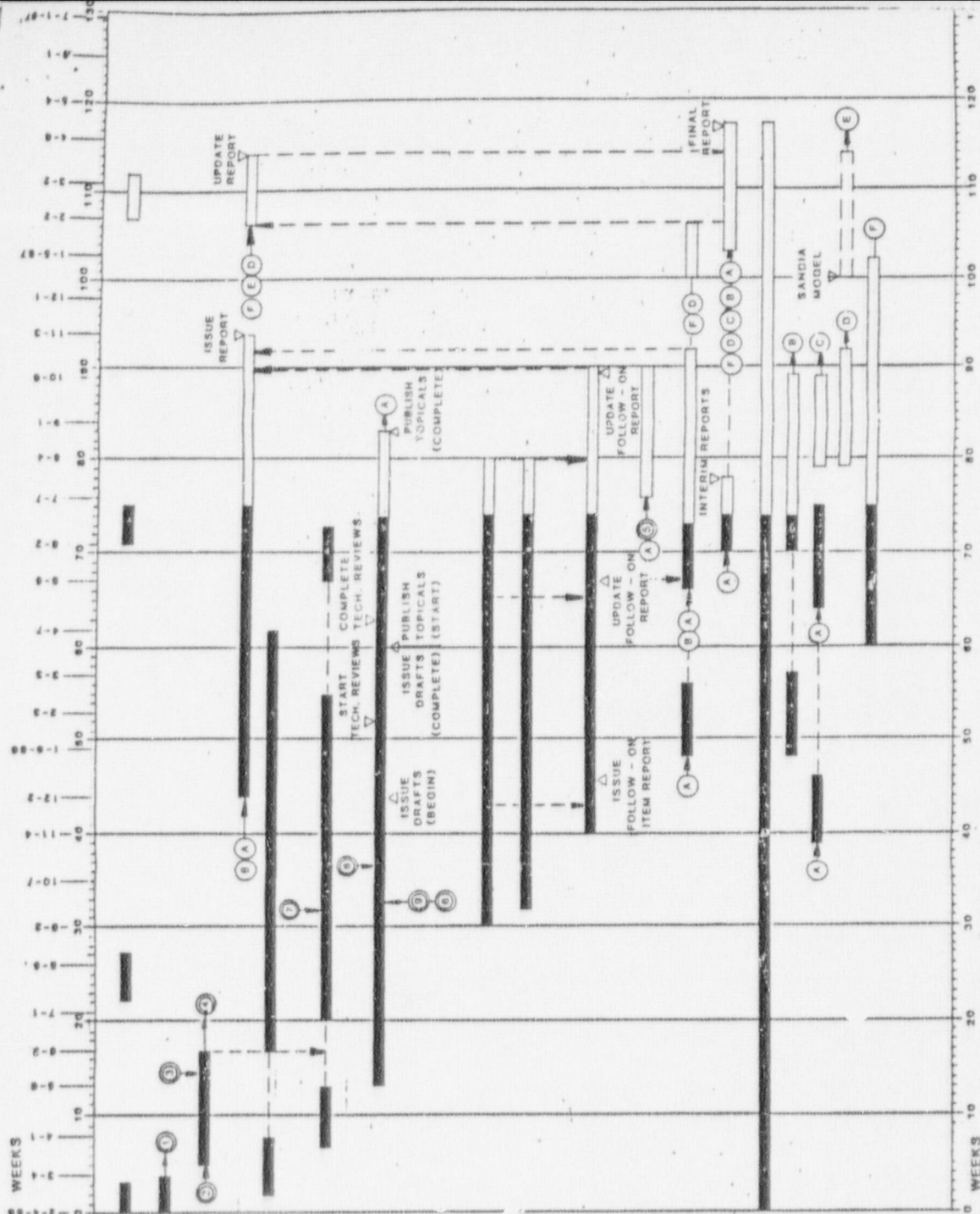


FIGURE 2
MDC TASK SCHEDULE
MONTICELLO PLANT LIFE
EXTENSION PROGRAM

MULTIPLE DYNAMICS CORPORATION
DOCUMENT No. NSPE-11-2868
JUNE 1986, REVISION 2

- Task Description (see Table 2)
- 1-1 Finalize and maintain Program Plan
 - 1-2 Develop criteria for critical plant elements
 - 1-3 Finalize component-parameter matrix and prioritize
 - 1-4 Conduct Cost/Benefit analysis
 - 2-1 Determine methods and technologies for component life evaluation
 - 2-2 Critical Components/Structure: Information retrieval, site visits, data cataloging, etc.
 - 2-3 Critical component/structure topical report preparation including data assessment, present life determination and extended life projections, condition assessments, inspections, and testing programs, etc.
 - 3-1 Evaluate surveillance, ISI and recordkeeping methods
 - 4-1 Evaluate operational, maintenance practices and potential improvements, preventive measures, etc.
 - 5-1 Identify and prioritize R&D needs appropriate to nuclear plant life extensions
 - 7-1 Monticello Plant Life Extension Workbook
 - 7-2 Generate Plant Cycle Management Chart
 - 7-3 Write and publish Final Report to EPRI
 - 8-1 Project Management
 - 11 Non-Critical Component Evaluation
 - 12 In-Plant Testing and Surveillance
 - 13 Improved Economic Assessment
 - 20 Expanded Components Evaluations
- Notes:
- (1) Designates interconnections between activities shown on this figure.
 - (2) Designates interconnections between activities shown on Figure 2 and Figure 1.
 - (3) Indicates activity completion status.

Task
No.

Task Description (see Table 3)

GE-1M

Review Monticello component/
structure listing (GE scope)
for completeness.

GE-3M

Review criteria and component/
structural listings.

GE-4M

Perform matrix scoring.

GE-7M

Prepare technical reports on
selected GE scope components.

GE-10(b)M

Summarize impact of 27
critical components on
availability and capacity for
Monticello plant

GE-10(c)M COMPASS data trend reports on
plant life extension for
Monticello.

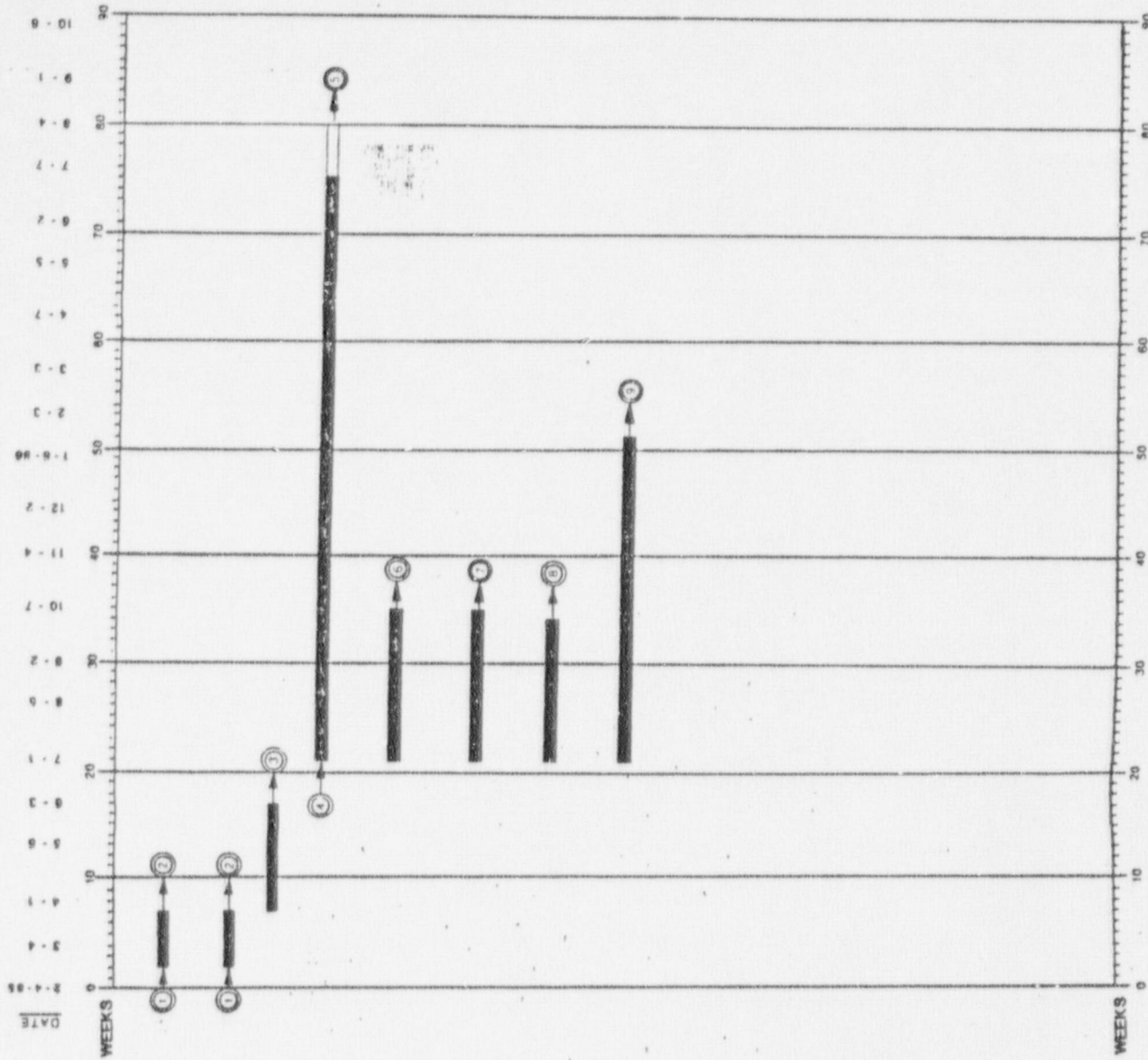
GE-10(d)M Estimate capacity factor
improvement for changes to 27
critical components.

GE-10(e)M Corrosion and fatigue impact
on critical components/
structures.

NOTES: (1) M = Monticello specific
G = Generic to all BWR's (All
generic activities are
awaiting BWROG approval)

(2)  designates intercon-
nections between activities
shown on Figure 2 and
Figure 3

(3)  indicates activity
completion status



(2A)

THE SURRY 1 PILOT PROJECT

AN OVERVIEW
PRESENTED AT THE
SEMINAR ON NUCLEAR PLANT LIFE EXTENSION
AUGUST 25, 1986

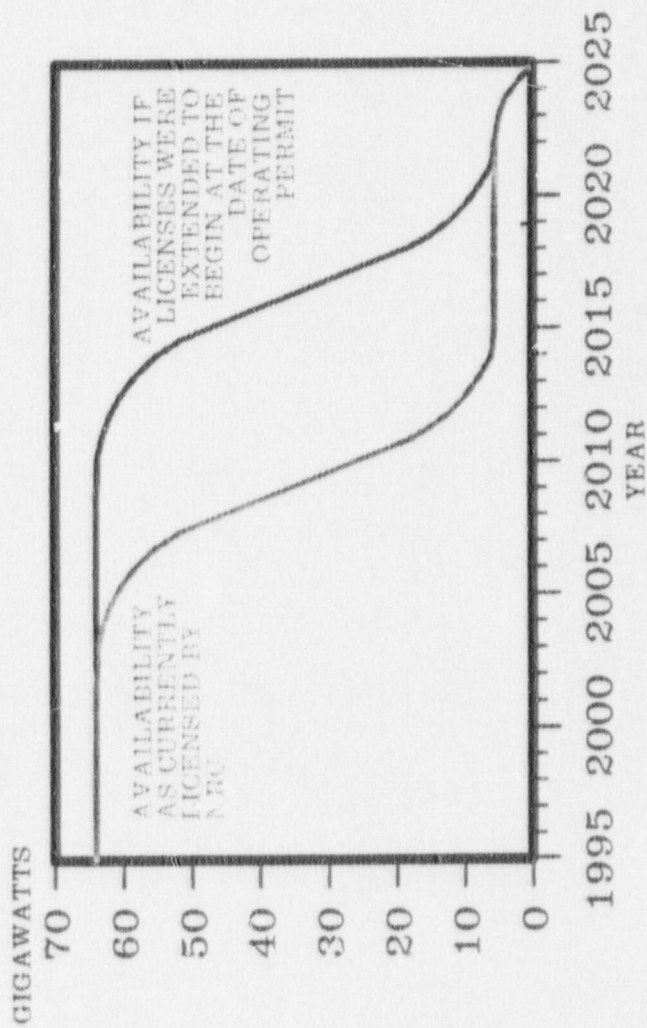
C-2a

NUCLEAR UNIT

	CAPACITY MWE NET	CP	OL	LICENSE EXPIRES CP OL
SURRY 1*	788	1968	1972	2008 2012
SURRY 2*	788	1968	1973	2008 2013
NORTH ANNA 1	865	1971	1978	2011 2018
NORTH ANNA 2	890	1971	1980	2011 2020

*FIRST UNITS IN U.S. TO BE LICENSED FOR DRY CASK
SPENT FUEL STORAGE

AVAILABILITY OF NUCLEAR GENERATION NATIONALLY AS OF AUGUST 1984



LIFE EXTENSION AT VIRGINIA POWER

- LIFE EXTENSION TASK FORCE FORMED MARCH 1984
- REVIEWED FOSSIL AND NUCLEAR LIFE EXTENSION
- ISSUED REPORT ON AUGUST 1984
- CONCLUSIONS APPLICABLE TO NUCLEAR LIFE EXTENSION
 - THE COMPANY SHOULD ADOPT A POSITIVE LIFE EXTENSION POLICY
 - THE LIFE EXTENSION POTENTIAL OF ALL FOSSIL, NUCLEAR AND HYDRO GENERATING UNITS SHOULD BE EVALUATED
 - LIFE EXTENSION SHOULD BE COORDINATED ON A FULL TIME BASIS BY ASSIGNED PERSONNEL
 - NUCLEAR LIFE EXTENSION ACTIVITIES SHOULD BEGIN IN THE VERY NEAR FUTURE
- THE RECOMMENDATIONS WERE ACCEPTED

CONSIDERATIONS EXPRESSED TO MANAGEMENT

- THE UNITS REPRESENT A SIGNIFICANT BASE
LOAD
- THEY WILL END LIFE IN GOOD CONDITION
- WE DO NOT SEE A MORE ECONOMIC ALTERNATIVE
- ENVIRONMENTAL CONCERN MAKES NUCLEAR
POWER THE ENERGY OF CHOICE
- REPLACEMENT COST WILL BE HIGH
- DECISIONS MUST BE MADE TEN YEARS
BEFORE THE LICENSES EXPIRE

WHY LIFE EXTENSION NOW?

- TO PRESERVE THE OPTION!
- WHILE ACTIONS TAKEN NOW WON'T GUARANTEE LIFE EXTENSION, FAILURE TO ACT SOON COULD PRECLUDE LIFE EXTENSION!
- EARLY IDENTIFICATION OF CRITICAL ISSUES WILL PERMIT:
 - TIMELY START OF ESSENTIAL R&D
 - EARLY DIALOG WITH NRC

EPRI/DOE PILOT STUDIES

- EPRI ISSUED RFP IN SEPTEMBER, 1984
- SURRY AND MONTICELLO CHOSEN
- WORK BEGAN JANUARY, 1985
- DOE JOINED THE PROJECT JANUARY, 1985
- PHASE 1 TO BE COMPLETED IN 1986
- PHASE 2 (FOLLOW ON ACTIVITIES)
IS UNDERWAY

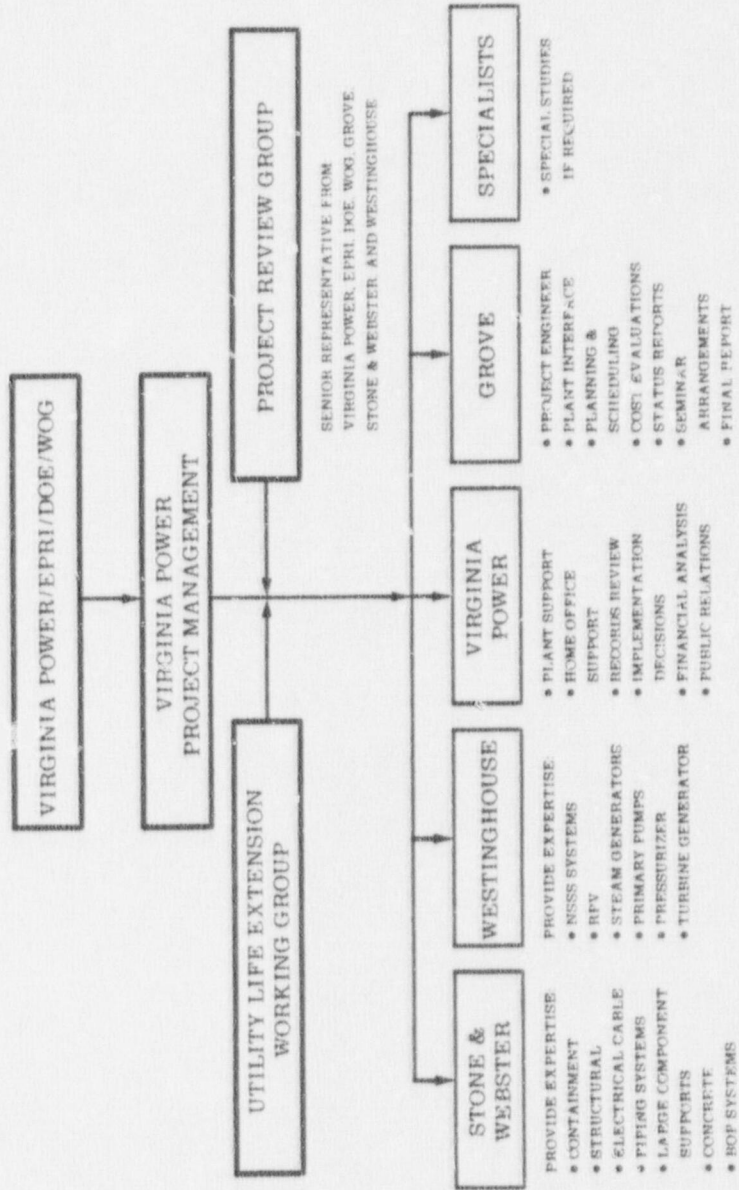
LIFE EXTENSION PROJECT OBJECTIVES

- A COMPLETE LIFE EXTENSION PLANNING STRATEGY THAT INCLUDES TECHNICAL METHODS, PROJECT MANAGEMENT CONSIDERATIONS OF BUDGETING, SCHEDULING, AND FINANCING
- THE TECHNICAL METHODS TO IDENTIFY PLANT COMPONENT STRUCTURES AND SYSTEMS THAT WILL HAVE A PRIMARY INFLUENCE ON LIFE EXTENSION DECISIONS
- IDENTIFICATION OF ACTIONS REQUIRED TO IMPLEMENT A LIFE EXTENSION PROGRAM

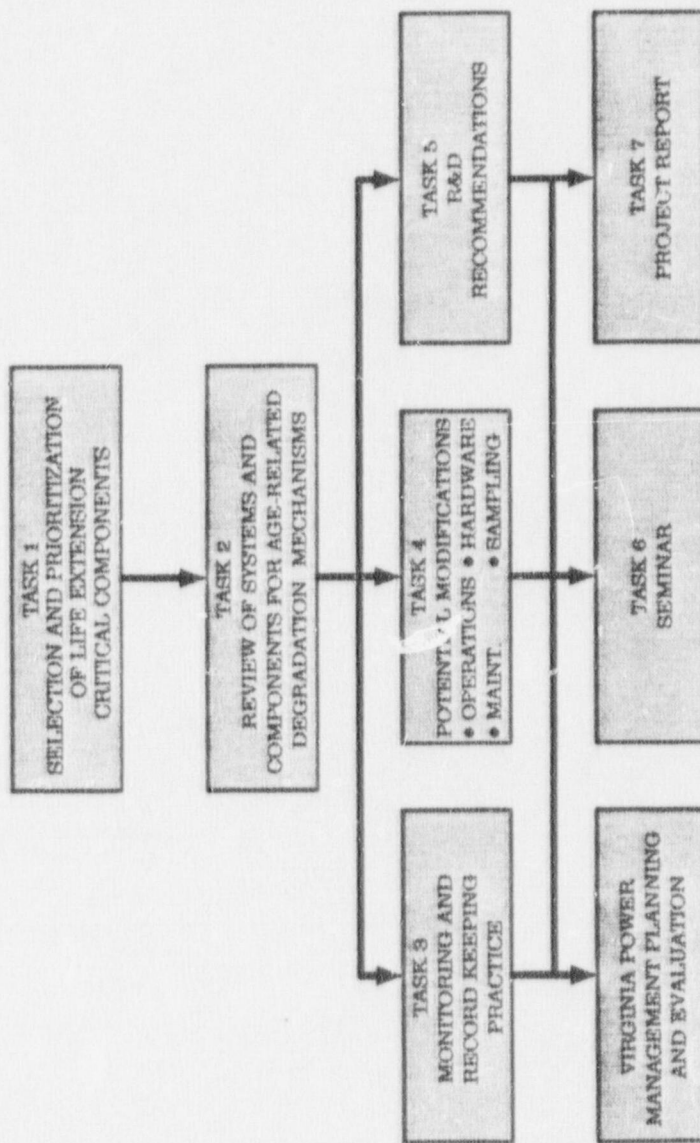
LIFE EXTENSION PROJECT OBJECTIVES

- UNCOVERING OF POTENTIAL OBSTACLES TO LIFE EXTENSION THAT CAN ONLY RESULT FROM THIS DETAILED LEVEL OF PLANNING
- RECOMMENDATIONS (WITH SUPPORTING RATIONALE) TO EPRI/DOE FOR R&D REQUIRED TO SUPPORT LIFE EXTENSION
- A MODEL APPROACH, METHODS AND PLAN FOR OTHER UTILITIES THAT WISH TO ADDRESS LIFE EXTENSION OF THEIR NUCLEAR PLANTS

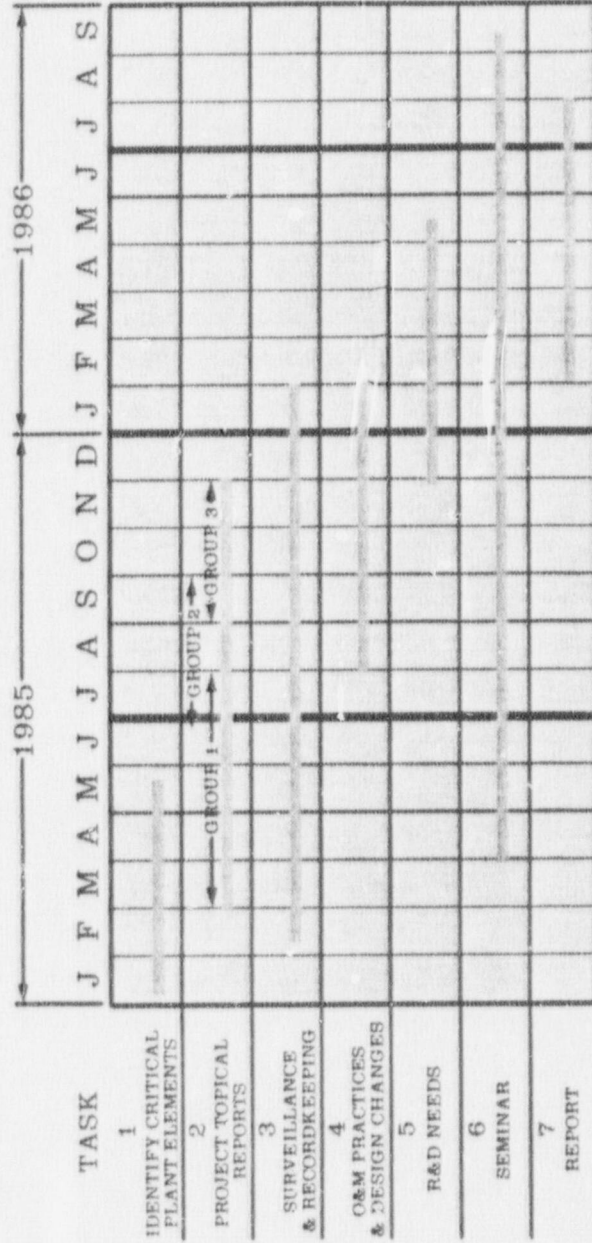
PROJECT ORGANIZATION CHART



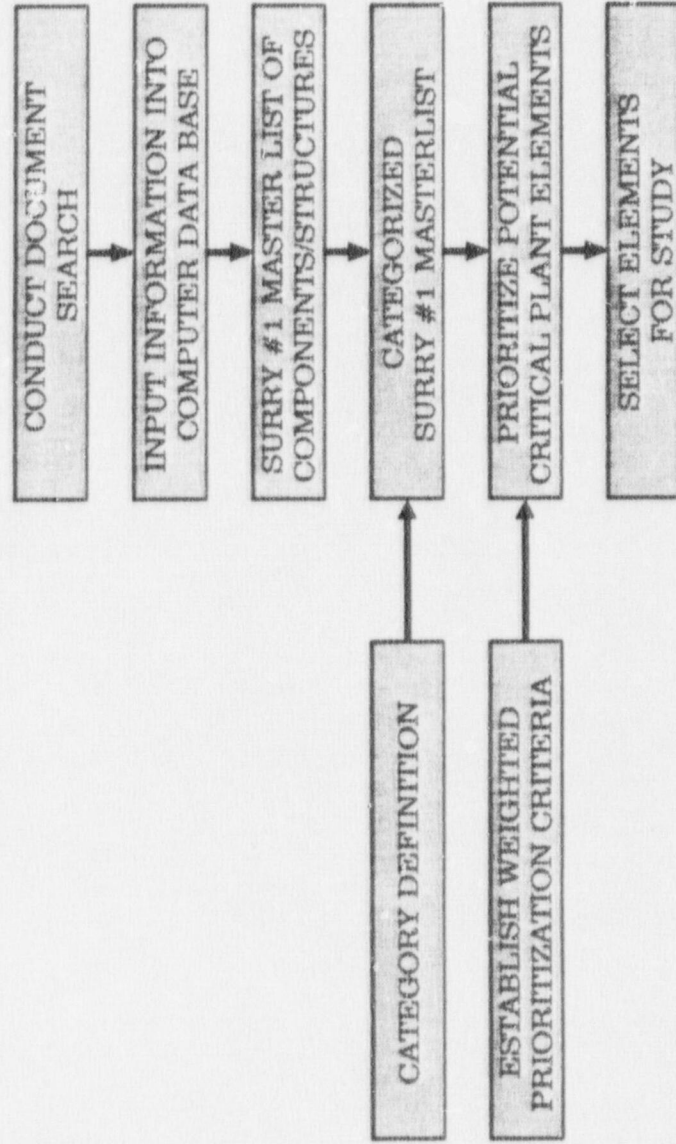
SURRY NUMBER 1 PROJECT FLOW CHART



SURREY UNIT #1 LIFE EXTENSION PROJECT SCHEDULE



TASK 1 FLOW CHART



CATEGORIZATION OF COMPONENTS

CATEGORY 1 PLANT LIFE NON-LIMITING,
JUSTIFICATION REQUIRED

CATEGORY 2 LONG LIFE WITH HIGH POTENTIAL
IMPACT ON LIFE EXTENSION

CATEGORY 3 LONG LIFE WITH NOMINAL IMPACT
ON LIFE EXTENSION

CATEGORY 4 NOMINAL LIFE WITH REPAIR OR
REPLACEMENT FEASIBLE, LOW
IMPACT ON LOW EXTENSION

CATEGORY 5 LIMITED LIFE WITH RECURRING
REPLACEMENT OR REFURBISHMENT,
NO IMPACT ON LIFE EXTENSION

ESTABLISH WEIGHTED PRIORITIZATION CRITERIA
(IN DECREASING ORDER OF IMPORTANCE)

- CONSEQUENCE OF FAILURE ON PLANT SAFETY
- REGULATORY IMPORTANCE
- IMPACT ON PLANT AVAILABILITY
- CONSEQUENCE OF FAILURE ON PLANT OPERATIONS
- COST TO REFURBISH OR REPLACE
- MODIFICATIONS TO SUPPORT LIFE EXTENSION
- DOSE TO REFURBISHMENT OR REPLACE
- CONSEQUENCE OF FAILURE ON SURRY UNIT 2
- MODE OF FAILURE
- REPLACEMENT PRECEDENT
- GENERIC APPLICABILITY

PRIORITIZATION RESULTS - TOP 10

1. REACTOR PRESSURE VESSEL
2. CONTAINMENT (INCL. BASEMAT)
3. RPV SUPPORTS AND NEUTRON SHIELD TANK
4. RC PIPING (CAT 1 AND 2)
5. STEAM GENERATORS
6. EMERGENCY DIESEL GENERATORS
7. RPV INTERNALS (UPPER AND LOWER)
8. RC PUMP BODY (3)
9. PRESSURIZER
10. CONTROL ROD DRIVE MECHANISMS

TASK 3 OBJECTIVES

- 1) EVALUATE THE CURRENT MONITORING AND RECORD KEEPING PRACTICES FOR COMPLETENESS, ACCURACY, AND RETRIEVABILITY
- 2) RESPOND TO DATA REQUESTS IN SUPPORT OF PTR'S
- 3) IDENTIFY MODIFICATIONS, CURRENT PRACTICES THAT COULD BE IMPLEMENTED TO SUPPORT LIFE EXTENSION
- 4) FORMULATE INTEGRATED RECOMMENDATIONS FOR LIFE EXTENSION MONITORING AND RECORD KEEPING

CONSIDERATIONS FOR RECOMMENDATIONS

- POSSIBLE USE OF DATA FOR IMPROVING NEAR TERM AVAILABILITY
- EFFORT REQUIRED TO RECONSTRUCT DATA FROM EXISTING OPERATING RECORDS
- NEEDS FOR DATA EVEN THOUGH NO LIFE LIMITATIONS ARE KNOWN
- OPPORTUNITY FOR INTERFACING WITH ONGOING DATA PROGRAMS
- ANTICIPATED REQUIREMENTS FOR LIFE EXTENSION
- COST OF PROPOSED IMPROVEMENTS VERSUS IMPACT ON LIFE EXTENSION OF NOT IMPLEMENTING THEM

PREOPERATIONAL DATA

- SOURCE OF BASE LINE DATA
 - DESIGN
 - CONSTRUCTION
 - STARTUP AND TESTING
- CONCLUSIONS
 - THE NECESSARY PREOPERATIONAL DATA DO EXIST FOR SURRY 1
 - THESE ARE TWO AREAS OF CONCERN:
 - (1) MANY DESIGN REPORTS AND DETAILED DRAWINGS ARE RETAINED BY THE EQUIPMENT MANUFACTURER AND NOT BY VIRGINIA POWER
 - (2) RADIOGRAPHIC RECORDS ARE DETERIORATING

OPERATING AND MAINTENANCE DATA

- PROVIDE SOURCE OF DATA REQUIRED TO:
 - TRACK AGE RELATED DEGRADATION
 - DEMONSTRATE THAT DESIGN BASES HAVE NOT BEEN EXCEEDED
 - QUALIFY DEGRADING ENVIRONMENT
 - PROVIDE INPUT TO STRATEGIC MAINTENANCE PROGRAMS
- DATA INCLUDE:
 - ENVIRONMENTAL MEASUREMENTS
 - CHEMISTRY
 - TRANSIENTS
 - IRRADIATION
 - FAILURE AND REPAIR HISTORIES
- CONCLUSIONS:
 - MANY KEY PARAMETERS ARE MONITORED BUT ALL ARE NOT ROUTINELY RECORDED
 - RETENTION MAY NOT BE ADEQUATE
 - FORMAT NOT CONDUCTIVE TO RECONSTRUCTION OF LIFE EXTENSION DATA

TEST, INSPECTION, AND MONITORING

- INTENDED TO DETECT THE ONSET/STATUS OF DEGRADATION
- CONCLUSIONS
 - MANY TESTS ARE ADEQUATE FOR LIFE EXTENSION
 - SURVEILLANCE CAPSULE PROGRAM SHOULD BE REVISED
 - SYSTEM TO MONITOR NEUTRON FLUX/FLUENCE IN RPV AND RPV SUPPORT
 - CONCRETE INSPECTION PROGRAM SHOULD BE DEVELOPED
 - TRANSIENT/FATIGUE MONITORING

PROPOSED MODIFICATIONS

- INCLUDES OPERATIONAL AND HARDWARE MODIFICATIONS BY MAJOR COMPONENT
- REACTOR PRESSURE VESSEL
- EMERGENCY DIESEL GENERATORS
 - O&M CHANGES
 - PHYSICAL CHANGES
- CONTROL ROD DRIVE MECHANISM
- CABLE IN CONTAINMENT
- REACTOR COOLANT PUMPS
- STEAM GENERATOR
- REACTOR INTERNAL

R&D NEEDS

PRIORITIZATION

- IS PROPOSED R&D ESSENTIAL TO LIFE EXTENSION?
- LEVEL OF CURRENT KNOWLEDGE
- TIMING, i.e., CAN THE R&D BE DELAYED?
- SPECULATIVE OR REAL ISSUE BASED ON CURRENT KNOWLEDGE
- GENERIC APPLICABILITY

HIGHER PRIORITY R&D

- EFFECT OF NEUTRON IRRADIATION OF NEUTRON SHIELD TANK MATERIALS AT LOW TEMPERATURES
- DEVELOPMENT OF A MONITORING PROGRAM FOR REACTOR INTERNALS
- WELD REPAIR METHODS FOR VESSEL AND INTERNALS
- DEVELOPMENT OF MECHANISTIC MODELS FOR THE EFFECTS OF IRRADIATION ON REACTOR VESSEL MATERIALS
- CONTAINMENT TESTING FREQUENCY
- FRACTURE TOUGHNESS OF REACTOR VESSEL INTERNALS

CONCLUSIONS

BASED ON THE WORK TO DATE INCLUDING THE EVALUATION OF 27 POTENTIAL CRITICAL PLANT ELEMENTS, THERE APPEAR TO BE NO TECHNICAL REASONS WHY THE OPERATING LIFE OF SURRY UNIT 1 COULD NOT BE EXTENDED SUBSTANTIALLY BEYOND THE INITIAL LICENSE PERIOD.

MONTICELLO
PLANT LIFE EXTENSION
PROGRAM OVERVIEW

PROGRAM PLAN

OBJECTIVES

- o DETERMINE POTENTIAL EXTENSION YEARS
- o INVESTIGATE TECHNICAL ISSUES/OBSTACLES
- o ASSESS COST-BENEFITS
- o ASSURE CURRENT LIFE GOAL IS MET
- o IDENTIFY PREVENTIVE ACTIONS, FUTURE WORK
- o ESTABLISH BASIS FOR LICENSE AMENDMENT

PROGRAM STEPS

- o MAJOR COMPONENT INVENTORY (120)
- o CRITICAL COMPONENT SELECTION, RANKING
- o CRITICAL COMPONENT ASSESSMENTS (27)
- o CATEGORIZE REMAINING COMPONENTS
- o EVALUATE ANOTHER 26 COMPONENTS
- o CONDUCT FIRST-CUT ECONOMIC ANALYSIS
- o ISSUE REPORTS

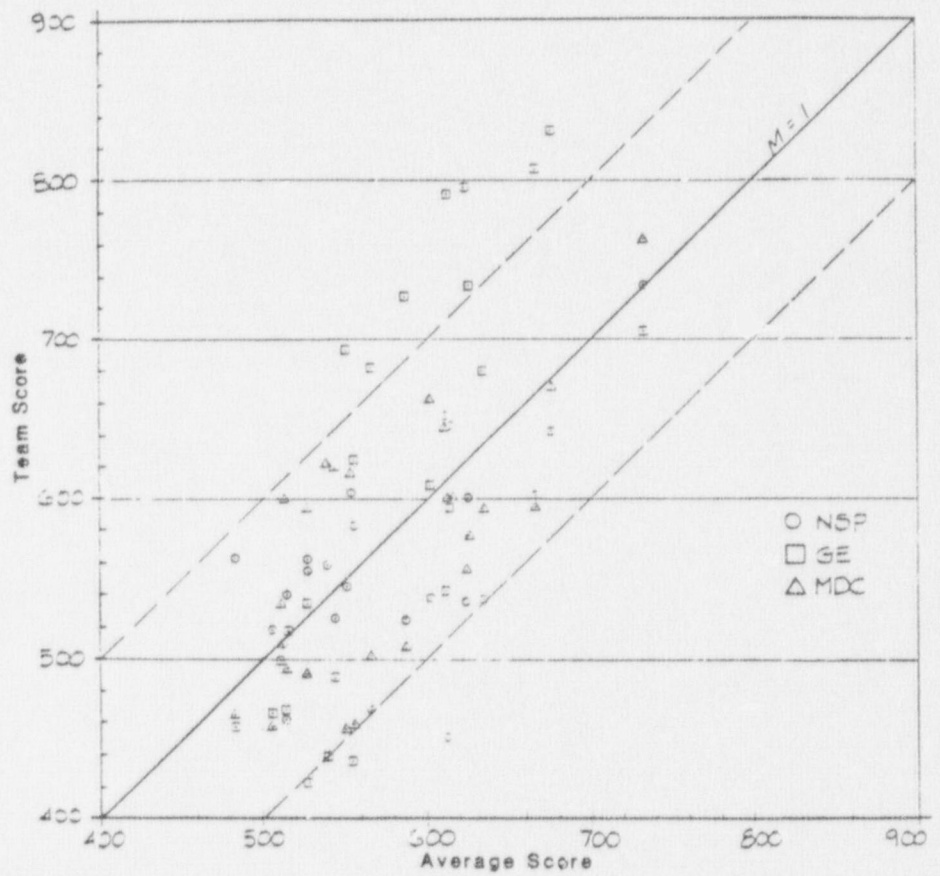


Figure 1: Scoring Sensitivity Chart
Top 24 Components

EVALUATION RESULTS COMPONENT RANKING

<u>RANK</u>	<u>COMPONENT</u>
1	VESSEL PRESSURE BOUNDARY
2	REACTOR PEDESTAL
3	DRYWELL FOUNDATION
4	BIOLOGICAL SHIELD
5	REACTOR BUILDING BASEMAT
6	FUEL POOL SLABS AND WALLS
7	SACRIFICIAL SHIELD WALL
8	DRYWELL METAL SHELL
9	SUPPRESSION CHAMBER INCLUDING SUPPORTS
10	RPV SUPPORT
11	REACTOR BUILDING FLOOR SLABS AND WALLS
12	CONTROL ROOM
13	CRD HOUSINGS EXTERNAL
14	CRD HOUSINGS INTERNAL
15	TURBINE PEDESTAL
16	SHROUD
17	CORE SUPPORT PLATE
18	CORE TOP AND BOTTOM GRID
19	VENT LINES INCLUDING BELLOWS
20	VENT HEADERS AND DOWNCOMERS
21	EMERGENCY DIESEL GENERATORS
22	REACTOR RECIRCULATION LINES
23	JET PUMPS
24	NOZZLE SAFE ENDS

CRITICAL COMPONENT TOPICAL REPORTS

- (1) REACTOR VESSEL PRESSURE BOUNDARY, INCLUDING HEAD, FLANGE, SKIRT, AND STUB TUBES
- (2) CONCRETE STRUCTURES, REACTOR PEDESTAL, DRYWELL FOUNDATION, BIOLOGICAL SHIELD, FUEL POOL SLABS AND WALLS, REACTOR BUILDING BASEMAT, SACRIFICIAL SHIELD WALL, REACTOR BUILDING FLOOR SLABS AND WALLS, AND THE TURBINE PEDESTAL
- (3) DRYWELL METAL SHELL
- (4) SUPPRESSION CHAMBER, SUPPORTS, VENT LINES AND BELLOWS, VENT HEADERS AND DOWNCOMERS
- (5) REACTOR VESSEL SUPPORT
- (6) CONTROL ROOM
- (7) CRD HOUSINGS AND GUIDE TUBES
- (8) SHROUD, SHROUD LEDGE, CORE SUPPORT PLATE, CORE TOP GUIDE, AND JET PUMPS
- (9) EMERGENCY DIESEL GENERATORS
- (10) REACTOR RECIRCULATION LINES, PUMP AND VALVE BODIES
- (11) NOZZLE SAFE ENDS, THERMAL SLEEVES
- (12) ECCS, MAIN STEAM AND FEEDWATER PIPING INSIDE PRIMARY CONTAINMENT

CRITICAL ELEMENT ASSESSMENT

- o ORIGINAL DESIGN BASIS, CRITERIA, CODES, EQ
- o IDENTIFY, ASSESS ALL FEASIBLE DEGRADATION PARAMETERS
- o EVALUATE OPERATING RECORDS, HISTORY
 - ISI, MAINTENANCE
 - PAST REPAIRS, REPLACEMENTS, IMPROVEMENTS
- o ASSESS RELEVANT TEST DATA
- o REVIEW DATA BASES, NPRDS, COMPASS, OPEC-2
- o IN-SITU INSPECTIONS, LIMITED TESTING, SAMPLING
- o DETERMINE RATE OF DEGRADATION, LIFE USAGE
- o LIFE TRENDING AND PROJECTION TO REACH LIMITS
- o IDENTIFY LIFE LIMITING DEGRADATION PARAMETER(S)
- o IDENTIFY/RECOMMEND ACTIONS
 - PREVENTIVE MEASURES
 - TESTING, MONITORING, INSPECTION
 - DIAGNOSTICS
 - RECORDS, DATA NEEDS
 - R&D
- o INITIAL LIFE CYCLE AND PLEX ACTIVITY COSTS
- o REPORTS REVIEW BY NSP, EPRI, SANDIA, BWR-OG

PROGRAM RESULTS

MAJOR CONCLUSIONS

- o RPV INTERNALS, STUB TUBES IS A MAJOR RISK
- o CONTROL ROOM CAPACITY, TECHNICAL OBSOLESCENCE
- o CONTAINMENT PRESERVATION, CORROSION
- o CONCRETE PRESERVATION, MAINTENANCE
- o HYDROTESTING ABOVE 212°F
- o STEAM LINE EROSION
- o THERMAL SLEEVE/SAFE END REPLACEMENTS
- o RECIRC PIPING LONG TERM PERFORMANCE UNCERTAIN
- o EMERGENCY AC/DC CAPACITY LIMITATIONS

TABLE 1
CRITICAL COMPONENT LIFE ESTIMATES

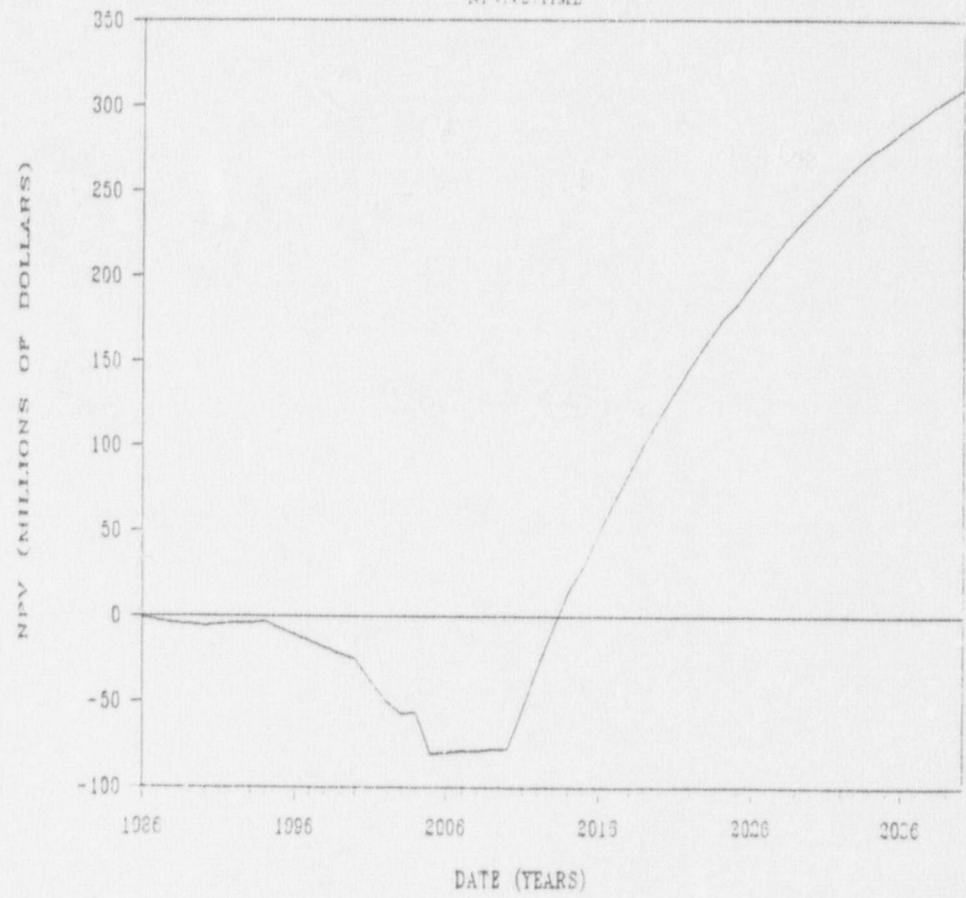
<u>COMPONENT SUBCOMPONENT</u>	<u>DEGRADATION PARAMETER</u>	<u>ESTIMATED LIFE (YRS)</u>
Reactor Vessel	Beltline Embrittlement	>90
Support Knuckle	Thermal Fatigue	70
Head Bolting	Cyclic Fatigue	65
Refuel Bellows Skirt	Fatigue	60
CRD Stub Tube Weld	IGSCC	<40
CRD Housing	Fatigue	>200
Tube-Stub tube weld	IGSCC	40-60
RPV Internals	IGSCC/IASCC	<70
Jet Pump Components	IGSCC/Vibration	<40
RPV Support Skirt	Fatigue	>100
Skirt Cylinder	Corrosion	>150
Vessel Safe Ends (SS)	IGSCC	<40
Safe Ends (CS)	Fatigue	60-70
RCPB Piping	Fatigue	>70
	Corrosion/Erosion	>80
Containment (Torus)	Corrosion	>70
Bellows	Fatigue	95
Vent System	Fatigue	95
Drywell Shell	Corrosion	>150
	Fatigue	200
Recirc. Sys. Piping (316 NG)	IGSCC	>25
Pump/Valve Castings	475°C Embrittlement	<25
Control Center	Capacity/Space	25-40
Diesel Generator Engine	Wear	>100
Generator Windings	Wear/Fatigue	<30
Concrete Structures	Vibration, Fatigue	>70
Shielding	Radiation	<65

PILOT STUDY - LESSONS LEARNED

- o CRITICAL COMPONENT REVIEW COMPLETE
 - 70-YEAR LIFE TECHNICALLY ACHIEVABLE
 - SOME ITEMS ARE NOT MAKING YEAR 40
 - KEY PREVENTIVE ACTIONS NEEDED SOON
 - IN-PLANT TEST RESULTS
 - RECORDS MANAGEMENT IS MAJOR PROBLEM
 - NO "BIG" SURPRISES
- o PLEX COST BENEFITS ARE 4:1 TO 8:1
- o SIGNIFICANT GENERIC WORK REMAINS
- o IMPROVED O&M, ISI, DIAGNOSTICS ARE IMPORTANT

PLEX COSTS CASE

NPV VS. TIME



MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: REACTOR PRESSURE VESSEL

KEY PARAMETERS

- FATIGUE DUE TO THERMAL CYCLING
- BELTLINE EMBRITTLEMENT
- CRD PENETRATION IGSCC

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|---------------------------|----|
| ○ SUPPORT SKIRT KNUCKLE | 70 |
| ○ BOLTING | 65 |
| ○ REFUELING BELLOWS SKIRT | 60 |
| ○ CRD STUB TUBES | ? |

RECOMMENDED ACTIVITIES (MAJOR)

- REFINE FATIGUE MARGIN & IMPROVE CYCLE COUNTING
- BELTLINE VOLUMETRIC EXAMINATION R+D
- INSPECT CRD PENETRATIONS
- R+D HYDROTESTING ABOVE 212°F
- LONG-TERM RT_{NDT} SPECIMEN PROGRAM

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: CONTROL ROD DRIVES/HOUSINGS

KEY PARAMETERS

- IGSCC
- FATIGUE
- WEAR

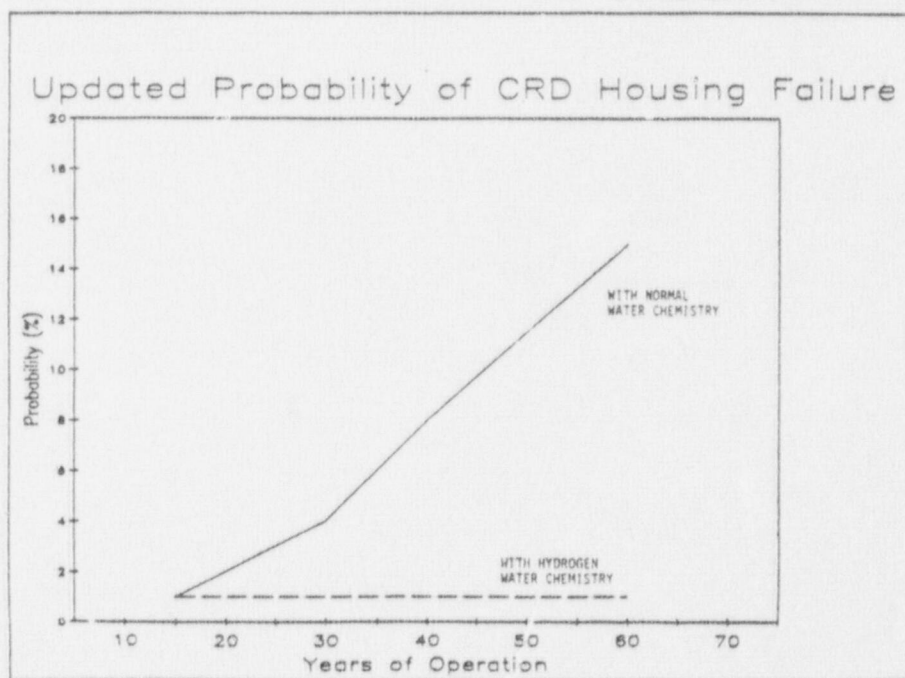
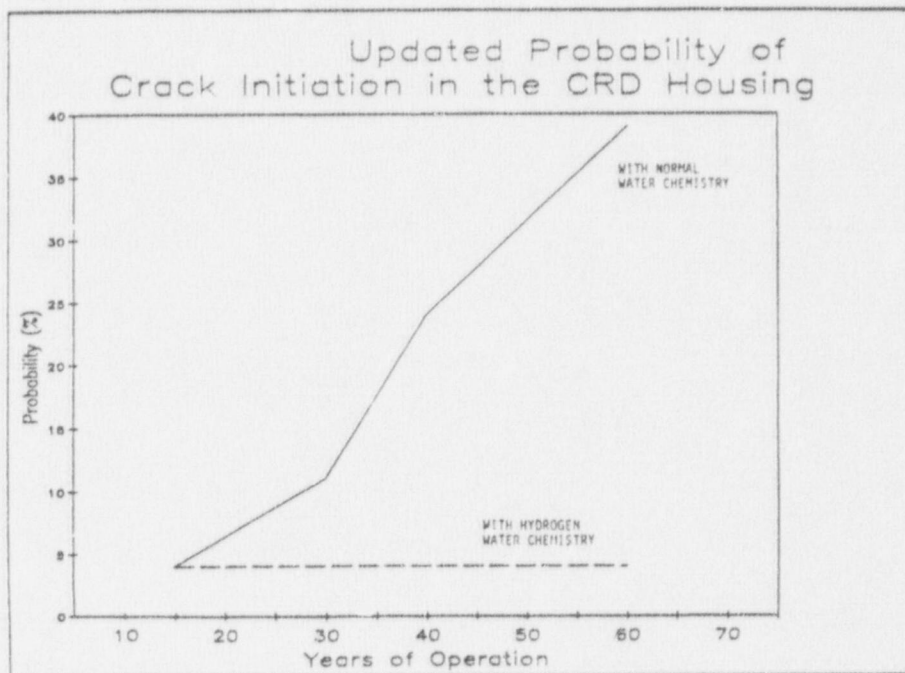
LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|-------------------------|-----|
| ○ TUBE-STUB TUBE WELD | |
| ○ CRD HOUSING (FATIGUE) | 276 |
| ○ | |
| ○ | |

RECOMMENDED ACTIVITIES (MAJOR)

- IMPLEMENT HWC
- CRD HOUSING INSPECTIONS (12 PER 5 YEARS)
- DEVELOP CRD HOUSING REPAIR PROGRAM
- DEVELOP CRD STUB TUBE INSPECTION METHODS



MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: REACTOR VESSEL INTERNALS

KEY PARAMETERS

- IGSCC, IASCC
- VIBRATION, FATIGUE
- EROSION

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- SHROUD SUPPORT CYLINDER
- BOTTOM BEAM (TOP GUIDE)
- BEAM-PLATE WELDS (CORE PLATE)
- RISER ELBOW WELD (JET PUMPS)

RECOMMENDED ACTIVITIES (MAJOR)

- HWC IMPLEMENTATION
- 5-10 YEAR VT INSPECTIONS
- DEVELOP UNDERWATER UT ROBOTS
- STUDY, DEVELOP REPAIR TECHNIQUES

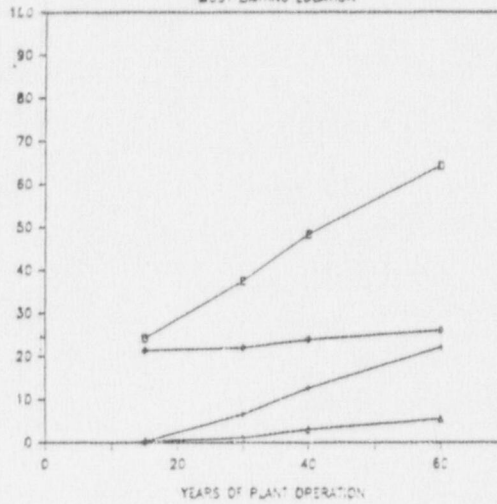
SUMMARY OF RPV INTERNALS

LIFE PREDICTION ASSESSMENT

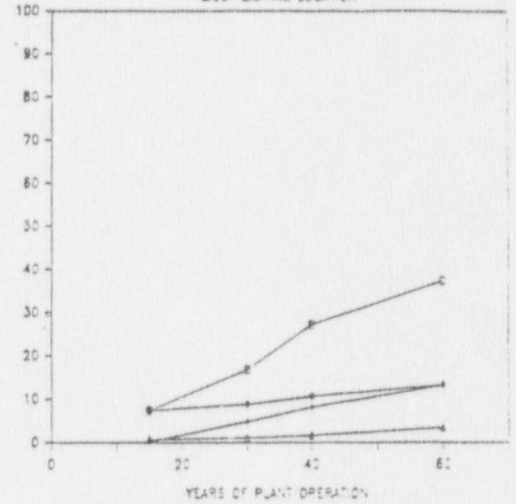
<u>Component and Most Limiting Location</u>	<u>60 Year Probability Prediction</u>			
	<u>Crack Initiation (%)</u>		<u>Repair/Replacement (%)</u>	
	<u>W/O HWC</u>	<u>With HWC*</u>	<u>W/O HWC</u>	<u>With HWC*</u>
Core Shroud				
Shroud to Core Support Cylinder Attachment	64.2	26.0	22.1	5.5
Top Guide				
Instrument Slot on Bottom Beams	39.6	25.1	23.0	12.3
Core Plate				
Beam to Plate Welds	37.4	13.3	13.2	3.5
Jet Pumps				
Riser Elbow to Thermal Sleeve Weld and Riser Support Braces	38.8	21.3	18.1	8.0

*Assumes HWC implementation in plant year 15

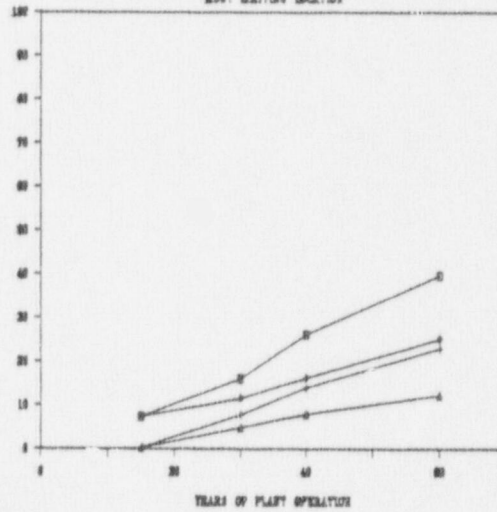
PREDICTED MONTICELLO SHROUD LIFE
MOST LIMITING LOCATION



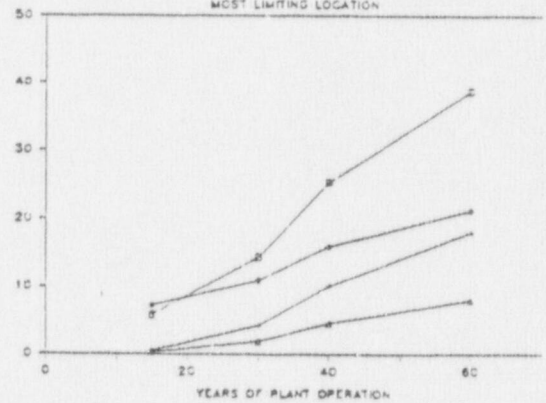
PREDICTED MONTICELLO CORE PLATE LIFE
MOST LIMITING LOCATION



PREDICTED MONTICELLO TOP GUIDE LIFE
MOST LIMITING LOCATION



JET PUMP RISER SUBASSEMBLY
MOST LIMITING LOCATION



- INITIATION
- + UNSUITABLE FOR SERVICE
- INITIATION WITH HNC
- △ UNSUITABLE FOR SERVICE WITH HNC

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: REACTOR PRESSURE VESSEL SUPPORT

KEY PARAMETERS

- FATIGUE INDUCED DURING STARTUP/SHUTDOWN
- GENERAL CORROSION
-

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|------------------------------|-----|
| ○ SKIRT EXTENSION (FATIGUE) | 118 |
| ○ SKIRT CYLINDER (CORROSION) | 150 |
| ○ | |
| ○ | |

RECOMMENDED ACTIVITIES (MAJOR)

- REANALYSIS OF SKIRT TO INTERACTIVELY MODEL W/PEDESTAL
- VISUAL INSPECTION OF SUPPORT INTERIOR
-
-

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: REACTOR PRESSURE VESSEL SAFE ENDS

KEY PARAMETERS

- IGSCC
- FATIGUE DUE TO THERMAL CYCLING
- MECHANICAL WEAR/BYPASS LEAKAGE

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|-------------------------------------|-------|
| ○ STAINLESS STEEL SAFE ENDS (IGSCC) | <40 |
| ○ CARBON STEEL SAFE ENDS (FATIGUE) | 60-70 |
| ○ | |
| ○ | |

RECOMMENDED ACTIVITIES (MAJOR)

- INCREASE INSPECTION FREQUENCY
- INSPECT FEEDWATER SPARGER/THERMAL SLEEVE FIT
- R+D IMPROVED WATER CHEMISTRY (COST/BENEFIT)
- CYCLE (TEMPERATURE) MONITORING

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: REACTOR COOLANT PRESSURE BOUNDARY PIPING

KEY PARAMETERS

- FATIGUE
- CORROSION/EROSION
- DYNAMIC EFFECTS

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|------------------------|----|
| ○ RHR PIPING (FATIGUE) | 47 |
| ○ MS PIPING (FATIGUE) | 70 |
| ○ FW PIPING (FATIGUE) | 70 |
| ○ PIPING (CORROSION) | 81 |

RECOMMENDED ACTIVITIES (MAJOR)

- FRACTURE TOUGHNESS TESTING
- VIBRATION MONITORING
- TRANSIENT MONITORING
- STEAM LINE EROSION MEASUREMENT

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: DRYWELL METAL SHELL

KEY PARAMETERS

- EXTERIOR SHELL CORROSION
- LOCALIZED CORROSION (EMBEDDED REGION & SAND POCKET REGION)
- SHELL FATIGUE

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|-----------------------------|--|
| ○ GENERAL SHELL (CORROSION) | 160 |
| ○ SHELL FATIGUE | 200 |
| ○ LOCALIZED CORROSION | UNKNOWN (PART OF FOLLOW-ON ACTIVITIES) |
| ○ | |

RECOMMENDED ACTIVITIES (MAJOR)

- ALL THICKNESS MONITORING PROGRAM
- EXAMINATION OF EMBEDDED SHELL REGION
- BELLOWS EXAMINATION & FATIGUE EVALUATION
- DOCUMENT MINIMUM SHELL THICKNESS VALUES

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: SUPPRESSION CHAMBER AND VENT SYSTEM

KEY PARAMETERS

- GENERAL ATMOSPHERIC CORROSION
- THERMAL EXPANSION INDUCED FATIGUE DURING STARTUP/
SHUTDOWN
- FATIGUE AT VENT HEADER/DOWNCOMER INTERSECTION

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|--------------------------------------|----|
| ○ VENT LINES/VENTHEADER (CORROSION) | 76 |
| ○ VENT LINE BELLOWS (FATIGUE) | 95 |
| ○ VENT HEADER/DOWNCOMER INTERSECTION | 95 |
| ○ | |

RECOMMENDED ACTIVITIES (MAJOR)

- THICKNESS MEASUREMENT OF VENT LINE AND VENT HEADER
- VISUAL INSPECTION OF VENT LINE BELLOWS
- DEVELOPMENT OF INSPECTION PROGRAMS VENT LINE AND
VENT HEADER INTERIORS AND EXTERIOR
- EXPANSION OF INSPECTION PROGRAMS FOR SUPPRESSION
CHAMBER INTERIOR AND EXTERIOR

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: REACTOR RECIRCULATION LINES

KEY PARAMETERS

- 475°C THERMAL EMBRITTLEMENT EFFECTS
- STRESS CORROSION CRACKING EFFECTS
- FATIGUE

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|--------------------------|-----|
| ○ RECIRC. PUMP CASINGS | 20 |
| ○ RECIRC. VALVE BODIES | 20 |
| ○ RECIRC. SYS. PIPING | >25 |
| ○ RHR RETURN S.S. PIPING | >25 |

RECOMMENDED ACTIVITIES (MAJOR)

- ENHANCED NDE OF CAST/WROUGHT WELD INTERFACES (DEVELOPMENT AND PERFORMANCE)
- DEVELOPMENT OF LONG-TERM WELD OVERLAY METHOD
- LONG-TERM HYDROGEN WATER CHEMISTRY AND INSI EFFECTS
- PERFORMANCE OF ENHANCED UT AT END OF OPERATING LICENSE

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: PLANT CONTROL CENTER

KEY PARAMETERS

- PHYSICAL SPACE IN EXISTING STRUCTURES
- COMPONENT HARDWARE SPARE CAPACITY
- GROWTH RATE OF 1E AND BOP SYSTEMS

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- 1E SPACE-CONTROL ROOM AREAS (20-40 YRS)
- PENETRATIONS, CABLE TRAYS IN CONTROL CENTER
- POTENTIAL "GRANDFATHERING" ISSUES
- STRUCTURAL LOADS IN CERTAIN FLOORS AND WALLS

RECOMMENDED ACTIVITIES (MAJOR)

- INVENTORIES OF SPARE CAPACITY AND PHYSICAL SPACE
- COMPREHENSIVE STRUCTURAL REANALYSES
- BETTER CONFIGURATION CONTROL SYSTEM
- TECHNOLOGY UPGRADES TO OVERCOME LIMITATIONS
- RESOLVE "GRANDFATHERING" ISSUES
- CONTROL OF SPACE UTILIZATION

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: EMERGENCY DIESEL GENERATORS

KEY PARAMETERS

- MAINTENANCE
- TESTING FREQUENCY
- ENGINE MUST HAVE CONSTANT OIL CIRCULATION AND PRE-HEATING IN STANDBY MODE

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|-----------------------------|-----|
| ○ GENERATOR WINDINGS (WEAR) | 20 |
| ○ GENERATOR (OBSCOLESCENCE) | 60 |
| ○ ENGINE (WEAR) | 100 |
| ○ | |

RECOMMENDED ACTIVITIES (MAJOR)

- STOCK SPARE GENERATOR
- TEST PROGRAM REVIEW
- MAINTENANCE INTERNAL REVIEW
- GENERATOR WINDING INSPECTIONS

MONTICELLO PLANT LIFE EXTENSION PROGRAM

TOPICAL REPORT SUMMARY

SUBJECT: CRITICAL CONCRETE STRUCTURES

KEY PARAMETERS

- EMBEDMENT/REBAR CORROSION
- GENERIC DURABILITY (STRENGTH, SHRINKAGE, CRACKS, FATIGUE)
- VIBRATION, CHEMICAL SPILLS

LIMITING SUBCOMPONENTS

EST. LIFE (YRS)

- | | |
|---------------------------------|----|
| ○ BIOLOGICAL SHIELD (RADIATION) | 65 |
| ○ REACTOR BLDG. BASEMAT | 65 |
| ○ MG SET FLOOR SLAB (FATIGUE) | 65 |
| ○ TURBINE PEDESTAL (VIBRATION) | 65 |

RECOMMENDED ACTIVITIES (MAJOR)

- DEVELOPMENT OF MORE ACCURATE METHODS OF PREDICTING SERVICE LIFE
- COMPILATION OF TESTING DOCUMENTATION AND SAMPLES
- DEVELOPMENT OF REPAIR PROCEDURES FOR CONCRETE/REBAR
- DEVELOPMENT OF ACCEPTANCE CRITERIA FOR CRACKS, POPOUTS, SPALLS, ETC.

3A

U.S. NRC Program for Nuclear Plant Aging Research

(COMPONENTS AND SYSTEMS)

SECOND INFORMATION EXCHANGE MEETING

WITH

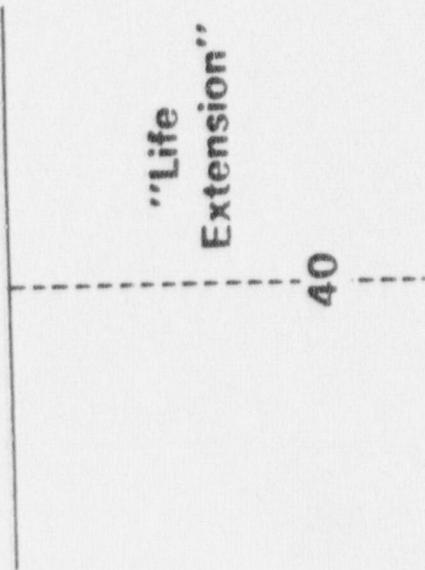
NUPLEX STEERING COMMITTEE
NUCLEAR UTILITY PLANT LIFE EXTENSION

FEBRUARY 5, 1987

J. P. VORA
ER/DES/RES

C-3a

← Aging →



Major Safety Issues

- Will aging of safety systems, structures and components result in (I) common mode failures? (II) catastrophic failures?
 - Reducing defense-in-depth
 - Leading to an accident
 - Rendering the redundant, but aged, safety systems/equipment needed in accident mitigation inoperable
- How to assure operational readiness of aged safety systems and components?
 - During forty years design life
 - During extended life

BROAD TECHNICAL SAFETY ISSUES FOR AGING AND LIFE EXTENSION PROGRAMS

	AGING ISSUE	LIFE EXTENSION ISSUE
1. WHAT STRUCTURES, SYSTEMS, AND COMPONENTS ARE SUSCEPTIBLE TO AGING EFFECTS THAT COULD ADVERSELY AFFECT PUBLIC HEALTH AND SAFETY? WHICH OF THESE STRUCTURES, SYSTEMS, AND COMPONENTS ARE RENEWABLE (BY MAINTENANCE, REFURBISHMENT, REPLACEMENT, ETC.)	X	X
2. WHAT ARE THE DEGRADATION PROCESSES OF MATERIALS, COMPONENTS, AND STRUCTURES WHICH COULD, IF UNCHECKED (IMPROPERLY MAINTAINED AND/OR NOT REPLACED), AFFECT SAFETY DURING NORMAL DESIGN LIFE AND EXTENDED LIFE?	X	X
3. HOW CAN OPERATIONAL READINESS OF AGED STRUCTURES, SYSTEMS, AND COMPONENTS BE ASSURED DURING 40-YEAR DESIGN LIFE AND EXTENDED LIFE?	X	X

BROAD TECHNICAL SAFETY ISSUES FOR
AGING AND LIFE EXTENSION PROGRAMS (CONT.)

	AGING ISSUE	LIFE EXTENSION ISSUE
4. ARE CURRENTLY AVAILABLE EXAMINATIONS AND TEST METHODS ADEQUATE TO IDENTIFY ALL RELEVANT AGING MECHANISMS BEFORE SAFETY IS AFFECTED? IF NOT, WHAT EFFORTS ARE UNDERWAY TO IMPROVE THEM?	X	X
5. WHAT CRITERIA ARE REQUIRED TO EVALUATE RESIDUAL LIFE OF COMPONENTS AND STRUCTURES? WHAT SUPPORTING EVIDENCE (DATA, ANALYSES, INSPECTIONS, ETC.) WILL BE NEEDED? WHAT KIND OF INDEPENDENT NRC EFFORT IS REQUIRED IN CONSIDERATION OF PLANT-LIFE EXTENSION?		X
6. HOW SHOULD STRUCTURES, SYSTEMS, AND COMPONENTS BE SELECTED FOR COMPREHENSIVE AGING ASSESSMENTS AND RESIDUAL LIFE EVALUATIONS? WHICH STRUCTURES, SYSTEMS, AND COMPONENTS SHOULD BE SELECTED?	X	X

BROAD TECHNICAL SAFETY ISSUES FOR
AGING AND LIFE EXTENSION PROGRAMS (CONT.)

	AGING ISSUE	LIFE EXTENSION ISSUE
7. HOW EFFECTIVE ARE CURRENT PROGRAMS FOR MITIGATING AGING (E.G., MAINTENANCE, REPLACEMENT, AND REPAIR)?	X	X
8. WHAT KINDS OF RELIABILITY ASSURANCE AND MAINTENANCE PROGRAMS WILL BE NEEDED DURING EXTENDED LIFE?		X
9. WHAT ADDITIONAL CHANGES WILL BE NEEDED IN CODES AND STANDARDS TO SUPPORT RELICENSING, BEYOND THOSE CHANGES ALREADY IN PROGRESS? WHAT SCHEDULE SHOULD BE FOLLOWED?		X
10. WHAT KINDS OF RECORDS AND OTHER DOCUMENTATION ARE NEEDED TO SUPPORT LIFE EXTENSION?		X
11. WILL LICENSE RENEWALS BE BASED ON CURRENT LICENSING CRITERIA, THE LICENSING CRITERIA IN PLACE WHEN THE PLANT WAS BUILT, OR ON SOME OTHER SET OF CRITERIA?		X
12. WHAT ROLE SHOULD PLANT PERFORMANCE HAVE IN REGULATORY DECISIONS?	X	X

Program Goals

- To identify and characterize aging and service wear effects which, if unchecked could cause degradation of structures, components, and systems and thereby impair plant safety
- To identify methods of inspection, surveillance and monitoring, or of evaluating residual life of structures, components, and systems, which will assure timely detection of significant aging effects prior to loss of safety function
- To evaluate the effectiveness of storage, maintenance, repair, and replacement practices in mitigating the effects of aging and diminishing the rate and extent of degradation caused by aging and service wear

COMPONENTS

ORNL

0	MOTOR OPERATED VALVES	0	CHECK VALVES
0	AUXILIARY FEEDWATER PUMPS	0	POWER OPERATED RELIEF VALVES
0	SOLENOID OPERATED VALVES		(Ph. 1)

BNL

0	ELECTRIC MOTORS	0	CHARGERS/INVERTERS
0	CIRCUIT BREAKERS AND RELAYS		
0	MOTOR CONTROL CENTERS		

PNL

0	SNUBBERS	0	DIESEL GENERATORS	0	ROOM COOLERS (Ph. 1)
---	----------	---	-------------------	---	----------------------

INEL

0	BATTERIES
0	CABLES, CONNECTORS, PRESSURE-TEMP.-LEVEL SENSORS, PENETRATIONS
	(PRELIMINARY EVALUATION, AS PART OF REACTOR PROTECTION SYSTEMS)

Systems/Support Systems

- Reactor Protection System [INEL]
- Class 1E Electrical Distribution Systems [INEL]
- High Pressure ECCS [INEL]
- RHR/Low Pressure ECCS [BNL]
- Service Water System [PNL]
- Component Cooling Water System [BNL]
- AUX. Feedwater System [ORNL]

RECOMMENDATIONS FOR ADDITIONAL COMPONENTS

0	HEAT EXCHANGERS
0	COMPRESSORS
0	TRANSFORMERS (POWER, CURRENT, POTENTIAL)
0	ACCUMULATORS
0	ELECTRICAL PENETRATIONS
0	SURGE ARRESTERS (LOW VOLTAGE)
0	TERMINAL BLOCKS
0	AIR OPERATED VALVES
0	CONTROL ROD DRIVE MECHANISMS
0	ISOLATION CONDENSER (BWR)
0	MAIN STEAM ISOLATION VALVES
0	PURGE AND VENT VALVES
0	SAFETY AND RELIEF VALVES

RECOMMENDATIONS FOR ADDITIONAL SYSTEMS

- 0 RECIRCULATION PUMP TRIP ACTUATION INSTRUMENTATION (BWR)
- 0 REACTOR CORE ISOLATION COOLING SYSTEM
- 0 STANDBY LIQUID CONTROL SYSTEM (BWR)
- 0 CONTAINMENT ISOLATION
- 0 CONTAINMENT COOLING SYSTEMS

SPECIAL TOPICS

- 0 RISK AND SYSTEM ORIENTED IDENTIFICATION OF AGING EFFECTS
 - EVALUATION OF SYSTEMS LEVEL AGING EFFECTS FROM OPERATING EXPERIENCE
 - RISK EVALUATION OF AGING PHENOMENON
- 0 SHIPPINGPORT AGING EVALUATION
- 0 RESIDUAL LIFE ASSESSMENT OF COMPONENTS
- 0 AN HYBRID APPROACH TO QUANTIFICATION OF AGING

NRC Research Plan for Residual Life Assessment of Components

- Identify and rank major components according to their relevance to plant safety
- Identify degradation sites and life limiting processes for each major component
- Assess the adequacy of inspection and residual life assessment methods
- Prepare plan to determine residual life of major components

MAJOR COMPONENTS FOR PWR

1. REACTOR PRESSURE VESSEL
2. CONTAINMENT AND BASEMAT
3. REACTOR COOLANT PIPING AND SAFE-ENDS
4. STEAM GENERATORS
5. REACTOR COOLANT PUMP BODY
6. PRESSURIZER
7. CONTROL ROD DRIVE MECHANISMS
8. CABLES AND CONNECTORS
9. EMERGENCY DIESEL GENERATORS
10. RPV INTERVALS
11. RPV SUPPORTS AND BIOLOGICAL SHIELD

MAJOR COMPONENTS FOR B&E

1. CONTAINMENT AND BASEMAT
2. REACTOR PRESSURE VESSEL
3. RECIRCULATION PIPING, SAFE ENDS, AND SAFETY SYSTEM PIPING
4. RECIRCULATION PUMP BODY
5. CONTROL ROD DRIVE MECHANISMS
6. CABLES AND CONNECTORS
7. EMERGENCY DIESEL GENERATORS
8. RPV INTERNALS
9. REACTOR PEDESTAL
10. BIOLOGICAL SHIELD

UTILIZATION OF RESEARCH RESULTS (MAJOR ELEMENTS)

0	SUPPORT NRR IN RESOLUTION OF GENERIC ISSUES
0	SUPPORT NRR IN THE DEVELOPMENT OF POLICY, GUIDES, AND REVIEW PROCEDURES FOR LIFE EXTENSION/LICENSE RENEWAL
0	SUPPORT IE - PLANT PERFORMANCE INDICATOR PROGRAM
0	SUPPORT NRR - MAINTENANCE AND SURVEILLANCE PROGRAM
0	SUPPORT IE/REGIONS - INSPECTION, SAFETY SYSTEM FUNCTIONAL PROGRAM
0	SUPPORT THE DEVELOPMENT OF ASME AND IEEE CODES AND STANDARDS
0	SUPPORT RES - OPERATIONAL SAFETY RELIABILITY RESEARCH PROGRAM
	- PROBABILISTIC EVALUATION OF TECHNICAL SPECIFICATIONS PROGRAM
0	
0	
0	

MEETING WITH INDUSTRY STEERING COMMITTEE
FOR PLANT LIFE EXTENSION

AGING - LIFE EXTENSION RESEARCH

MATERIALS, ENGINEERING BRANCHES

DES/RES

FEBRUARY 5, 1987

NRC HEADQUARTERS, BETHESDA, MD

C. Z. SERPAN, JR.

REACTOR VESSELS

AGING

- O MAJOR ELEMENTS UNDER STUDY
- O MANY BASES ALREADY GOOD FOR 40 YEARS
- O TECHNICAL AREAS
 - PRESSURIZED THERMAL SHOCK
 - FRACTURE TOUGHNESS AND EMBRITTLEMENT
 - FRACTURE MECHANICS PREDICTION
AND EVALUATION METHODS
 - SURVEILLANCE DOSIMETRY
 - CRACK GROWTH

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL ISSUES
- O EMBRITTLEMENT AND DOSIMETRY > 40 YEARS
- O VESSEL ANNEALING
- O VESSEL REPLACEMENT
- O CORE INTERNALS EMBRITTLEMENT
- O CRD NOZZLE CRACKING

PIPING

AGING

- O MAJOR ELEMENTS UNDER STUDY
- O MANY BASES ALREADY GOOD FOR 40 YEARS
- O TECHNICAL AREAS
 - PIPE FRACTURE ANALYSIS AND TEST
 - CRACKING OF BWR STAINLESS
STEEL PIPES
 - WATER CHEMISTRY
 - PIPE WALL THINNING

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL ISSUES
- O AGING OF CAST STAINLESS STEEL
- O FATIGUE DESIGN LIFE REMAINING

STEAM GENERATORS

AGING

- O SURRY PROGRAM ONLY PARTIAL ANSWER
- O LOW PROBABILITY OF ALL GENERATORS REACHING 40 YEARS
- O WATER CHEMISTRY CONTROL
- O TECHNICAL AREAS
 - INTEGRITY OF DEGRADED TUBES
 - NDE ECT RELIABILITY
 - IN-SERVICE INSPECTION PLAN

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL AREAS
- O WATER CHEMISTRY
- O IMPROVED NDE RELIABILITY

NONDESTRUCTIVE EXAMINATION

AGING

- O MAJOR ELEMENTS UNDER STUDY
- O IMPROVEMENTS IN DETECTION AND SIZING RELIABILITY
IN UT AND A/E FOR 40 YEAR LIFE
- O UT OF OVERLAYS
- O TECHNICAL AREAS
ACCURATE DETECTION AND SIZING OF FLAWS IN:
 - CARBON STEEL VESSELS, NOZZLES AND PIPING
 - WROUGHT AND CAST STAINLESS STEEL COMPONENTS
 - BIMETALLIC JOINTS

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL AREAS
- O NDE METHOD FOR MATERIAL PROPERTIES
- O UT OF STAINLESS STEEL PIPE AND COMPONENTS
AND NOZZLES
- O UT OF STAINLESS CLADDING

CONCRETE STRUCTURES

AGING

- O INTRODUCTORY PROGRAM FORMULATED
- O REWORK AND INSPECTION REQUIREMENTS
FOR AGED CONCRETE STRUCTURES
- O TECHNICAL AREAS
 - REBAR REINFORCEMENT CORROSION
 - CHEMICAL REACTIONS WITHIN CONCRETE
 - MICROCRACKING DUE TO THERMAL AND CYCLIC LOADING
 - RADIATION EFFECTS ON CONCRETE DEGRADATION
 - DEGRADATION OF STRUCTURAL STIFFNESS
 - EFFECTS OF MAINTENANCE ON THE ABOVE

LIFE EXTENSION

- O NEED TO DEFINE CRITICAL ISSUES
- O DEGREE OF STRENGTH DEGRADATION BEYOND 40 YEARS
- O SHIFT OF SEISMIC RESPONSE FREQUENCY
- O CONTAINMENT RETENTION CAPABILITIES
- O DECREASE IN STRUCTURAL MARGINS
- O MAINTENANCE AND REPAIR REQUIREMENTS

3c

NUCLEAR PLANT LIFE EXTENSION
MEETING WITH NRC

FEBRUARY 5, 1987

C-3c

G. NEILS	CHAIRMAN, NUPLEX (NORTHERN STATES POWER)
D. HOSTETLER	VICE CHAIRMAN, NUPLEX (VIRGINIA POWER)
L. DEL GEORGE	CHAIRMAN, TECHNICAL SUBCOMMITTEE (COMMONWEALTH EDISON)
D. EDWARDS	CHAIRMAN, LICENSING SUBCOMMITTEE (YANKEE ATOMIC)
E. MERRICK	CHAIRMAN, CODES AND STANDARDS SUBCOMMITTEE (TVA)

INTRODUCTION

INDUSTRY LIFE EXTENSION ORGANIZATIONS

- NUMARC - EXECUTIVE OVERSIGHT
- NUPLEX STEERING COMMITTEE - OVERALL INDUSTRY COORDINATION AND INTERFACE WITH NRC
 - TECHNICAL SUBCOMMITTEE
 - LICENSING SUBCOMMITTEE
 - CODES AND STANDARDS SUBCOMMITTEE
- OWNERS GROUPS (B&W, BWR, CE, W)
- EPRI
- DOE
- CONTRACTORS

NUFLEX STEERING COMMITTEE

WHAT'S CHANGED - WHY LIFE EXTENSION ?

- THE MID - 1940'S TO MID 1970'S CONDITIONS
 - REGULAR AND PREDICTABLE LOAD GROWTH (7% - 9% PER YEAR)
 - SYSTEM GENERATION CAPACITY DOUBLING-TIME: 8 TO 10 YEARS
 - UNITS > 20 YEARS AGE REGULARLY < 20% OF EXISTING CAPACITY
 - OLDER UNITS REPLACED BY SMALL ADDITION TO NEXT NEW UNIT SIZE
 - ECONOMY OF SIZE AND TECHNOLOGY TO OFFSET RISING COSTS
 - ECONOMICS DROVE RETIREMENT OF 20-25 YEAR AGE UNITS
 - NEW CAPACITY PLANNING CYCLE 6 - 8 YEARS
 - RESERVE CAPACITY MARGIN 12% to 15%

THE MID - 1970'S TO MID - 1980'S

- NO GROWTH, SLOW GROWTH IN LOAD DEMAND
- NO NEW UNITS PLANNED AFTER 1973
- COMPLETED UNITS INITIATED PRIOR TO 1973 CREATED > 40% RESERVE
- NO ECONOMIC OFFSET TO BALANCE DRAMATICALLY INCREASING COSTS
- PLANNING CYCLE GREW TO 12 - 14 YEARS
- FUTURE LOAD/CAPACITY DEMAND UNPREDICTABLE
- NEW UNITS PLANNED UNTIL EXCESS RESERVE CAPACITY CONSUMED
- EACH YEAR, CAPACITY > 20 YEARS AGE IS BECOMING GREATER FRACTION OF
TOTAL GENERATION CAPACITY

● THE AGING NUCLEAR UNITS

- DEPRECIATED BOOK VALUE INCREASING EACH YEAR
- COST OF BACKFITS EXCEEDS ANNUAL DEPRECIATION
- MAINTAINED IN SAFE MATERIAL CONDITION

● LIFE EXTENSION BECOMING INCREASINGLY IMPORTANT

- EXTEND LIFE TO REDUCE RATE IMPACT OF DEPRECIATION EXPENSE
- AVOID INVESTMENT RISK FOR REPLACEMENT COST
- LEVELIZE CAPITAL BURDEN OF CONCURRENT NEW CAPACITY FOR REPLACEMENT AND GROWTH
- SPREAD DECOMMISSION COST OVER 60 - 70 YEARS LIFE CYCLE

NUPLEX OBJECTIVES

- COORDINATE INDUSTRY, DOE, EPRI PROGRAM EFFORTS
- DEVELOP GENERIC UTILITY ASSISTANCE
- SEEK REGULATORY POLICY, FRAMEWORK, PROCESS
 - RELEVANT TO "LIFE AFTER 40" ONLY
 - IN PLACE ON TIME TO MEET INDUSTRY NEED
 - NOT UNDULY ONERUS
 - REASONABLE APPLICATION PROCESS TIME
 - COMPATIBLE WITH UTILITY PLANNING CYCLE LEAD TIME
- PROVIDE A FOCUS FOR RAPIDLY GROWING INDUSTRY INTEREST AND PARTICIPATION/
PREVENT UNDUE BURDEN ON NRC

NUPLEX 5-YEAR PROGRAM PLAN

CODES AND STANDARDS

Codes and Standards Subcommittee

Charter

- Act as a link between the Steering Committee and various organizations working on codes and standards for life extension
- Monitor the activities of code and standards organizations that may affect life extension
- Assure that issues developed in industry sponsored studies and methods developments are appropriately considered in amended codes and standards
- Communicate the Steering Committee's recommendations

Codes and Standards Subcommittee

Membership and Responsibilities

- Subcommittee membership should be represented by a cross-section of knowledge. These should include metallurgy and materials, mechanical, electrical, civil/structural disciplines.
- Voting membership of the subcommittee will be restricted to utility employees.
- Consultants may attend on an as-needed basis, either as requested by the Subcommittee or as designated by a utility as their representative.
- The Chairman will represent the Steering Committee as a member of the National Board of Codes and Standards.
- Individual Subcommittee members will represent the Steering Committee on designated codes and Standards Organizations, working groups, and task forces.
- The Subcommittee representatives will identify the specific actions before Codes and Standards Committees to the Chairman and propose utility positions regarding these actions for subsequent presentation to the Subcommittee and to the Steering Committee.
- After the Steering Committee has approved a position, the Subcommittee representative will convey these approved positions to the respective organization for incorporation. Other utility representatives on various Codes and Standards organizations will be advised of these positions.
- The Subcommittee Chairman assures, via his voting rights on the National Board, that these positions have been adequately implemented.

Codes and Standards Subcommittee

Deliverables

- Progress/Status Reports
- Position Papers; contents include:
 - the reason for the need for a Code or Standard revision
 - whether the need is primarily to satisfy regulatory issues, as contrasted with a reliability issue, or whether it addresses both
 - whether the need is procedural(i.e, a paper process) or is directly related to material conditions
 - what has been proposed; and by whom
 - the knowledge base from which the methods can be validated
 - what sort of evidence will be required to show conformance
 - the state of the art for providing the required evidence
 - how the proposed code or standard is intended to be used by utilities
 - how it is to be enforced; where and when it will be applicable
 - assessment with respect to the backfit rule philosophy; if possible, a realistic cost-benefit analysis should be performed
 - consequences of not developing a proposed code or standard

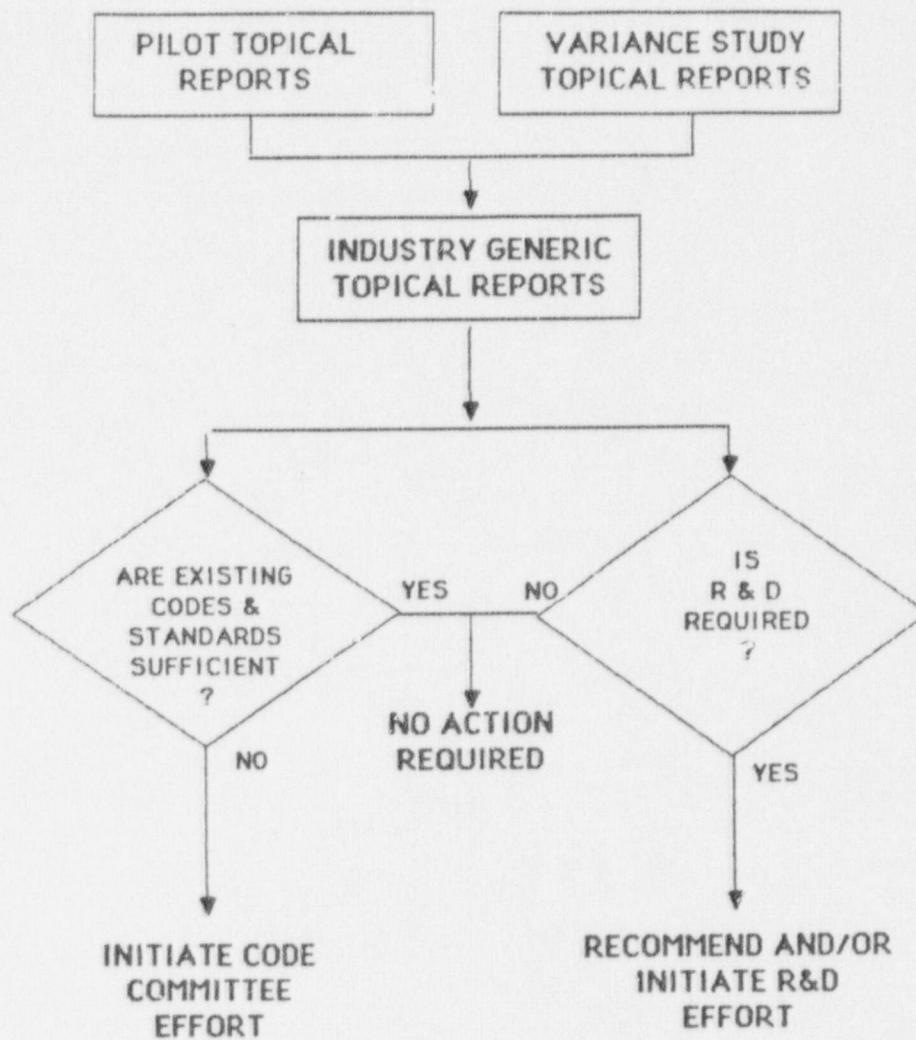


Figure 1

REGULATORY APPROACH

THEME: CONTINUATION OF SAFE/RELIABLE PERFORMANCE

- 40 YEAR LICENSE TERM DERIVED FROM AUTHORIZATION PERIOD
- RENEWAL NEED NOT BE A WATERSHED EVENT
 - NO DIRECT TIE TO SAFETY OR ENVIRONMENTAL IMPACT
 - FOCUSED REVIEW TO CONFIRM ADEQUACY
- SCOPE NECESSARILY LIMITED - ENABLES PROPOSED TIMETABLE
- ALLOW ECONOMIC DECISION ON LIFE EXTENSION

KEY ELEMENTS OF INDUSTRY POSITION

PRICIPLES

RENEWAL PROCESS DEALS WITH A KNOWN ENTITY

FOCUS ON AGE-RELATED DEGRADATION OF SAFETY-RELATED EQUIPMENT

MAINTENANCE OF THE EXISTING LEVELS OF SAFETY

MAINTENANCE OF THE EXISTING LICENSE/DESIGN BASIS

FLEXIBILITY NEEDED

MANIFESTATION

ENVIRONMENTAL ASSESSMENTS ARE ADEQUATE

PROCESS LOOKS LIKE AN AMENDMENT

RENEWAL PROCESS WILL DEAL WITH A KNOWN ENTITY

- PLANT DESIGN
+
OPERATING STAFF
+
CORPORATE MANAGEMENT } → PERFORMANCE
- PERFORMANCE OVER TIME → OPERATING HISTORY
(OPERATING DATA)
- OPERATING DATA ENABLES EVALUATION OF AGE-RELATED DEGRADATION
- OPERATING HISTORY CAN AID JUDGEMENT
 - STAFF CONFIDENCE IN LICENSEE
 - DEGREE OF DOCUMENTATION
 - VARIABILITY IN APPROACH
- RENEWAL APPLICATION IS NOT A HYPOTHETICAL PROPOSAL

FOCUS ON AGE-RELATED DEGRADATION OF SAFETY-RELATED EQUIPMENT

- LOGICAL CRITERION FOR PLEX
 - DOES (ITEM) HAVE SIGNIFICANT IMPACT ON OVERALL PLANT SAFETY
 - DOES MECHANISM BECOME OF CONCERN ONLY IN EXTENDED OPERATION
- SHOWING OF ADEQUACY OF EXISTING MONITORING AND MAINTENANCE PROGRAMS
- USE OF OPERATING DATA
- USE OF PROBABILISTIC TECHNIQUES

EXISTING LEVELS OF SAFETY WILL BE MAINTAINED
AND
EXISTING LICENSING/DESIGN BASIS WILL BE MAINTAINED

(I.E. THE STANDARD FOR JUDGEMENT SHOULD NOT CHANGE)

- EACH PLANT SATISFIES THE REGULATIONS
 - UNIQUE DESIGN
 - UNIQUE TIMING OF SUBSEQUENT REQUIREMENTS
 - "NEW" SAFETY INFORMATION HAS BEEN INCORPORATED
 - FLEXIBILITY NECESSARY TO ACCOMMODATE DIFFERENCES
- BACKFIT RULE IS PART OF THE BODY OF REGULATIONS
 - DOES NOT PREVENT BACKFITS
 - GUIDES DECISIONS ON APPLICABILITY
- PERFORMANCE OF MATURE PLANTS HAS NOT BEEN DECREASED WITH AGE

ENVIRONMENTAL ASSESSMENTS (EA'S) ARE ADEQUATE

- RENEWAL APPLICATION WOULD PROMPT AN E.A.
 - STAFF EXPERIENCED IN PREPARATION
 - SAME PROCESS FOR ALL LICENSE AMENDMENTS
- E.A. COULD DISCLOSE ANY SIGNIFICANT IMPACTS
 - RELATED TO PREVIOUS ENVIRONMENTAL STUDIES
 - DETERMINE IF IMPACTS ARE BEYOND MITIGATION
 - EFFECTS LIKELY TO BE SIGNIFICANT
 - TYPICALLY CONSISTANT WITH PROJECTIONS
- OVERALL PROCESS SIMILAR TO AMENDMENT
 - RENEWAL TREATED UNDER AMENDMENT PROCEDURES
(50.90 - 50.92)

TASKS FOR LICENSING SUB-COMMITTEE IN 1987

- RESPONSE TO COMMENTS BY OTHERS
- POLICY WHITE PAPER
 - DISTILLATION OF DOCUMENT TO DATE
 - AVAILABLE FOR USE BY OTHERS
- MONITORING AND SUPPORT OF CP/OL APPLICATIONS
- LISTING OF POTENTIAL REGULATION CHANGES
 - FEW IN NUMBER - BASED ON PREMISE OF APPLICABILITY OF AMENDMENT PROCESS
 - DRAFT OF RULEMAKING PETITIONS 10 CFR 51.20(B)(2)

SUMMARY

A PRESENTATION ON THE REGULATORY
ASPECTS OF LICENSE RENEWAL

April 22, 1987

TOPICS

PURPOSE OF MEETING

BACKGROUND OF NESP STUDY

CONCLUSIONS RE: FRAMEWORK OBSERVATIONS

THEMES RE: APPROACH

TECHNICAL ASPECTS OF LICENSE RENEWAL

PROCEDURAL ASPECTS OF LICENSE RENEWAL

QUESTIONS & ANSWERS

* * * * *

CURRENT STATUS OF INDUSTRY EFFORTS ON LIFE EXTENSION

FUTURE INFORMATION EXCHANGE MEETINGS

PURPOSE OF MEETING

- TO PRESENT KEY CONCLUSIONS OF THE RECENT NESP STUDY, "REGULATORY CONSIDERATIONS FOR EXTENDING THE LIFE OF NUCLEAR POWER PLANTS" (AIF/NESP - 040, December 1986)
 - NESP REPORT IS AN INITIAL EXAMINATION OF KEY ISSUES
 - THE CONCLUSIONS AND ANALYSES IN NESP-040 SHOULD BE VIEWED AS A USEFUL STARTING POINT FOR THE DEVELOPMENT AND COMMUNICATION OF ISSUES AND KNOWLEDGE CONCERNING LIFE EXTENSION AND LICENSE RENEWAL.
- TO EXPLAIN THE RATIONALE BEHIND THESE CONCLUSIONS
- TO PROVIDE NRC'S CONTRACTOR (MITRE) AN OPPORTUNITY TO ASK QUESTIONS OF THE SPONSORS AND AUTHORS OF NESP - 040 AS A PRELUDE TO MITRE'S FORTHCOMING RESEARCH EFFORTS TO EXPLORE LICENSE RENEWAL POLICY OPTIONS FOR THE NRC

ATOMIC INDUSTRIAL FORUM/
NATIONAL ENVIRONMENTAL STUDIES PROJECT
STUDY SCOPE & OBJECTIVES

- Identify Issues to be Addressed by Utilities and by NRC in Establishing Federal Policy for License Renewal
- Evaluate Issues and Recommend Specific Policy Alternatives
- Identify Timing Issues Associated with License Renewal
- Assess Utility and NRC Actions to Arrive at License Renewal Policy, and Provide a Roadmap for Taking Such Actions

AIF/ NESP

SCOTT LEIPER - PROJECT MANAGER

MELINDA RENNER - MANAGER, SPECIAL PROJECTS

AIF/ NESP TASK FORCE

CHAIRMAN - DENNIS COX
SOUTHERN CALIFORNIA EDISON

MEMBERSHIP

13	UTILITY SPECIALISTS
1	A-E REPRESENTATIVE
1	CONSULTANT REPRESENTATIVE
4	NSSS VENDOR REPRESENTATIVES
1	DOE REPRESENTATIVE
1	EPRI LIAISON

slide # 5

CONTRACTOR

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(CONSULTANT)

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(STRATTON & ASSOC. - FORMER ACRS
MEMBER)

MILESTONES

OCTOBER	1985	STUDY INITIATED
FEBRUARY	1986	KEY ISSUES IDENTIFIED AND PRESENTED TO AIF NESP TASK FORCE
APRIL	1986	DRAFT REPORT REVIEWED WITH PROJECT ADVISORY GROUP
JUNE	1986	DRAFT REPORT REVIEWED WITH AIF NESP TASK FORCE FOR COMMENT
JULY	1986	AIF TASK FORCE COMPLETE REVIEW AND COMMENT ON REPORT
AUGUST	1986	GROVE ENGINEERING REVISE AND SUBMIT FINAL REPORT
OCTOBER	1986	NESP TECHNICAL ADVISORY GROUP APPROVAL
DECEMBER	1986	FINAL REPORT PUBLISHED

CONCLUSION RE: PROCESS FOR POLICY DEVELOPMENT

(CHAPTER 2 - APPROACH AND SCHEDULE)

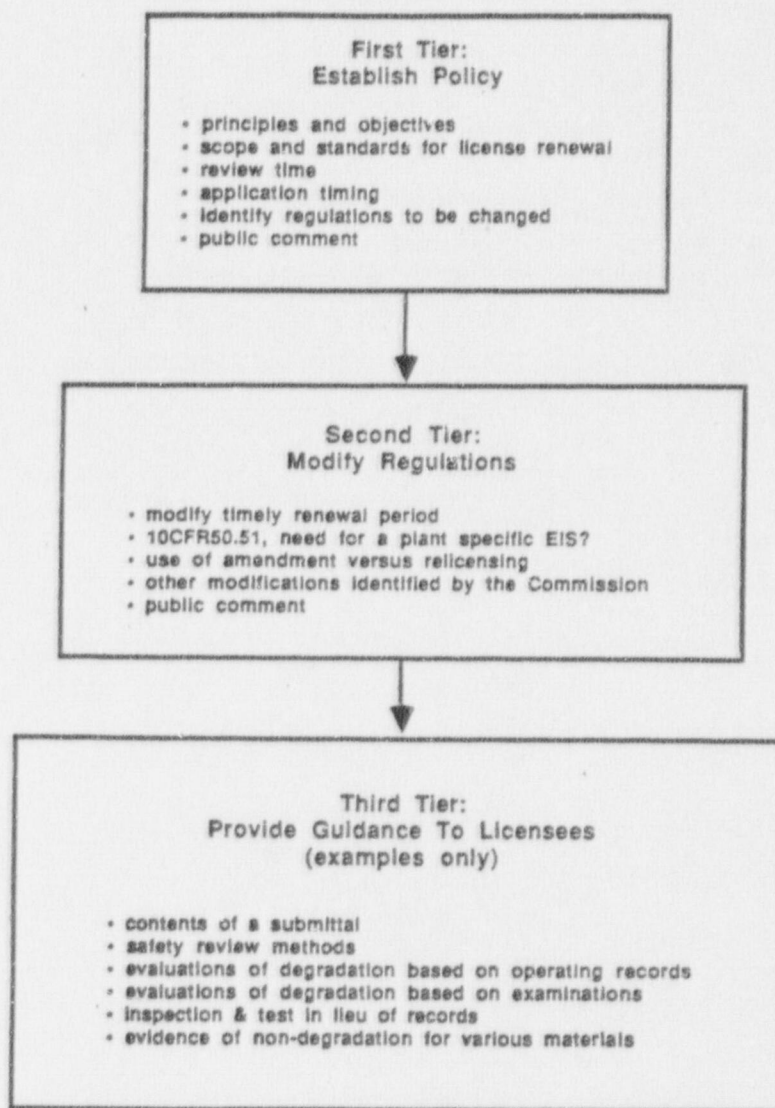
FRAMEWORK OBSERVATIONS

AD HOC APPROACH VERSUS FORMAL POLICY MECHANISM

RECOMMENDED THREE TIER APPROACH - WHAT IT IS AND RATIONALE

TIERS 1 AND 2 - POLICY STATEMENT AND CHANGES TO REGULATIONS

TIER 3 - IMPLEMENTING PROCEDURES AND GUIDES



Three Tiered Approach To Establishing
A License Renewal Process



NRC ACTIONS

- Develop Policy (Tier 1)
- Modify Regulations (Tier 2)
- Staff Guidance (Tier 3)
- Act on First Applications

Act on Follow on Applications

UTILITY INDUSTRY
GENERIC ACTIONS
(includes D/E/EPRI efforts)

Tier 1: provide input to NRC policy development, draft NRC policy and rules

Tier 2: other industry R&D efforts (typical reports, revised codes and standards, generic guides for license renewal applications, etc.)

Tier 3: submit to NRC and iterate, comment on Reg Guide revisions

ACTIONS BY LICENSEES

expansive data recording per output of pilot plant projects/generic R&D

develop and prepare lead renewal applications, interact w/NRC, approve

submit, NRC action on applications, docket first "routine" application

SCHEDULE FOR DEVELOPMENT OF NRC POLICY/PROCESS FOR LICENSE RENEWAL

THEMES RE: APPROACH

(CHAPTER 5 - SECTIONS 5.2 TO 5.9)

THEME 1 - THE CONTINUITY THEME

"EXTENDING PLANT LIFE BEYOND 40 YEARS IS A REAFFIRMATION OF THE ONGOING AND CONTINUOUS PROCESS OF HARDWARE RENEWAL THAT IS AN INTEGRAL PART OF EVERY NUCLEAR POWER PLANT'S OPERATING PROGRAM. . . THE PRACTICE OF FOCUSING ON SPECIFIC DEGRADATION MECHANISMS AND ESTABLISHING CRITERIA TO ASSURE CONTINUED SAFETY OF THE PUBLIC IS THUS ALREADY AN ESTABLISHED POLICY AT THE NRC. LICENSE RENEWAL CAN BE VIEWED AS A CONTINUATION OF THIS POLICY, AND AN OPPORTUNITY TO OVERSEE ITS OVERALL APPLICATION TO BE SURE NOTHING HAS BEEN MISSED."

THEME 2 THE EXTANT LICENSING BASIS CONCLUSION

"BASED ON THE OVERALL SAFETY RECORD OF NUCLEAR POWER PLANTS DURING THEIR INITIAL TERMS, IT DOES NOT SEEM APPROPRIATE FOR NRC TO INCLUDE NEW CRITERIA IN THE SAFETY EVALUATION OF INDIVIDUAL COMPONENTS OR STRUCTURES FOR LICENSE RENEWAL. IT IS RECOMMENDED THAT THE OVERALL COMMISSION POLICY BE ESTABLISHED ON THIS PREMISE."

THEME RE: APPROACH - The Continuity Theme

- OWNERS ALREADY PERIODICALLY EVALUATE MATERIAL CONDITIONS
- AND OWNERS UPGRADE AND MAINTAIN HARDWARE BASED ON THESE PERIODIC EVALUATIONS
- NRC OVERSEES THE OWNER PROGRAMS TO MAINTAIN THE MATERIAL CONDITION OF THE PLANT
- THE PERIODIC OWNER EVALUATION PROGRAMS ALSO PROJECT FUTURE PERFORMANCE
- LIFE EXTENSION EVALUATIONS MERELY LENGTHEN THE PROJECTION TIME FRAME
- LICENSE RENEWAL EVALUATIONS LOOK AT THE SAFETY RELATED ASPECTS OF SUCH OWNER EVALUATIONS

- IN SUMMARY, THE "CONTINUITY" THEME SAYS THAT AN EVALUATION FOR LICENSE RENEWAL IS REALLY AN EXPANSION OF WHAT THE LICENSEE ALREADY DOES PERIODICALLY.

THE METHOD USED TO CONDUCT THE PERIODIC EVALUATIONS, AND THE SPECIFIC ONE FOR LICENSE RENEWAL, CAN TAKE MANY DIFFERENT FORMS.

IF NEW EVALUATION METHODS, CODES AND STANDARDS, AND REGULATORY APPROACHES ARE REQUIRED FOR AGING, THEY ARE NEEDED DURING THE INITIAL TERM AND NOT JUST FOR LICENSE RENEWAL. THEY SHOULD NOT BE TIED TO LICENSE RENEWAL.

THEREFORE, LICENSE RENEWAL ITSELF IS NOT A "WATERSHED" EVENT FROM AN ENGINEERING POINT OF VIEW. THE REGULATORY PROCESS SELECTED FOR LICENSE RENEWAL SHOULD BE ESTABLISHED ACCORDINGLY.

ALTERNATIVE CONSIDERED

THE NESP STUDY CONCLUDED THAT SUBJECTING THE ENTIRE PLANT TO A THOROUGH AND COMPREHENSIVE SAFETY EVALUATION, EITHER DETERMINISTIC OR PROBABILISTIC, OR SOME COMBINATION, WAS NOT RECOMMENDED FOR SEVERAL REASONS:

- **OPERATING EXPERIENCE** AND DATA ON THE CONTINUING MATERIAL CONDITION OF THE PLANT ARE A MORE RELIABLE INDICATION OF SAFETY THAN ANALYSES OF HYPOTHETICAL EVENTS.
- SUCH AN APPROACH IS INCONSISTENT WITH THE REGULATORY POSITION WHICH SAYS **THE PLANT IS SAFE ON THE 40TH YEAR OF OPERATION**. ANY CONCERNS ABOUT THE OVERALL SAFETY OF THE PLANT AFTER YEAR 40, WOULD ALSO BE RELEVANT TO EVALUATING THE PLANT DURING ITS INITIAL TERM. THE OWNERS' AND REGULATORS' ACTIONS TO ASSURE SAFETY DURING THE INITIAL TERM, MUST, BY DEFINITION, BE SUFFICIENT TO ASSURE SAFETY DURING THE EXTENDED TERM.

THEMES RE: APPROACH - The Licensing Basis

- RATIONALE SIMILAR TO CONTINUITY RATIONALE
- IF PUBLIC SAFETY IS PROTECTED AT YEAR 40...ALSO PROTECTED AT YEAR 41
- IF NEW INFORMATION DEVELOPS AFTER INITIAL LICENSING, NRC APPLIES ON CASE BASIS...DOESN'T WAIT FOR RENEWAL
 - TMI ACTION PLAN ITEMS
 - PRESSURIZED THERMAL SHOCK
- CONSISTENT WITH CURRENT PRACTICE TO APPLY HIGHER STANDARDS TO NEWER PLANTS, WHILE ALLOWING OLDER PLANTS TO CONTINUE OPERATING UNDER PRIOR STANDARDS
 - CURRENT NEW SOURCE PERFORMANCE STANDARDS FOR FOSSIL PLANTS
 - NAVAL PLANTS
- SAFETY IS COMBINATION OF OPERATING SKILL AND MATERIAL CONDITION OF PLANT. OLDER PLANTS HAVE LONG TERM DEMONSTRATION OF SAFETY VIA OPERATING RECORD

TECHNICAL ASPECTS OF LICENSE RENEWAL

- PRESUMPTION - CONTINUITY THEME IS ACCEPTED
- SCREENING PROCESS
 - For Owner: system-by-system review for age-related degradation
 - For NRC: that subset of owner evaluation which affects safety
 - For Both: identify subset which involves routine inspection, maintenance, replacement. Assure program remains effective.
 - Remaining components/systems need to have special evaluations
- COMPONENT EVALUATION PROCESS
 - Key is to evaluate and project performance of remaining components against approved design criteria. Use operational and inspection data, and analytical tools.
 - Use generic methods where possible . . . Industry Topical Reports
 - Codes and standards amended as appropriate

- THE BACKFIT RULE

- If, in projecting the future performance of a key component, NRC chooses to use new technical criteria, Backfit Rule should apply.

- PLANT UPGRADES AND MODIFICATIONS

- OPERATING EXPERIENCE

- Main rationale for selecting review process and criteria. . .
- Therefore, should consider in renewal review.
- The most relevant information which supports engineering determination on material condition of plant.
- Maintenance and inspection results and data - system by system.
- Operational performance of entire systems as evidence of continued satisfactory operation.

- ENVIRONMENTAL REPORT

- Evaluate any changes in site factors - cooling water, etc., which could Affect safe plant performance.
- Evaluate efforts to minimize worker exposure and projected future exposure.
- Basis for NRC environmental assessment.

PROCEDURAL ASPECTS OF LICENSE RENEWAL

- NEPA CONSIDERATIONS

- PEIS
- EIS versus EA

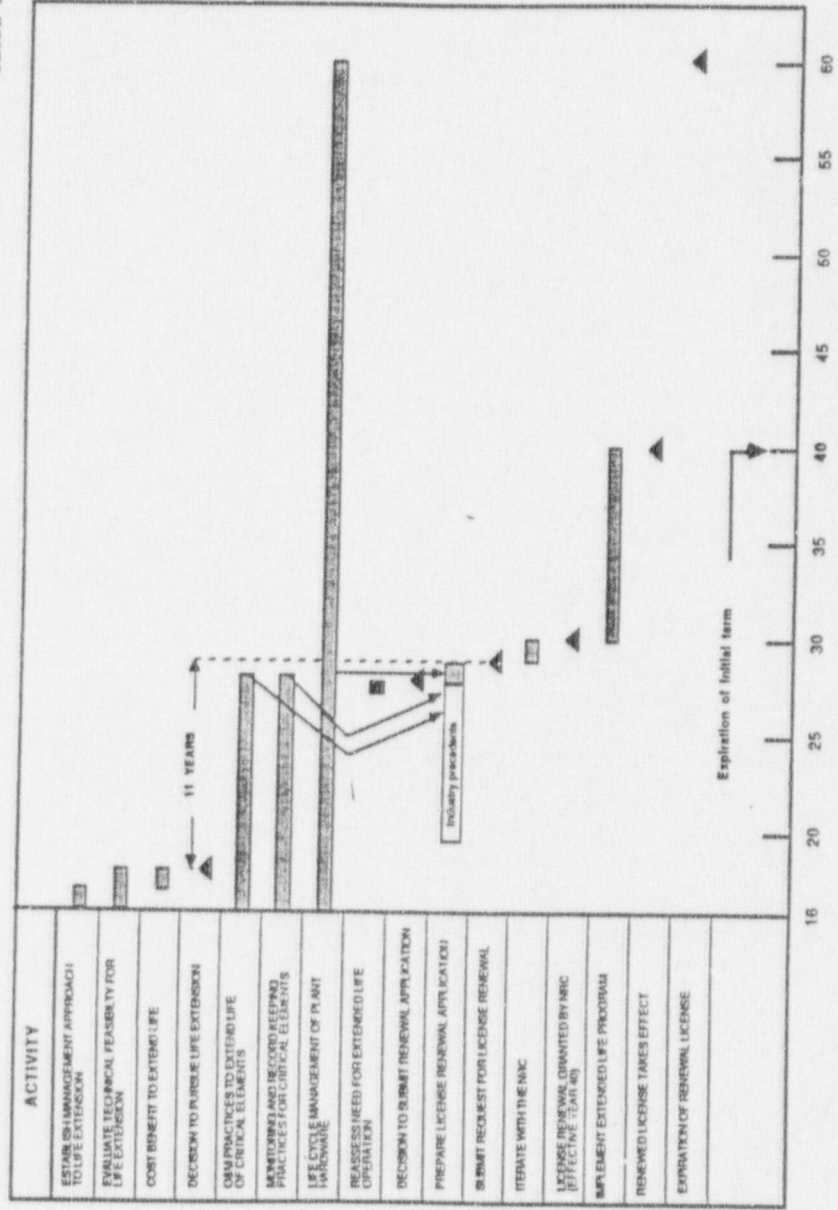
- TIMELY RENEWAL DOCTRINE

- HEARINGS

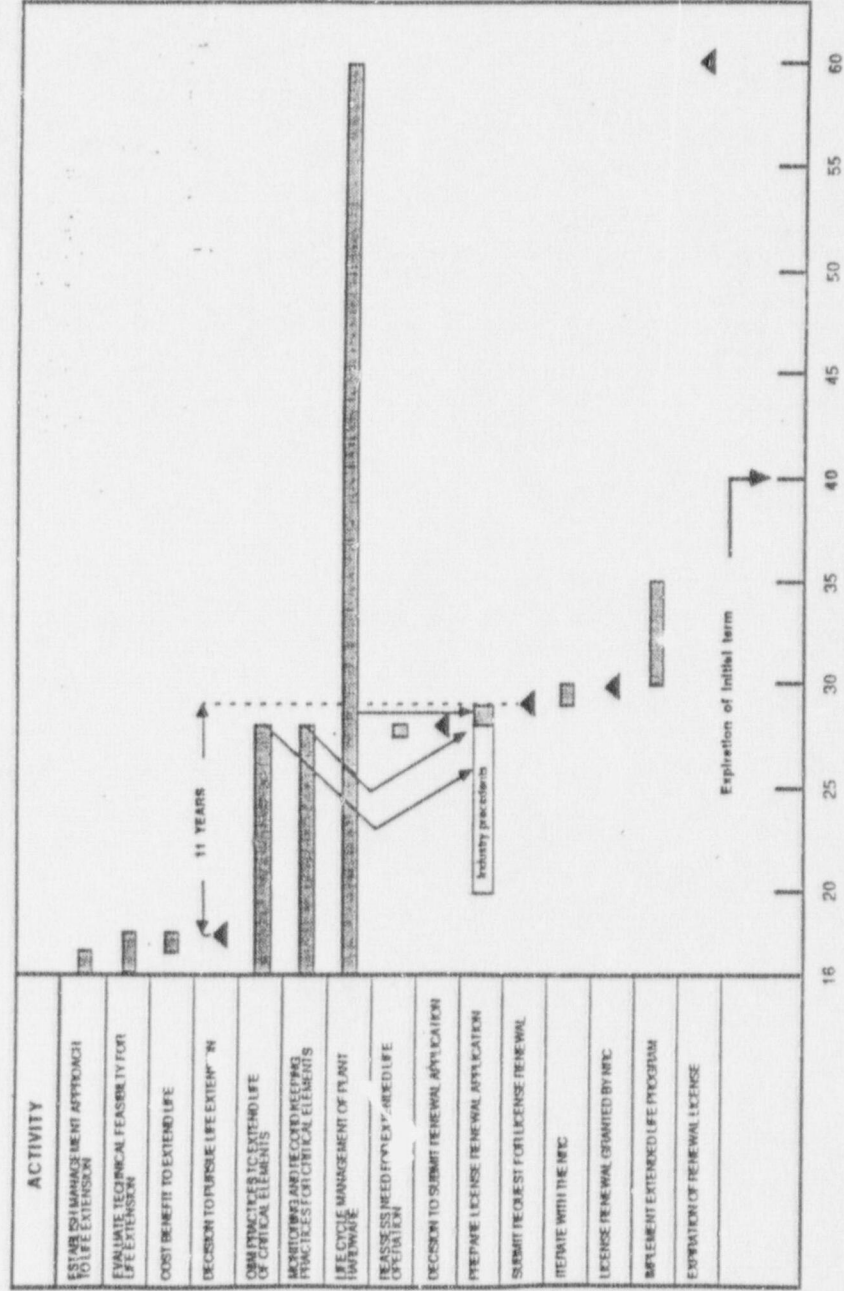
- NATURE
- TIMING

- EFFECTIVE DATE OF RENEWED LICENSE

- TACK-ON
- SUPERSESSION



Start Program At Year 16 - Apply For Renewal At Year 29
Effective Year 40 For An Additional 20 Years



Supersession Renewal:
 Start Program At Year 16 - Apply For Renewal At Year 29
 Effective Year 30 For A Total Of 60 Years

INDUSTRY LIFE EXTENSION ORGANIZATIONS

- NUMARC - EXECUTIVE OVERSIGHT
- NUPLEX STEERING COMMITTEE - OVERALL INDUSTRY COORDINATION AND INTERFACE WITH NRC
 - TECHNICAL SUBCOMMITTEE
 - LICENSING SUBCOMMITTEE
 - CODES AND STANDARDS SUBCOMMITTEE
- OWNERS GROUPS (B&W, BWR, CE, W)
- EPRI
- DOE
- CONTRACTORS

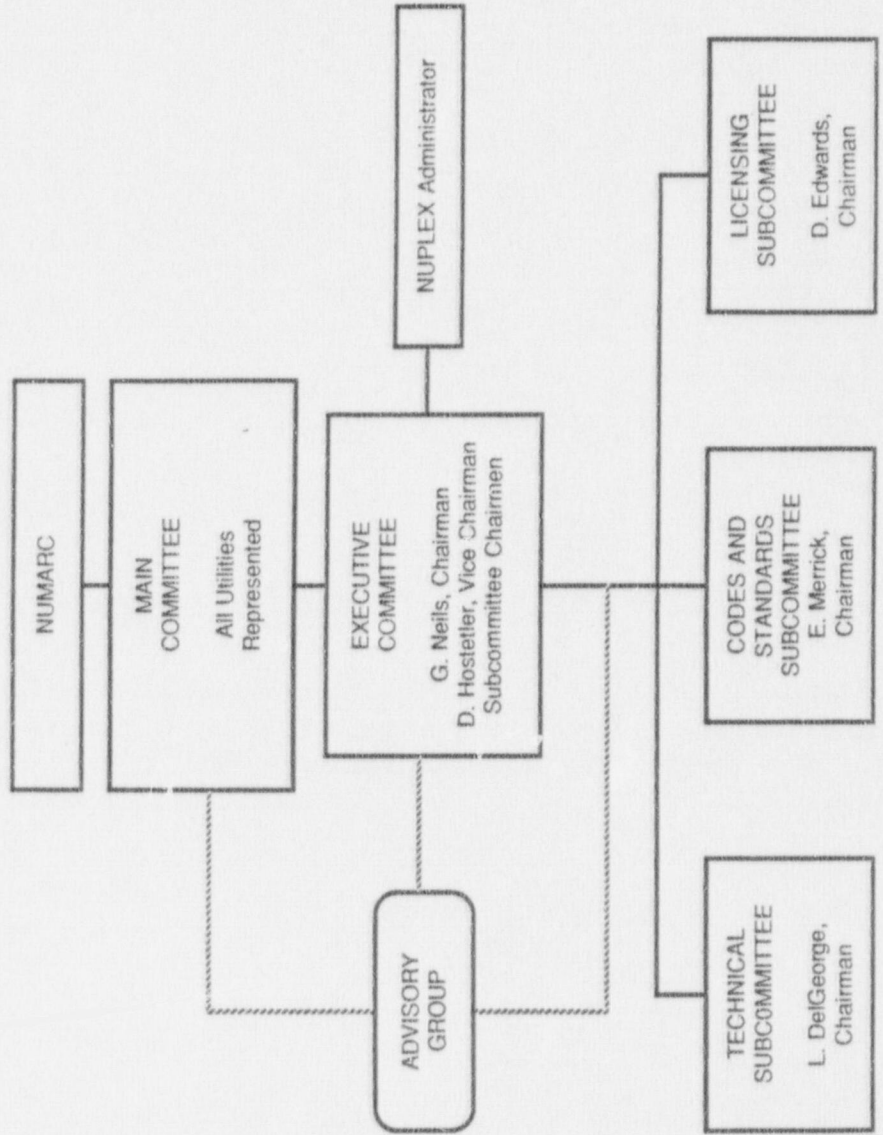
NUPLEX OBJECTIVES

- COORDINATE INDUSTRY, DOE, EPRI PROGRAM EFFORTS
- DEVELOP GENERIC UTILITY ASSISTANCE
- SEEK REGULATORY POLICY, FRAMEWORK, PROCESS
 - CLEAR, PREDICTABLE, WORKABLE
 - IN PLACE ON TIME TO MEET INDUSTRY NEED
 - REASONABLE APPLICATION PROCESS TIME
 - COMPATIBLE WITH UTILITY PLANNING CYCLE LEAD TIME
- PROVIDE A FOCUS FOR RAPIDLY GROWING INDUSTRY INTEREST AND PARTICIPATION
- OPTIMIZES RESOURCE REQUIREMENTS FOR BOTH INDUSTRY AND NRC

NUPLEX PROGRAM

- IN ORDER TO PLAN FOR FUTURE POWER NEEDS, SOME OWNERS WILL NEED LICENSE RENEWAL IN HAND BY 1995.
- FIRM NRC POLICY AND PROCESS FOR LICENSE RENEWAL ARE NEEDED IN 1991 TO SUPPORT PREPARATION, REVIEW, AND APPROVAL OF THE FIRST APPLICATIONS.
- NRC'S RECENT EFFORTS TO ACCELERATE DEVELOPMENT OF LICENSE RENEWAL POLICY ARE APPRECIATED BY THE INDUSTRY.
- NUPLEX STEERING COMMITTEE EFFORTS FOCUS ON **GENERIC** ACTIVITIES SO OWNERS CAN USE COMMON TECHNIQUES FOR LIFE EXTENSION EVALUATIONS.
- A GENERIC APPROACH IS ALSO DESIREABLE FOR REGULATORY REVIEW BY NRC.
- THE DEVELOPMENT OF AN EFFICIENT AND STABLE LICENSE RENEWAL PROCESS WILL BE OF BENEFIT TO BOTH THE INDUSTRY AND THE NRC
- THEREFORE, WE BELIEVE THAT CLOSE INTERACTION BETWEEN NUPLEX AND NRC IS ESSENTIAL.
- THE NUPLEX APPROACH DRAWS HEAVILY ON THE RECOMMENDATIONS OF THE AIF/NESP STUDY ON THE REGULATORY ASPECTS OF LIFE EXTENSION.

NUPLEX STEERING COMMITTEE ORGANIZATION



OVERVIEW OF PLANNED STEERING COMMITTEE ACTIVITIES

1. TECHNICAL SUBCOMMITTEE ACTIVITIES

- EXISTING PILOT STUDIES
- VARIANCE STUDIES
- INDUSTRY TOPICAL REPORTS AND NRC ITERATION
- IDENTIFY AND MONITOR RESOLUTION OF TECHNOLOGY ISSUES
- PLANNING AND INFORMATION SYSTEMS
- DECISIONMAKING TOOLS
- GENERIC METHODOLOGIES

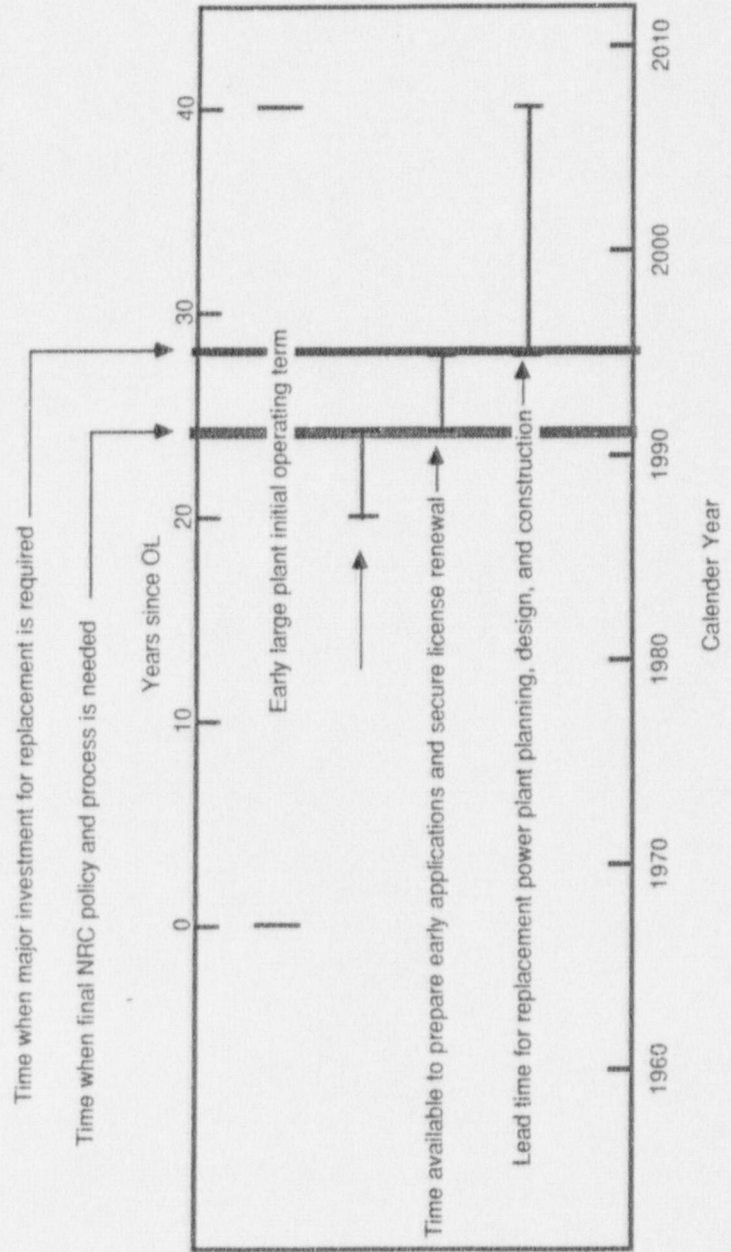
2. CODES AND STANDARDS SUBCOMMITTEE ACTIVITIES

- LIAISON WITH CODES AND STANDARDS COMMITTEES
- LIAISON WITH STEERING COMMITTEE SUBCOMMITTEES

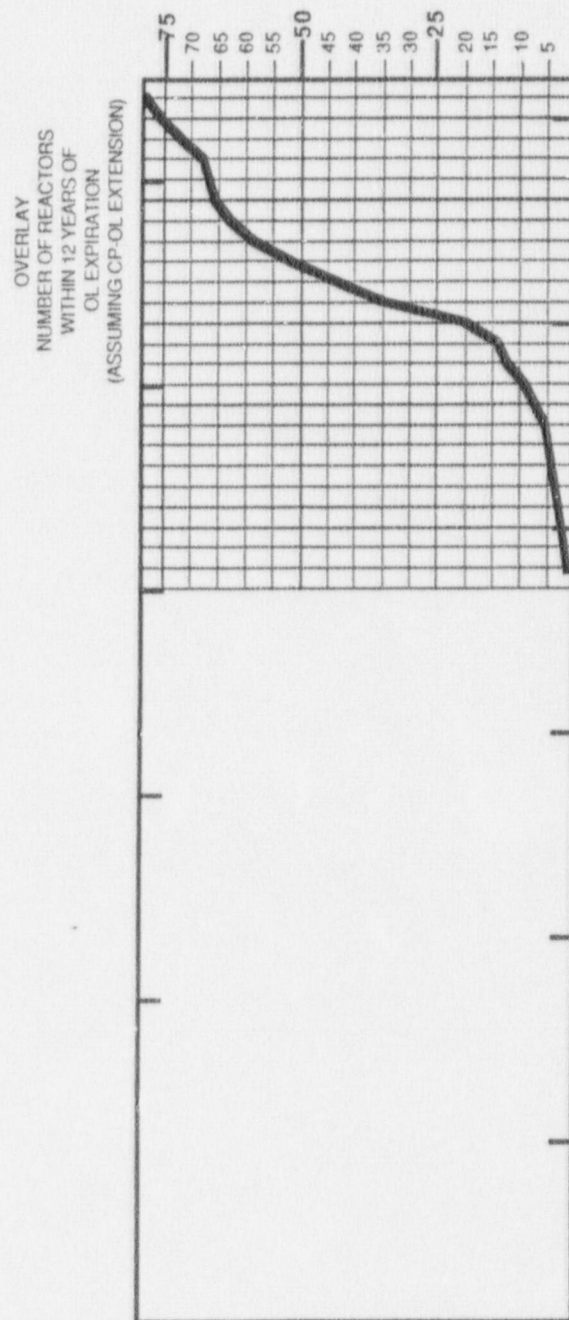
3. LICENSING SUBCOMMITTEE ACTIVITIES

- TIMING ISSUES AND SCHEDULES
- GUIDANCE DOCUMENTS
- REGULATORY POLICY POSITIONS

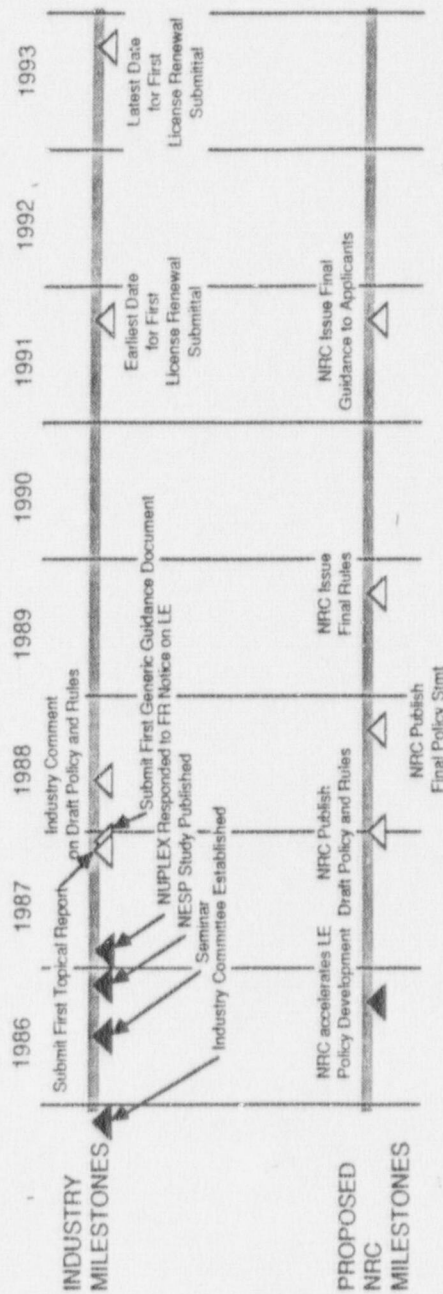
LIFE EXTENSION AND LICENSE RENEWAL TIMING



SLIDE # 26b



MILESTONES



▲ Completed Milestone

△ Future Milestone

A PRESENTATION ON THE
REGULATORY ASPECTS
OF LICENSE RENEWAL

To: Nuclear Regulatory Commission

By: NUPLEX Steering Committee

May 27, 1987

AGENDA

OPENING REMARKS; INTRODUCTION	G. NEILS
PURPOSE OF MEETING/ BACKGROUND OF NESP STUDY	D. EDWARDS
FRAMEWORK OBSERVATIONS	M. ROWDEN
SUBSTANTIVE ELEMENTS OF LICENSE RENEWAL	H. FEINROTH
PROCEDURAL ASPECTS OF LICENSE RENEWAL	J. KRAEMER
TIMING	D. HOSTETLER
INDUSTRY PERSPECTIVE	G. NEILS
DISCUSSION	

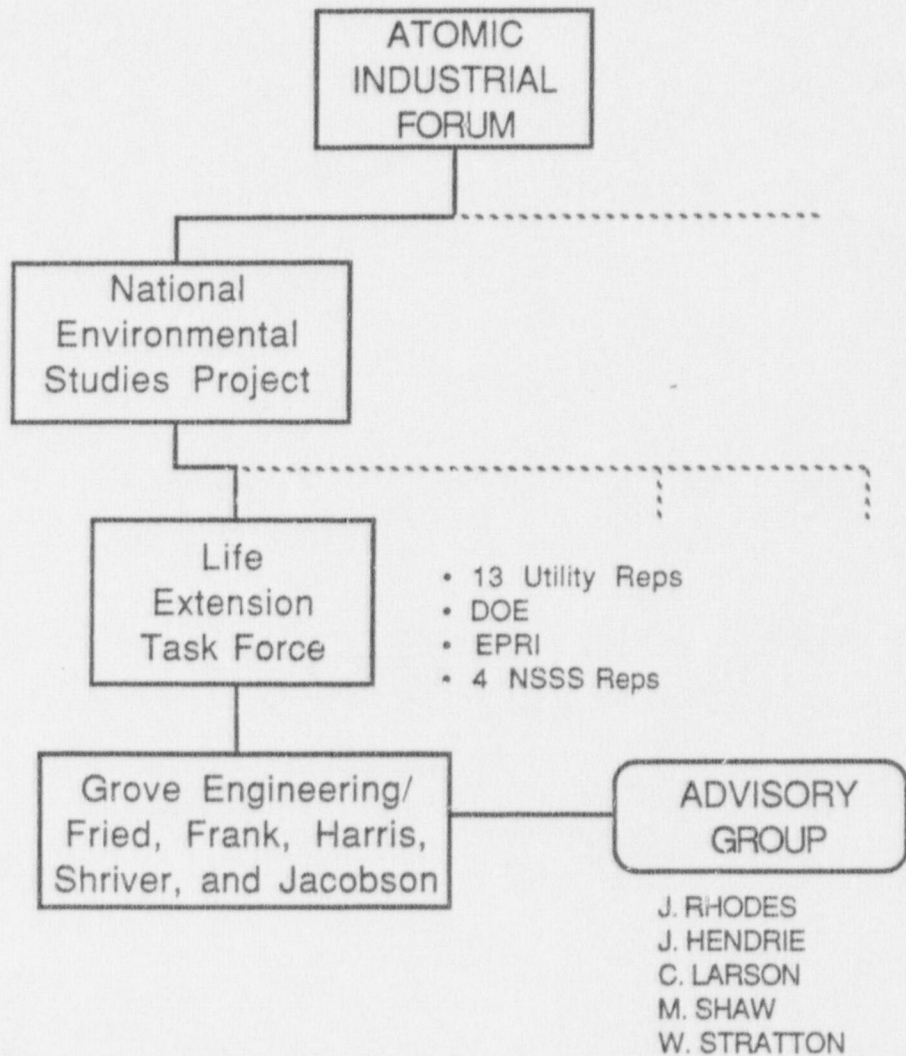
PURPOSE OF MEETING

- TO PRESENT KEY CONCLUSIONS OF THE RECENT NESP STUDY, "REGULATORY CONSIDERATIONS FOR EXTENDING THE LIFE OF NUCLEAR POWER PLANTS" (AIF/NESP - 040, December 1986)
 - NESP REPORT IS AN INITIAL EXAMINATION OF KEY ISSUES
 - THE CONCLUSIONS AND ANALYSES IN NESP-040 SHOULD BE VIEWED AS A USEFUL STARTING POINT FOR THE DEVELOPMENT AND COMMUNICATION OF ISSUES AND KNOWLEDGE CONCERNING LIFE EXTENSION AND LICENSE RENEWAL.
- TO EXPLAIN THE RATIONALE BEHIND THESE CONCLUSIONS
- TO PROVIDE AN OPPORTUNITY TO ASK QUESTIONS OF THE SPONSORS AND AUTHORS OF NESP - 040 AS A PRELUDE TO NRC'S EFFORTS TO EXPLORE LICENSE RENEWAL POLICY OPTIONS
- TO PROVIDE AN OVERVIEW OF THE INDUSTRY'S EFFORTS TO PURSUE LIFE EXTENSION/LICENSE RENEWAL

ATOMIC INDUSTRIAL FORUM/
NATIONAL ENVIRONMENTAL STUDIES PROJECT
STUDY SCOPE & OBJECTIVES

- Identify Issues to be Addressed by Utilities and by the NRC in Establishing Federal Policy for License Renewal
- Evaluate Issues and Recommend Specific Policy Alternatives
- Identify Timing Issues Associated with License Renewal
- Assess Utility and NRC Actions to Arrive at License Renewal Policy, and Provide a Roadmap for Taking Such Actions

PROJECT ORGANIZATION



POLICY DEVELOPMENT

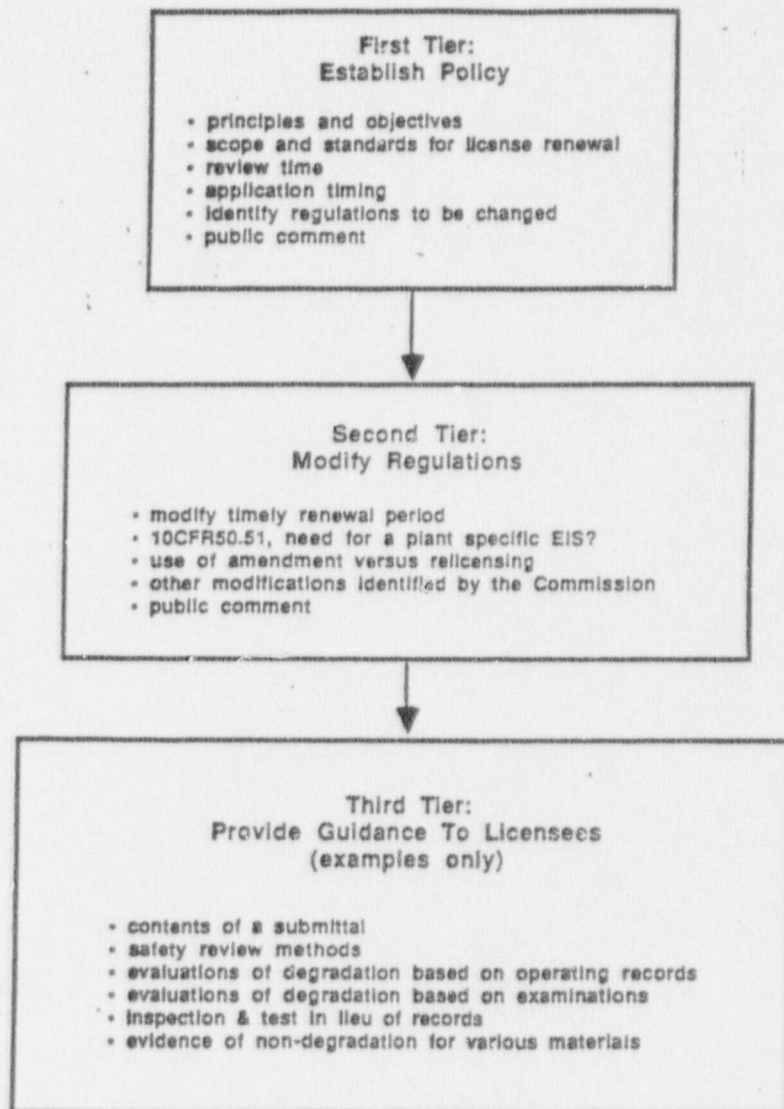
FRAMEWORK OBSERVATIONS

AD HOC APPROACH VERSUS FORMAL POLICY MECHANISM

RECOMMENDED THREE TIER APPROACH - WHAT IT IS AND RATIONALE

TIERS 1 AND 2 - POLICY STATEMENT AND CHANGES TO REGULATIONS

TIER 3 - IMPLEMENTING PROCEDURES AND GUIDES



**Three Tiered Approach To Establishing
A License Renewal Process**

PROJECT CONSIDERATIONS

- TWO CRITICAL ASPECTS OF LICENSE RENEWAL REVIEW
 - What is the Scope
 - What are Criteria for Judging Acceptability
- NESP STUDY INPUTS INCLUDED
 - Recent Utility Experience with CP-OL
 - Other Regulatory Regimes (UK, Fossil)
 - NRC Practice with Test Reactors
 - Language of Legislative History
- MAJOR INPUT-FROM NESP SPONSORS
"What do the licensees need to do to assure themselves of the safety and regulatory practicability of extended life?"
- TWO BASIC THEMES EMERGED
- REFINED VIA INTERACTION WITH SPONSORS, ADVISORY GROUP, NESP TAG

SUBSTANTIVE ELEMENTS OF LICENSE RENEWAL

THEME 1 - CONTINUITY

"EXTENDING PLANT LIFE BEYOND 40 YEARS IS A *REAFFIRMATION OF THE ONGOING AND CONTINUOUS PROCESS OF HARDWARE RENEWAL* THAT IS AN *INTEGRAL PART* OF EVERY NUCLEAR POWER PLANT'S *OPERATING PROGRAM*. . . THE PRACTICE OF *FOCUSING ON SPECIFIC DEGRADATION MECHANISMS* AND ESTABLISHING CRITERIA TO ASSURE CONTINUED SAFETY OF THE PUBLIC IS THUS ALREADY AN ESTABLISHED POLICY AT THE NRC. LICENSE RENEWAL CAN BE VIEWED AS A CONTINUATION OF THIS POLICY, AND AN OPPORTUNITY TO OVERSEE ITS OVERALL APPLICATION TO BE SURE NOTHING HAS BEEN MISSED."

THEME 2 - EXISTANT LICENSING BASIS

"BASED ON THE OVERALL SAFETY RECORD OF NUCLEAR POWER PLANTS DURING THEIR INITIAL TERMS, IT DOES *NOT* SEEM *APPROPRIATE* FOR NRC *TO INCLUDE NEW CRITERIA* IN THE SAFETY EVALUATION OF INDIVIDUAL COMPONENTS OR STRUCTURES FOR LICENSE RENEWAL. IT IS RECOMMENDED THAT THE OVERALL COMMISSION POLICY BE ESTABLISHED ON THIS PREMISE."

The Continuity Theme

- OWNERS ALREADY REGULARLY EVALUATE THE MATERIAL CONDITION OF THEIR PLANTS
- AND OWNERS UPGRADE AND MAINTAIN HARDWARE BASED ON THESE REGULAR EVALUATIONS
- NRC OVERSEES THE OWNERS' ACTIVITIES TO MAINTAIN THE MATERIAL CONDITION OF THE PLANT
- THE OWNER EVALUATION PROCESS ALSO PROJECTS FUTURE PERFORMANCE
- LIFE EXTENSION EVALUATIONS MERELY LENGTHEN THE PROJECTION TIME FRAME
- LICENSE RENEWAL EVALUATIONS LOOK AT THE SAFETY RELATED ASPECTS OF SUCH OWNER EVALUATIONS

- IN SUMMARY, THE "CONTINUITY" THEME SAYS THAT AN EVALUATION FOR LICENSE RENEWAL IS REALY AN EXPANSION OF WHAT THE LICENSEE ALREADY DOES.

THE METHOD USED TO CONDUCT THESE EVALUATIONS, AND THE SPECIFIC ONE FOR LICENSE RENEWAL, CAN TAKE MANY DIFFERENT FORMS.

IF NEW EVALUATION METHODS, CODES AND STANDARDS, AND REGULATORY APPROACHES ARE REQUIRED FOR AGING, THEY ARE NEEDED DURING THE INITIAL TERM AND NOT JUST FOR LICENSE RENEWAL. THEY SHOULD NOT BE TIED TO LICENSE RENEWAL.

THEREFORE, LICENSE RENEWAL ITSELF IS NOT A "WATERSHED" EVENT FROM AN ENGINEERING POINT OF VIEW. THE REGULATORY PROCESS SELECTED FOR LICENSE RENEWAL SHOULD BE ESTABLISHED ACCORDINGLY.

The Extant Licensing Basis Theme

- THE LICENSING CRITERIA (BASES) USED TO JUDGE SAFETY DURING AN EXTENDED TERM SHOULD BE THE SAME AS THOSE EVOLVED DURING THE INITIAL TERM AND "EXTANT" AT THE TIME OF LICENSE RENEWAL APPLICATION.
- IF PUBLIC SAFETY IS PROTECTED AT YEAR 40...ALSO PROTECTED AT YEAR 41
- IF NEW INFORMATION DEVELOPS AFTER INITIAL LICENSING, NRC APPLIES ON A CASE-BY-CASE BASIS...DOESN'T WAIT FOR RENEWAL
 - TMI ACTION PLAN ITEMS
 - PRESSURIZED THERMAL SHOCK
- SAFETY IS COMBINATION OF OPERATING KNOWLEDGE AND MATERIAL CONDITION OF PLANT. OLDER PLANTS HAVE LONG TERM DEMONSTRATION OF SAFETY VIA OPERATING RECORD

TECHNICAL ASPECTS OF LICENSE RENEWAL

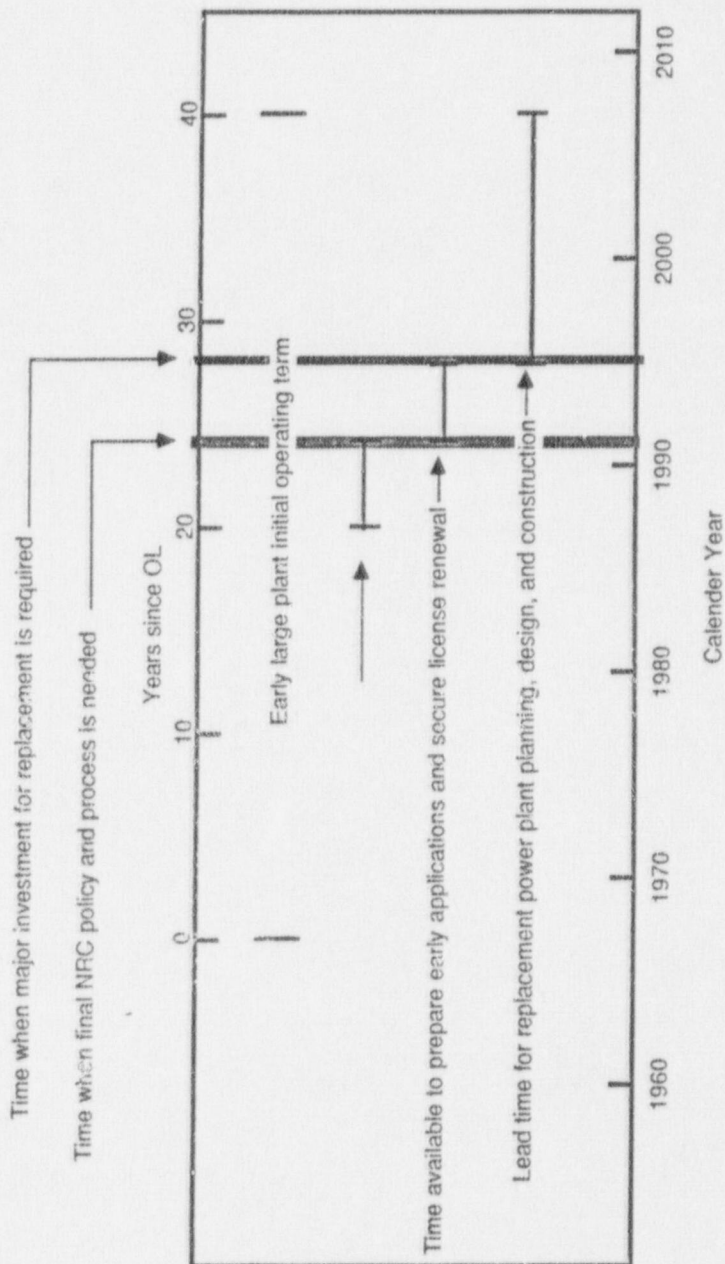
- SCREENING PROCESS
- COMPONENT EVALUATION PROCESS
- THE BACKFIT RULE
- PLANT UPGRADES AND MODIFICATION
- OPERATIONS EXPERIENCE

PROCEDURAL ASPECTS OF LICENSE RENEWAL

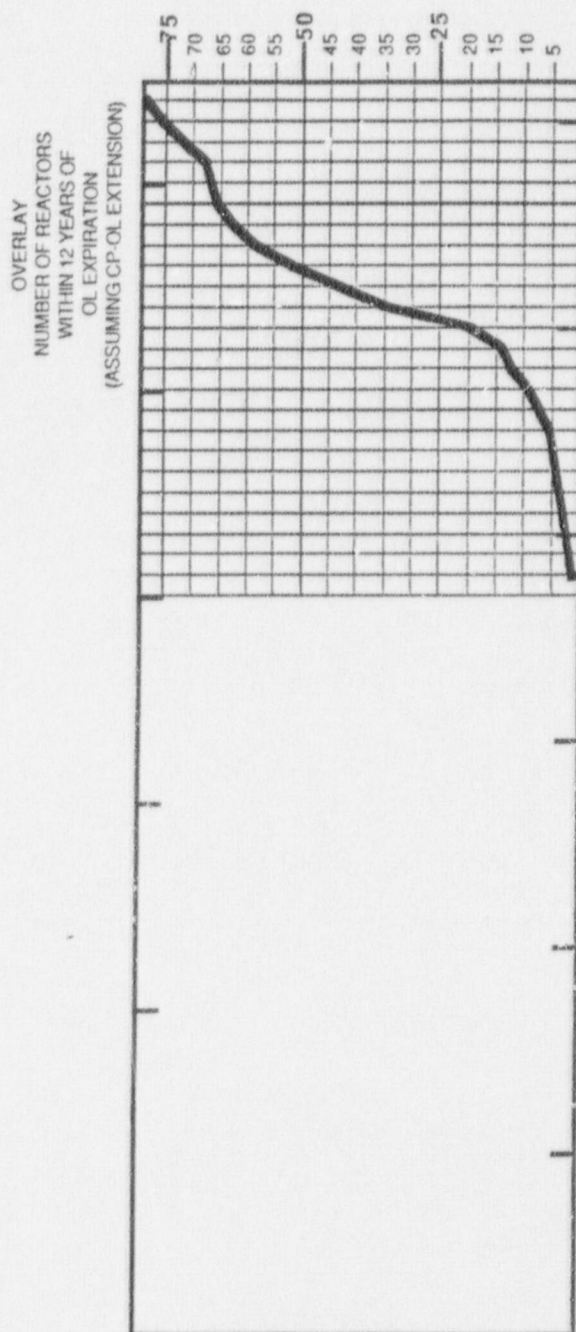
- NEPA CONSIDERATIONS
 - PEIS
 - EIS verses EA
- TIMELY RENEWAL DOCTRINE
- HEARINGS
 - Nature
 - Timing
- EFFECTIVE DATE OF RENEWED LICENSE
 - Tack-on
 - Supersession

SLIDE #14a

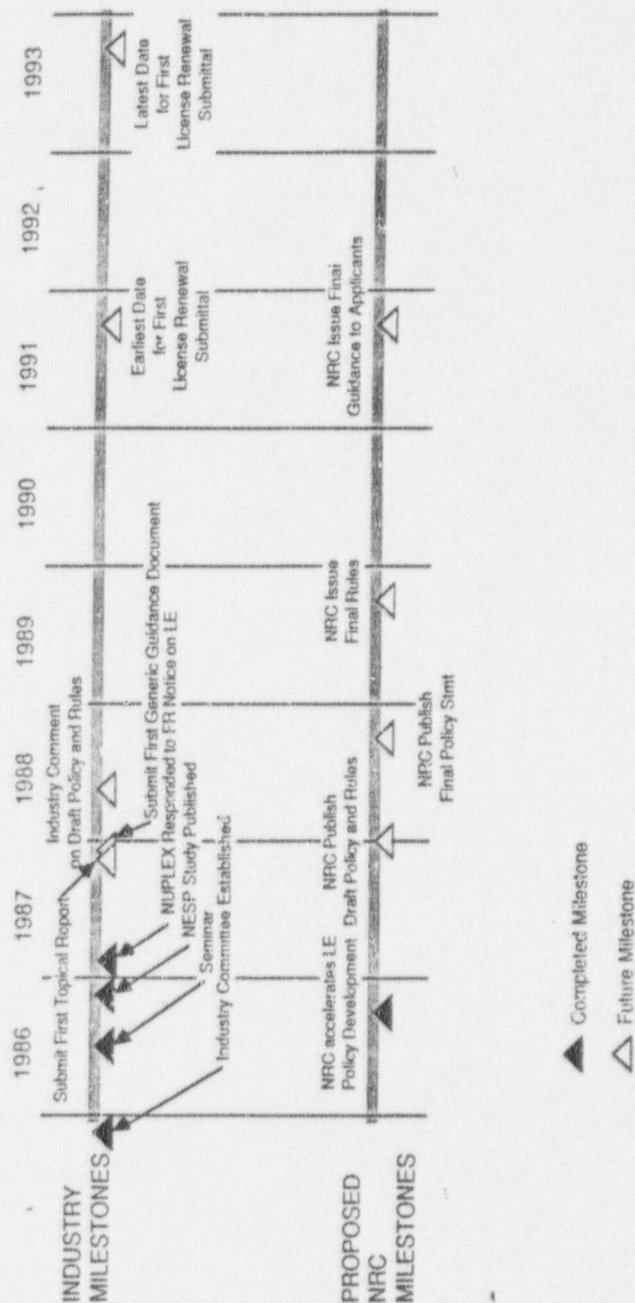
LIFE EXTENSION AND LICENSE RENEWAL TIMING



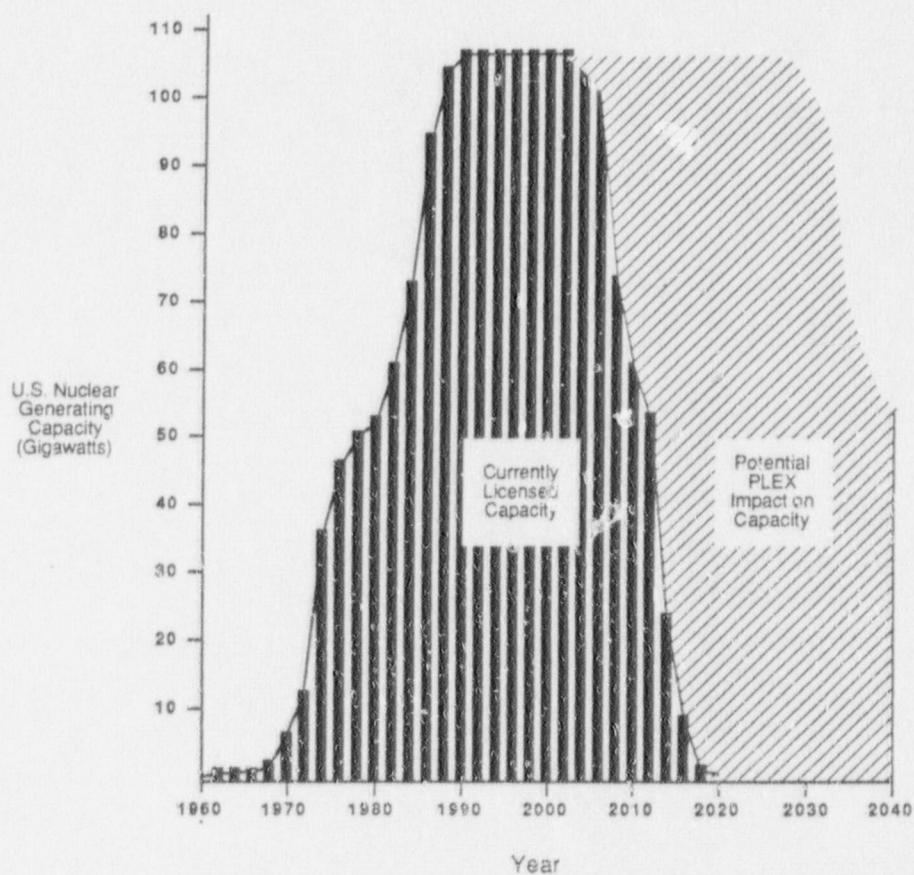
SLIDE #14b



MILESTONES



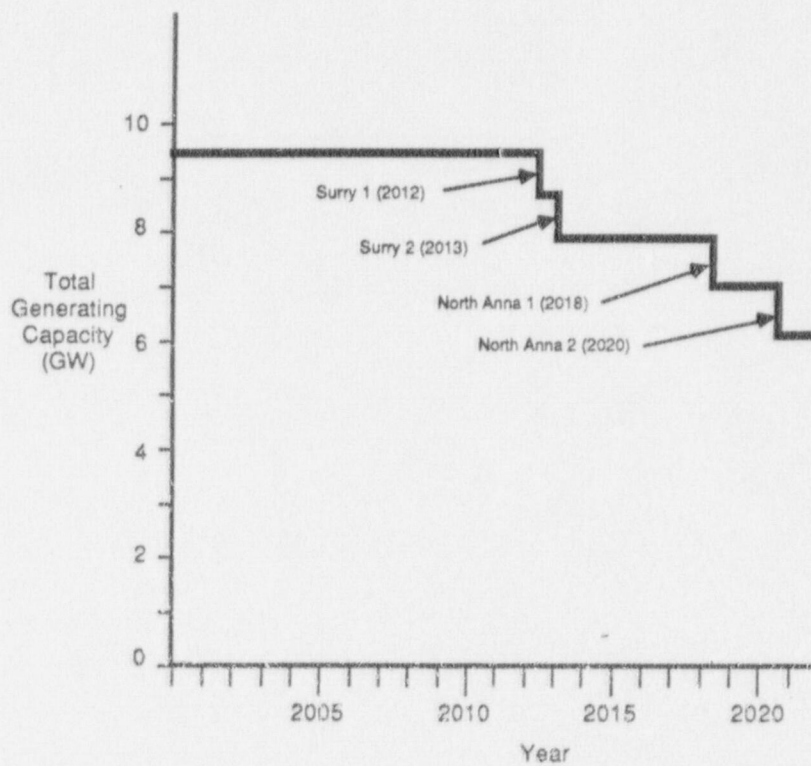
Nuclear Generating Capacity



Currently - Nuclear power represents:

- 16% of U.S. electricity supplied
- >40 % for 6 states
- >25% for 13 other states

IMPACT OF NUCLEAR PLANT RETIREMENTS ON VIRGINIA POWER GENERATING CAPACITY*



* assumes all fossil plants continue in operation indefinitely

INDUSTRY'S PERSPECTIVE-WHAT'S CHANGED

1940s to 1970s

1970s to 1980s

Predictable

LOAD GROWTH

Erratic

8 to 10 Years

CAPACITY
DOUBLING TIME

Unpredictable

12% to 15 %

RESERVE MARGIN

> 40 %

6 to 8 Years

PLANNING CYCLE

12-14 Years

Incremental
Size Increase
(economy of size)

REPLACEMENT
RATIONALE

Aging Units Not
Being Replaced
(no incentive)

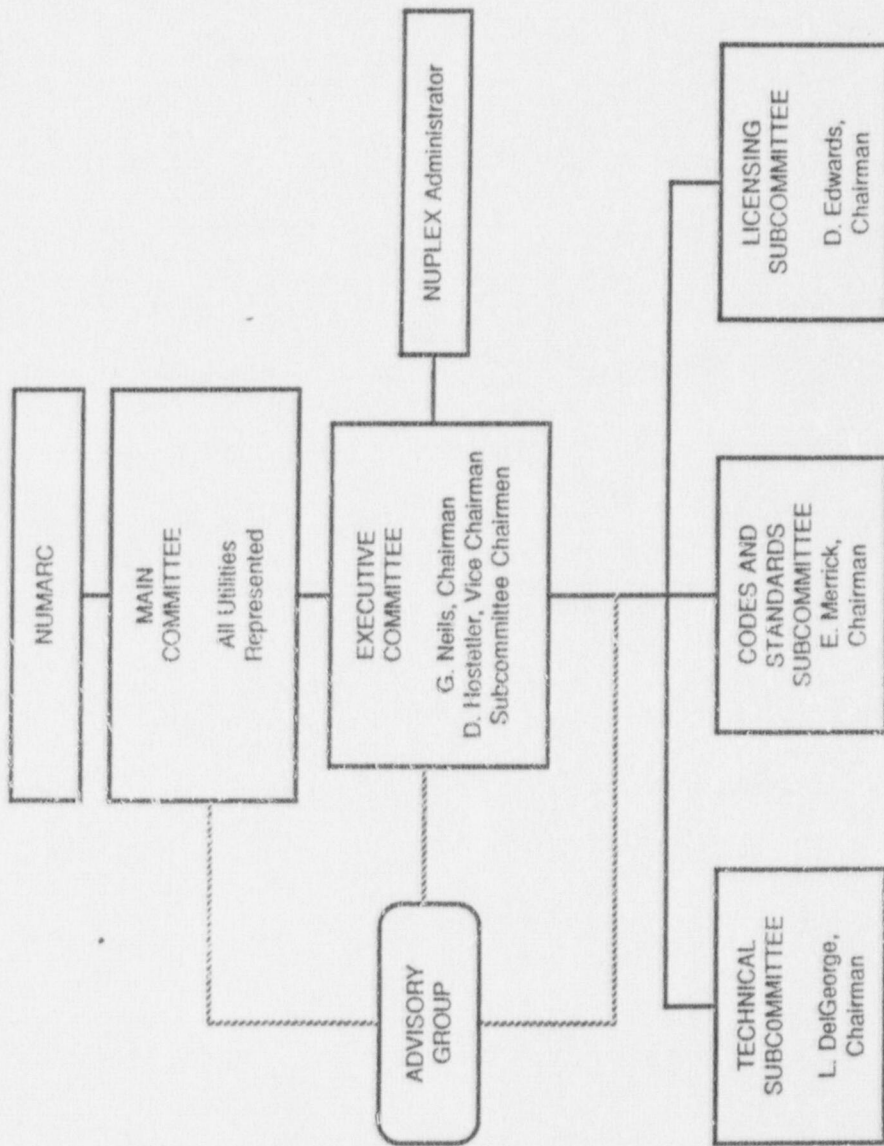
< 20 %

% OF CAPACITY
> 20 YEARS OLD

Approaching
80%

NUPLEX STEERING COMMITTEE ORGANIZATION

SLIDE #19



NUPLEX OBJECTIVES

- COORDINATE INDUSTRY, DOE, EPRI PROGRAM EFFORTS
- DEVELOP GENERIC UTILITY ASSISTANCE
- SEEK REGULATORY POLICY, FRAMEWORK, PROCESS
 - Clear, Predictable, Workable
 - In Place On Time To Meet Industry Needs
 - Compatible with Utility Planning Cycle Lead Time
- PROVIDE A FOCUS FOR RAPIDLY GROWING INDUSTRY INTEREST AND PARTICIPATION
- OPTIMIZE RESOURCE REQUIREMENTS FOR BOTH NRC AND INDUSTRY

NUPLEX PROGRAM

- In order to plan for future power needs, some owners will need license renewal in hand by 1995.
- Firm NRC policy and process for license renewal are needed in 1991 to support preparation, review, and approval of the first applications.
- NRC's recent efforts to accelerate development of license renewal policy are appreciated by the industry.
- NUPLEX steering committee efforts focus on generic activities so owners can use common techniques for life extension evaluations.
- A generic approach is also desirable for regulatory review by NRC.
- The development of an efficient and stable license renewal process will be of benefit to both the industry and the NRC.
- Therefore, we believe that close interaction between NUPLEX and NRC is essential.