PUBLIC WORKSHOP
ON
TECHNICAL AND POLICY CONSIDERATIONS
FOR
NUCLEAR POWER PLANT LICENSE RENEWAL

November 13 - 14, 1989

Reston, Virginia

U.S. NUCLEAR REGULATORY COMMISSION

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NRC LICENSE RENEWAL WORKSHOP

November 13, 1989

Time	Subject	Session Leader(s)	Place
7:30 am	Registration		Foyer of Room A
8:30 am	Introduction	E. Beckjord	Rooms A, B, & C
8:45 am	Regulatory Philosophy and Approach	J. Sniezek	Rooms A, B, & C
9:30 am	**Session I** - Overview of Conceptual Approach to a License Renewal Rule	F. Gillespie, R. Bosnak, L. Chandler	Rooms A, B, & C
10:00 am	Break		
10:15 am	Session 1 Continued		Rooms A, B, & C
12:00 am	Lunch		
1:15 pm	Concurrent Sessions		
	Session 2 - Reactor Pressure Boundary	J. Richardson, L. Shao	Room C
	Session 3 - Fluid and Mechanical System	J. Wermiel, M. Vagins	Room B
	Session 4 - Screening Methodology for System, Structures and Components Important to Safety	A. Thadani, M. Cunningham	Room A
	Session 5 - Overview of Conceptual Approach and Regulatory Framework - continued discussion from Session 1	C. Thomas, R. Bosnak, L. Chandler	Room 5
2:45 pm	Break		
3:00 pm	Sessions 2, 3, 4, and 5 Continue		
5:00 pm	Adjourn		

NRC LICENSE RENEWAL WORKSHOP

November 14, 1989

Time	Subject	Session Leader(s)	Place
8:00 am	Registration		Foyer of Room A
8:30 am	Concurrent Sessions		
	Session 6 - Containments	J. Richardson, L. Shao	Room C
	Session 7 - Electrical Systems	A. Thadani, M. Vagins	Room B
	Session 8 - Environmental Effects	F. Gillespie, D. Cleary	Room A
10:00 am	Break		
10:15 am	Sessions Continue		
11:45 am	Lunch		
1:15 pm	Summary of Concurrent Sessions	T. Speis, All Session Leaders	Rooms A, B, & C
2:45 pm	Break		
3:00 pm	Comments and Discussion	T. Speis, All Session Leaders	Rooms A, B, & C
4:00 pm	Summary and Conclusion	T. Speis	Rooms A, B, & C
4:30 pm	Adjourn		

SPEAKERS AND SESSION LEADERS

WORKSHOP ON LICENSE RENEWAL

OFFICE OF NUCLEAR REGULATORY RESEARCH:

Eric S. Beckjord, Director
Themis P. Speis, Deputy Director for Generic Issues
Lawrence C. Shao, Director, Division of Engineering
Robert J. Bosnak, Deputy Director, Division of Engineering
Milton Vagins, Chief, Electrical and Mechanical Engineering Branch, Division of Engineering
Mark A. Cunningham, Chief, Probabilistic Risk Analysis Branch, Division of Systems Research
Donald P. Cleary, Senior Task Manager, Reactor and Plant Safety Issues Branch, Division of Safety Issue Resolution

OFFICE OF NUCLEAR REACTOR REGULATION:

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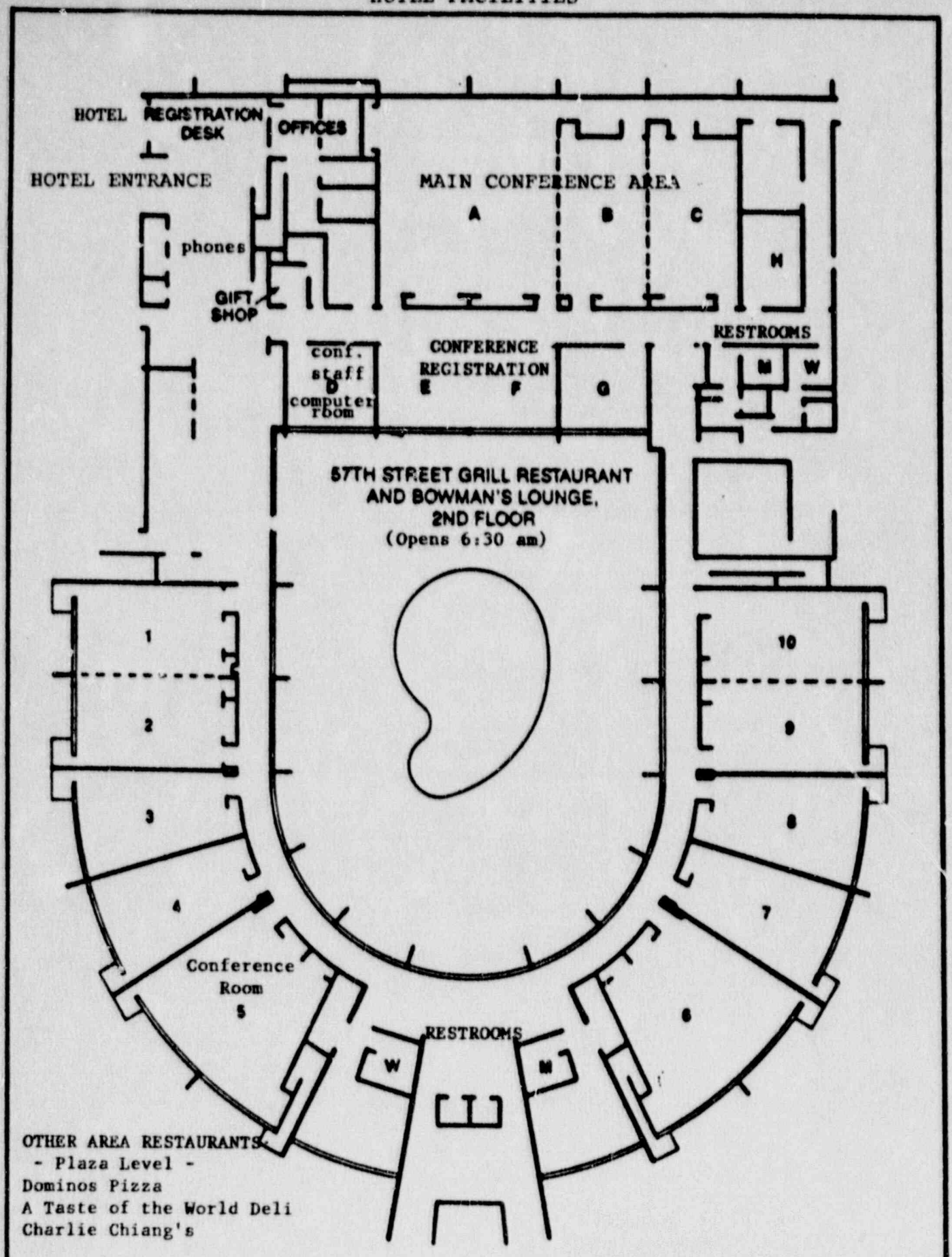
James E. Richardson, Director, Division of Engineering Technology
Ashok C.Thadani, Director, Division of System Technology
Jarad S. Wermiel, Section Leader, Plant Systems Branch, Division of System Technology

OFFICE OF THE GENERAL COUNSEL:

Lawrence J. Chandler, Assistant General Counsel for Hearings and Enforcement

HOTEL FACILITIES



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U.S. NUCLEAR REGULATORY COMMISSION PUBLIC WORKSHOP
ON NUCLEAR POWER PLANT LICENSE RENEWAL
RESTON, VIRGINIA
NOVEMBER 13-14, 1989

Eric S. Beckjord, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Good morning ladies and gentlemen. I want to welcome you to the U.S. Nuclear Regulatory Commission's Public Workshop on Nuclear Power Plant License Renewal. The purpose of this workshop is to elicit public views on technical and policy considerations for nuclear power plant license renewal. I appreciate your attendance at this meeting and look forward to the discussion and obtaining your comments.

Extending the life of nuclear power plants beyond the current 40 year license period has the potential to save the country considerable energy resources. Nuclear power now produces about 18% of our electrical energy needs. By safely extending the life of a typical nuclear power plant by 20 years, it is estimated that the net benefit for each plant is about $1 billion. Since the licenses of the current operating reactors will start to expire by the year 2000, it is important to establish the terms and conditions for license renewal by the early 1990s.

The NRC has been working on license renewal for several years and has actively sought public participation in this process. On two previous occasions, public comments have been solicited through the Federal Register. The first solicitation on seven major license renewal issues was published in November, 1986. The second solicitation was part of an advance notice of proposed rule-making published on August 29, 1988. The advance notice requested comments on NUREG-1317 entitled Regulatory Options for Nuclear Power Plant License Renewal. Over fifty written responses to NUREG-1317 were received. For those who are interested in reviewing the responses, a summary and analysis are presented in NUREG/CR-5532. The process of obtaining public input as the Commission develops its plans for license renewal is continuing with this workshop.

For the benefit of you who may not be familiar with the NRC's program on aging research, I would like to describe briefly this program since it is an important contributor to license renewal. The NRC has for a number of years been carrying out a program of aging research. Much of this effort can be directly applied to assuring the continued safety of operating nuclear plants for which extended licenses may be granted. The principal concern of the NRC's aging research is that plant safety could be compromised if the degradation of key components or structures and the effects of such degradation on system operation were not detected and mitigated well before a loss of functional capability. The technical safety issue here is that age-related degradation could result in a reduction of defense-in-depth.

The NRC aging research effort is directed toward gaining an understanding of degradation processes within nuclear power plants. This hardware-oriented engineering program is a rigorous and systematic investigation into the potentially adverse effects of aging on plant components, systems, and structures during the period of normal licensed plant operation, as well as the potential period of extended plant life for license renewals beyond 40 years.

The emphasis is on identifying and characterizing the mechanisms of material and component degradation during service and on using research results in the regulatory process. The research includes evaluating methods of inspection, surveillance, condition monitoring, and maintenance as a means of managing aging effects that may impact safe plant operation. Specifically, the goals of the program are

- Identify and characterize aging effects that could cause degradation of components, systems, and structures.

- Identify methods of inspection, surveillance, and monitoring, and evaluate residual life of components, systems, and structures that will ensure timely detection of significant aging effects before loss of safety function.

- Evaluate the effectiveness of storage, maintenance, repair, and replacement practices in mitigating the rate and extent of degradation caused by aging.

I expect that the results of this program will be reflected in the sessions to be held during this workshop. Additional recent information on the aging research program can be obtained in the proceedings of the Seventeenth Water Reactor Safety Information Meeting.

I wish to review briefly the agenda for this workshop. The agenda has been arranged to obtain views on the technical and policy issues involved in license renewal. Input is requested as to what should be appropriately addressed in the rule and what should be included in regulatory guides to support a proposed rule. This morning's plenary session will open with the staff's presentation of regulatory philosophy and approach for license renewal. This will provide an overview of the basis for developing technical, policy and legal positions regarding a license renewal rule and the regulatory guides to support the rule. Following this presentation a series of questions which have been made available in the handout will be used to guide the presentation of comments. This session will generally track the conceptual rule as presented in the Federal Register Notice. The intent is to complete an overview tour through this material so that only a limited time will be spent on individual parts. This overview will then be expanded on in the concurrent sessions to be held this afternoon and tomorrow morning.

This afternoon's sessions will consist of four concurrent meetings with the topics being Reactor Pressure Boundary, Fluid and Mechanical Systems, Screening Systems Structures and Components Important to Safety and continuation of session one. The staff will make a very short introduction at the start of

each session, which will be guided by the series of questions for that session presented in the handout, followed by comments by parties who have previously notified the Commission. Additional comments may be allowed at the discretion of the individual session chairmen as time permits. Tomorrow morning's sessions will consist of three concurrent sessions with the topics being Containments, Electrical Systems and Environmental Effects and will be conducted in a similar manner. On tomorrow afternoon, a summary session will be held with all participants. Each chairman of the individual sessions will present a brief summary of his session. This will enable all participants to get an overview of the entire workshop. This will be followed by a general session for comments and conclusions. For your information, a verbatim transcript will be taken of all sessions, and will be available about the end of this week.

I wish to emphasize the importance that we place in obtaining your input to the Preliminary Regulatory Philosophy and conceptual approach to a License Renewal Rule. Thank you again for your attendance and participation in this workshop.

REGULATORY APPROACH AND PHILOSOPHY

by

JAMES H. SNIEZEK
DEPUTY DIRECTOR
OFFICE OF NUCLEAR REACTOR REGULATION

PUBLIC WORKSHOP ON LICENSE RENEWAL
NOVEMBER 13, 1989

PLANNED DISCUSSION TOPICS

- o Purpose of the workshop
- o Background
- o Regulatory Philosophy
- o Program Plan for License Renewal

PURPOSE OF THE LICENSE RENEWAL WORKSHOP

- To inform the industry and public of the staff concept for license renewal

- To obtain feedback on technical and policy issues

- To obtain feedback on the framework regulatory language

- To determine whether there are additional issues which should be dealt with in the regulatory process

BACKGROUND

- FRN on License Renewal Policy Development, November 6, 1986

- SECY-87-179, Status of Staff Activities and Report on Public Comments - July 21, 1987

- Advance Notice of Proposed Rulemaking and NUREG-1317, "Regulatory Options for Nuclear Plant License Renewal," August 29, 1988

- NUREG/CR-5332, "Summary and Analysis of Public Comments," March, 1989

MAJOR ISSUES REQUIRING RESOLUTION PRIOR TO PROPOSED RULEMAKING

- o License Renewal Basis and Scope
- o Severe Accident Treatment
- o Environmental Impact Treatment

LICENSE RENEWAL PHILOSOPHY

- Current licensing basis is sufficient for adequate protection of public health and safety

- Maintain the current level of plant safety during the extended plant life

APPROACH FOR MAINTAINING CURRENT LEVEL OF PLANT SAFETY

- Ensure that systems, structures and components will perform intended functions
- Focus attention on managing age-related degradation unique to extended life
- Credit given for ongoing regulatory and licensee programs
- Use industry technical studies for resolution of issues on generic basis
- Use NRC research findings for development of acceptance criteria

SEVERE ACCIDENT TREATMENT

- Resolved prior to submittal of license renewal application
  - -- IPE completed and submitted to staff
  - -- Accident Management Program in place
  - -- Corrective actions identified and agreed to by staff
  - -- Approved schedule for corrective actions

ENVIRONMENTAL IMPACT TREATMENT

- o Comply with NEPA requirements
  - -- Rulemaking to specify technical and procedural requirements
  - -- Actual relicensing of plants
- o Handle issues in generic manner
  - -- Environmental Assessment
  - -- Environmental Impact Statement
- 0 Plant-specific Environmental Reports

LICENSE RENEWAL PROGRAM PLAN

- Rulemaking
- GEA/GEIS
- Regulatory Guidance Development
- Industry Technical Report Program
- Lead Plant Program

OVERALL SCHEDULE

o Publish proposed rule for comment	June 1990
o Publish proposed key Regulatory Guides SRP Sections, and GEA/GEIS	December 1990
o Pilot plant application	June 1991
o Publish Final Rule, key RGs, SRP and GEA/GEIS	April 1992
o Publish additional RGs or SRP, as necessary	April 1993
o Issue SER on Pilot Plant application	June 1993

Session 1
Overview of Conceptual Approach to a License Renewal Rule

Public Workshop
on Technical and Policy Considerations
for Nuclear Power Plant License Renewal
U. S. Nuclear Regulatory Commission
November 13-14, 1989, Reston, Virginia

SESSIONS 1 AND 5

OVERVIEW OF A CONCEPTUAL APPROACH
TO A LICENSE RENEWAL RULE

I. Approach

1. Is the approach taken reasonable in light of known technical information?

2. Are the two principles stated in the philosophy discussion supported by the rule wording?

3. Are there any known technical or safety issues that would argue against the selected approach?

4. What areas of the philosophy need additional clarification?

5. Is the schedule for the rulemaking adequate to permit utilities to consider license renewal as an option for assuring adequate electrical supply?

II. Definition of the Licensing Basis

1. Has the current licensing basis been adequately defined?

2. What requirements, if any, should be included or deleted?

3. Are the requirements clear and is it clear how the requirements will be met?

4. What type and amount of documentation should be required as part of a renewal application?

5. What are the problems or issues in meeting the proposed requirements and is regulatory guidance needed in this area?

III. Exclusion of Regulatory Programs from Review

1. Should any identified programs or any other programs be included or excluded from review during a renewal application review? If so, identify those programs or issues and provide the technical or safety basis for the need to review or for exclusion from review.

2. Is it clear how the regulatory requirements of the programs excluded from review will continue to be met during a renewal term?

Sessions 1 and 5 Continued

IV. Envelope of Structures, Systems and Components to be Considered

1. Is equipment "important to safety" adequately defined and comprehensive?

2. Is it clear how the requirements will be met and what problems exist with establishing the envelope of "important to safety?"

3. Is it clear that this rule requires the review of mild environment electrical equipment in systems important to safety to the identified degradation mechanisms?

V. Degradation Mechanism

1. Are there any additional known degradation mechanisms which should be included in a license renewal rule? If so, identify the mechanism and cite references to technical information describing the mechanism.

2. Is it clear how the requirements for identifying the mechanisms will be met or is there a need for additional regulatory guidance in this area or are definitions needed for the categories of the degradation mechanisms?

3. Should definitions of the mechanisms be included in the rule?

VI. Severe Accidents

1. Should the staff require a completion of the Individual Plant Examination as a precondition to submission of a renewal application?

2. Should severe accidents have any additional role in a decision on renewal of an operating license?

3. Are the requirements clear and is it clear how the requirements can be met?

4. What are the problems or issues in meeting the proposed requirement and is additional regulatory guidance needed in this area?

5. Should the Accident Management Program be required to be in place?

VII. Content of Application

1. Are the requirements for what should be submitted clear and is it clear how those requirements are to be met?

2. Should a new FSAR be submitted in support of a renewal application or an addendum to the existing document?

Sessions 1 and 5 Continued

3. What amount of documentation of data, analyses and program changes should be provided in the application? Should the rule propose the types of information that can be retained in auditable forms at applicant locations?

4. Is additional regulatory guidance needed in this area and should publication of additional guidance in this area be linked to publication of the final rule?

5. Is more detail needed to provide a regulatory framework in the conceptual rule for a well-defined and acceptable screening process?

VIII. Certification of Compliance

1. Is the requirement clear and is it clear how the requirement will be met?

2. Should the NRC require applicants for renewal licenses to describe deviations from the SRP as is required of initial OL applicants?

IX. Environmental Information

1. Should the staff prepare a generic environmental statement which would discuss and envelope as many environmental issues as possible and which would then be used as a cited reference and preclude litigation in any relicensing proceeding?

2. Need for Separate rulemaking on Part 51 separate or with proposed rule?

X. Standards for Issuance of a Renewed License

1. Is it clear what the standards require and how the standards can be satisfied?

2. Do the specified standards provide reasonable assurance that a facility can be operated beyond its initial time or subsequent renewal terms? If not, what additional standards should be established for the issuance of renewal licenses?

3. Should a limit be placed on the number of renewals permitted at any one facility?

XI. Postponement of Compliance in the area of Decommissioning and Fuel Managements

1. Should a license renewal rule include an automatic postponement of the existing requirements or should it be necessary to have the renewal applicant specifically request a postponement or exemption from the stated requirements?

Sessions 1 and 5 Continued

2. Is the postponement period reasonable or should it be more limited in time, e.g. for one year or 2 years only?

XII. Maintenance, Surveillance and Recordkeeping

1. What, if any, maintenance practices should be required by a license renewal rule? (such as reliability centered maintenance.)

2. What type of process should be required by this regulation to assure that future changes in the maintenance or surveillance programs do not reduce the effectiveness of these programs in monitoring plant degradation mechanisms?

3. What specific standards for maintenance practices should be developed and issued in a regulatory guide related to license renewal?

4. What types and amount of documentation of existing or newly proposed maintenance practices should be submitted as part of a renewal application?

5. What types of documentation can provide a verification of insitu equipment condition and how much onsite inspection should be performed to validate the documentation?

6. What, if any, use and participation in NPRDS should be required in a license renewal application?

7. What steps should be required as part of a license renewal to assure that programmatic aspects of an enhanced maintenance program are effectively implemented?

8. What credit, if any, should be given for voluntary adoption and implementation of an industry standard for maintenance?

9. What type of information should be included or required of maintenance records for license renewal?

10. What specific requirements should be included for monitoring aging effects on specific critical components?

11. Should the proposed license renewal rule require a program for tracking maintenance records (performance trending) on specific safety-related equipment in order to monitor system performance, and how soon prior to submittal of the licensee renewal request should such a program be implemented?

12. When inspections have not been made or operating history records and trending information documentation have not been maintained, what alternative measures can be taken to justify extended life?

13. Can components which are "routinely maintained" be excluded from license renewal considerations unless there are agreed upon reliability goals for these components?

OVERVIEW OF CONCEPTUAL APPROACH TO A LICENSE RENEWAL RULE

F. GILLESPIE, NRR (POLICY ISSUES)
R. BOSNAK, RES (TECHNICAL ISSUES)
L. CHANDLER, OGC (LEGAL ISSUES)

PUBLIC WORKSHOP ON LICENSE RENEWAL
NOVEMBER 13, 1989

TOPICS OF DISCUSSION

- o Renewal philosophy
- o Licensing basis
- o Severe accidents
- o Content of application
- o Standards for issuance
- o Backfit considerations
- o Hearings
- o Maintenance and records

LICENSE RENEWAL PHILOSOPHY

- Current licensing basis is sufficient for adequate protection of public health and safety

- Maintain the current level of plant safety during the extended plant life

LICENSING BASIS

- Establishes the envelope of regulatory compliance and enforcement for the renewal term

- Includes: Regulations of 10 CFR
  - Orders
  - License Conditions
  - Exemptions
  - Adjudicatory decisions
  - Technical Specifications
  - NRC Bulletins
  - Generic Letters
  - Docketed Correspondence

PROPOSED REGULATORY PROGRAMS NOT SUBJECT TO REVIEW FOR LICENSE RENEWAL

- Programs excluded:
  - Staffing and training programs
  - Operational QA programs
  - Health physics and ALARA programs
  - Security programs
  - Approved ISI and IST programs
  - Containment testing programs
  - Emergency plans
  - EQ covered by 10 CFR 50.49

- Compliance concerns with above programs to be treated under 10 CFR 2.206

SEVERE ACCIDENTS

- Subject to be resolved under initial license
- Precondition in rule to assure completion prior to application
- Completion includes:
  - IPE including external events
  - Accident Management Plan
  - Approved schedule or completion of licensee proposed modifications

CONTENT OF APPLICATION

- o Definition of licensing basis
- o Certification of licensing basis
- o Technical evaluations and SSC screening process
- o Degradation mechanisms covered
- o Basis for conclusions that degradation is properly monitored or corrected
- o Technical specifications
- o Environmental Report update

STANDARDS FOR ISSUANCE OF LICENSE

- Identifies only those areas on which the staff must make findings in order to issue a renewal license

- Regulatory areas not identified are not basis for issuance of renewal license

STANDARDS FOR ISSUANCE (CONT.)

- Standards include:
  1. Licensing basis has been completely and accurately defined
  2. SSC important to safety have been identified
  3. Applicable degradation mechanisms have been identified
  4. Appropriate actions have been or will be taken to account for degradation
  5. Acceptable program for trending and evaluation degradation effects

BACKFIT CONSIDERATIONS

- Requirements specified in rule are not covered by backfit rule

- Previous decisions on backfit for some technical issues may be revisited to determine if additional life significantly affects previous position

- Backfit rule to apply after issuance of renewal license

LICENSE RENEWAL APPROACH

- Are there any known technical or safety issues that would argue against the selected approach?

- Is the philosophy implemented by the wording of the framework?

- Is the schedule reasonable in light of public and utility interests?

SCREENING PROCESS AND CONTENT OF APPLICATION

- Is equipment "important to safety" adequately defined?
- Should degradation mechanisms be included in the rule?
- What is an adequate level of documentation concerning data, analyses and program changes?
- Is it clear how and why the certification of compliance is an essential part of application?
- Is there a need for additional guidance?

LICENSING BASIS

- Has licensing basis been adequately defined?
- What is the necessary level of documentation in application?
- Is it clear how the requirements will be met?
- Are other regulatory programs candidates for exclusion from review for license renewal?

ROLE OF SEVERE ACCIDENTS

- Should completion of IPE be an precondition of application?
- Should an Accident Management Plan be required?
- Should the question of severe accidents have any role in a license renewal decision?

STANDARDS FOR ISSUANCE

- Do the specific standards provide reasonable assurance that a facility can be operated safely for an extended term?

- Should a limit be placed on the number of renewals?

- Should a process for renewal of a renewal license be different than that for the first renewal and what would be a reasonable approach?

Session 2
Reactor Pressure Boundary

Public Workshop
on Technical and Policy Considerations
for Nuclear Power Plant License Renewal
U. S. Nuclear Regulatory Commission
November 13-14, 1989, Reston, Virginia

SESSION 2

REACTOR PRESSURE BOUNDARY

1. Since the surveillance programs required by Appendix H of 10 CFR 50 to monitor radiation embrittlement of reactor vessels generally have been designed for a 40 year period, what additional requirements should be implemented to comply with this Appendix for the extended life?

2. In view of the uncertainties involving the material properties of aged cast austenitic stainless steel, what measures are needed to assure safe operation of components manufactured of this material during extended plant life?

3. Do the current ISI and IST programs adequately address aging mechanisms in the reactor pressure boundary systems and components?

4. Many operating plants with piping which cracked due to IGSCC have had weld overlay repairs. While this repair is safe for current operations, NDE is difficult and stress patterns have been changed in the piping system. What bases exist to permit the continued use of such piping for extended plant life?

5. Since plants have used less efficient NDE techniques than are available today, should they be re-baselined with modern techniques? Should ISI intervals and extent of sampling remain the same? Considering loss of toughness with aging, should flaw acceptance standards be modified? Because of uncertainties in the level of degradation and in the effectiveness of ISI, should continuous monitoring NDE techniques be applied during extended life?

6. Existing fatigue requirements do not take into account the accelerated damage caused by water environment and higher temperatures of LWR plants. What provisions should be required to permit operating life to be safely extended without more definitive knowledge of this effect and how should these provisions affect the application of Miner's rule and the S-N curves applied in the ASME design code incorporated by reference into the NRC regulations? Should NDE techniques be used that give measures of remaining fatigue life and levels of toughness?

7. Are there any kinds of tests that should be done to demonstrate integrity and operability to qualify for extended life?

PRIMARY PRESSURE BOUNDARY

- REACTOR VESSELS
- STEAM GENERATORS
- PIPINGS
- PUMPS
- VALVES

REACTOR VESSEL

- NEUTRON IRRADIATION EMBRITTLEMENT OF BELTLINE MATERIALS
- REGULATORY GUIDE 1.99, REV. 2 PROVIDES COMPUTATION METHOD FOR CALCULATING EMBRITTLEMENT
- COPPER, NICKEL, NEUTRON FLUENCE AND IRRADIATION TEMPERATURE ARE IMPORTANT VARIABLES AFFECTING EMBRITTLEMENT
- THERMAL FATIGUE
- IRRADIATION ASSISTED STRESS CORROSION CRACKING OF VESSEL INTERNALS AND CORE SUPPORT STRUCTURE

STEAM GENERATOR TUBES

- PRIMARY SIDE STRESS CORROSION CRACKING
- SECONDARY SIDE STRESS CORROSION CRACKING
- FATIGUE (FLOW INDUCED VIBRATIONS)
- DENTING (SUPPORT PLATE CORROSION)
- INTERGRANNULAR ATTACK
- FRETTING & WEAR (FOREIGN OBJECTS)
- PITTING
- WASTAGE
- STEAM GENERATOR PLUGS

PIPING

- INTERGRANULAR STRESS CORROSION CRACKING (IGSCC)

  CAUSED BY - SENSITIZED MATERIALS

  - RESIDUAL STRESSES

  - OXYGEN CONTENT AND IMPURITIES IN COOLANT WATER

- EMBRITTLEMENT DUE TO AGING AT OPERATING TEMPERATURE (PWR CAST S.S.)

- THERMAL STRATIFICATION

- EROSION/CORROSION

PUMPS

- CUMULATIVE FATIGUE EFFECTS TO SHAFT
- BEARING WEAR
- DEGRADATION OF SEALS, GASKETS AND PACKING
- EROSION AND CORROSION OF INTERNALS
- DISTORTION OF SUBCOMPONENTS
- LOOSENING OF PARTS

VALVES

- CUMULATIVE FATIGUE EFFECTS TO DISC AND CONNECTIONS
- SEAT WEAR
- DEGRADATION OF SEAL AND MOTOR INSULATION
- SET POINT DRIFT
- EROSION AND CORROSION OF INTERNALS
- DISTORTION OF INTERNAL PART
- STEM AND GEAR WEAR
- DISC/SEAT BINDING
- WORN OR BROKEN BEARINGS
- TORQUE SWITCH OR LIMIT SWITCH BINDING

Session 3
Fluid and Mechanical Systems

Public Workshop
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SESSION 3

FLUID AND MECHANICAL SYSTEMS

1. What additional criteria should the proposed license renewal rule and associated regulatory guidance contain regarding periodic surveillance and preventative maintenance to ensure the operability of mechanical equipment important to safety and fluid system performance beyond their initial design life?

2. What type of augmented inspections and/or analyses are needed to address aging mechanisms in pumps and valves, such as:

   - detection of degradation in pump and valve internals (e.g., erosion and corrosion due to flow turbulence and chemical attacks)

   - detection of possible cumulative fatique of pump shafts which may lead to cracking.

   - detection of possible cumulative fatique effects to valve discs and hinges due to cyclic stresses and impact loading from valve operation and flow excitations.

3. What should the proposed license renewal rule require regarding functional testing of systems important to safety as a prerequisite for license renewal, recognizing that such functional testing may not have been performed previously as part of the original licensing basis?

4. In light of the great variability in the treatment of fatique in the design of Class I (or quality group A) piping and components, there is a need that license extension requirements be based on operating history of individual plants. How should the NRC confirm that Class I components have not exceeded their original fatique design requirements? Also, should the industry address this issue in a topical report?

5. How can the residual fatique life for Class 2 and 3 piping and components be determined for license renewal?

6. Existing fatique requirements do not take into account the accelerated damage caused by water environment and higher temperatures of LWR plants. What provisions should be required to permit operating life to be safely extended without more definitive knowledge of this effect and how should these provisions affect the application of Miner's rule and the S-N curves applied in the ASME design code incorporated by reference into the NRC regulations? Should NDE techniques be used that give measures of remaining fatique life and levels of toughness?

7. Are there any kinds of proof tests or hot functional tests that should be done to demonstrate integrity and operability to qualify for extended life?

APPROACH TO ESTABLISHING SCOPE OF TECHNICAL ISSUES

1. DEFINES A PROPOSED SCREENING PROCESS FOR EQUIPMENT AND STRUCTURES TO BE REVIEWED

2. DEFINES STRUCTURES, SYSTEMS, AND COMPONENTS FOR EVALUATION

3. DEFINES SPECIFIC SET OF DEGRADATION MECHANISMS FOR EVALUATION

4. DEFINES REQUIREMENTS FOR CORRECTIVE ACTION WHEN DEGRADATION IS NOT BEING MONITORED

LICENSE RENEWAL WORKSHOP

SESSION 3

FLUID AND MECHANICAL SYSTEMS

1. ADDITIONAL CRITERIA FOR PERIODIC SURRVEILLANCE AND PREVENTATIVE MAINTENANCE TO ENSURE OPERABILITY OF MECHANICAL EQUIPMENT BEYOND INITIAL DESIGN LIFE

2. AUGMENTED INSPECTIONS/ANALYSIS TO ADDRESS AGING MECHNAISMS IN PUMPS AND VALVES

3. FUNCTIONAL TESTING OF SYSTEMS AS A PREREQUISITE FOR LICENSE RENWAL

4. LONG TERM EFFECT OF FATIGUE ON CLASS I COMPONENTS

5. RESIDUAL FATIGUE LIFE FOR CLASS 3 AND 3 PIPING AND COMPONENTS

6. EFFECTS OF WATER ENVIRONMENT AND ELEVATED TEPERATURES ON FATIGUE OF PIPING AND COMPONENTS

7. PROOF TESTING AND HOT FUNCTIONAL TESTING TO DEMONSTRATE INTEGRITY AND OPERABILITY

Session 4

Screening Methodology for Systems, Structures and Components Important to Safety

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SESSION 4

SCREENING METHODOLOGY FOR SYSTEMS, STRUCTURES AND COMPONENTS IMPORTANT TO SAFETY

1. Is the scope of the systems covered by the conceptual rule adequate to assure safety?

2. Are the requirements clear?

3. Is it clear how the screening process in the rule works and is it clear how the requirements of the rule will be met?

4. Should the regulation permit the use of screening methods that are based on probabilistic risk assessments? If yes, describe the type of assessment and the specific rule of the risk assessment. If no, provide an explanation for your answer.

5. Should experimental aging models be required in probabilistic risk assessments to estimate aging degradation effects?

6. What are any additional issues or problems that might arise in meeting the proposed requirements and how can these concerns be dealt with through regulatory instruments?

7. Can defense in depth be incorporated into the screening methods?

8. How should the NRC judge the adequacy of an aging data model for use in PRA?

9. What, if any, should be the role of a mandatory plant-specific data base in license renewal?

10. What types of data analysis should be used to detect increasing failure rates of components?

11. It is well known that the data used in PRAs can change the results as well as the ranking of the contributors to core damage frequency. If a PRA is used in license renewal, what role should plant specific data play in this area? How much data are required for plant specific applications?

12. PRAs normally do not include passive components as basic events in the logic models. How should passive components be treated in PRA for license renewal?

13. If a PRA is used in a screening process for license renewal, how should the human error probabilities be treated so that the PRA reflects the design and not the human actions?

Session 4 Continued

14. To what level of detail does a PRA need to be for use in license renewal? Does specific guidance exist for performing a PRA for license renewal?

15. What is the role of Level I PRA in license renewal? Level II? Level III?

APPROACH TO ESTABLISHING SCOPE OF TECHNICAL ISSUES

1. DEFINES A PROPOSED SCREENING PROCESS FOR EQUIPMENT AND STRUCTURES TO BE REVIEWED

2. DEFINES STRUCTURES, SYSTEMS, AND COMPONENTS FOR EVALUATION

3. DEFINES SPECIFIC SET OF DEGRADATION MECHANISMS FOR EVALUATION

4. DEFINES REQUIREMENTS FOR CORRECTIVE ACTION WHEN DEGRADATION IS NOT BEING MONITORED

LICENSE RENEWAL WORKSHOP

SESSION 4

SCREENING METHODOLOGY FOR SYSTEMS, STRUCTURES AND COMPONENTS IMPORTANT TO SAFETY

1. THE ADEQUACY OF THE SCOPE OF SYSTEMS COVERED BY THE PROPOSED RULE

2. THE CLARITY OF REQUIREMENTS IN THE RULE

3. THE CLARITY OF THE SCREENING PROCESS

4. THE APPLICABILITY OF PRAs

5. THE NEED FOR EXPERIMENTAL AGING MODELS

6. THE RESOLUTION OF POTENTIAL ADDITIONAL PROBLEMS IN MEETING THE PROPOSED REQUIREMENTS

7. INCORPORATION OF DEFENSE IN DEPTH

LICENSE RENEWAL WORKSHOP

SESSION 4 - CONTINUED

SCREENING METHODOLOGY FOR SYSTEMS, STRUCTURES AND COMPONENTS IMPORTANT TO SAFETY

8. THE ADEQUACY OF THE AGING DATA MODEL

9. THE ROLE OF MANDATORY PLANT-SPECIFIC DATA BASE

10. DATA ANALYSIS TO DETECT INCREASING FAILURE RATES

11. THE ROLE OF PLANT-SPECIFIC DATA IN PRAs USED IN LICENSE RENEWAL

12. THE TREATMENT OF PASSIVE COMPONENTS IN PRAs USED IN LICENSE RENEWAL

13. THE TREATMENT OF HUMAN ERROR PROBABILITIES IN PRAs USED IN LICENSE RENEWAL

14. THE LEVEL OF DETAIL AND THE NEED FOR SPECIFIC GUIDANCE FOR PRAs USED IN LICENSE RENEWAL

15. THE ROLE OF LEVEL I THRU III PRAs IN LICENSE RENEWAL

Session 5

Overview of Conceptual Approach and Regulatory Framework

(continued discussion, see Session 1 questions and notes)

Public Workshop
on Technical and Policy Considerations
for Nuclear Power Plant License Renewal
U. S. Nuclear Regulatory Commission
November 13-14, 1989, Reston, Virginia

Session 6
Containments

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SESSION 6

CONTAINMENTS

1 What additional measures should be taken to monitor and address anticipated and unanticipated structural degradations (including the loss of prestressing forces) such that an acceptable level of safety is maintained during the extended life?

2. For what additional degradation environments or mechanisms should containments be monitored or inspected? Also, how can detrimental long term chemical interactions in concrete containment be measured and predicted in the future?

3. Prior to granting a license renewal, should the licensee be required to implement (a) containment leak rate qualification test, (b) containment structural integrity test, and (c) containment configuration (including foundation) surveillance? For other Category I structures (including ultimate heat sink, water retaining structures), what type of surveillance should be required for detection of likely degradations during extended license?

SESSION 6
CONTAINMENTS

Background

- Defense-In-Depth Concept
  Last Barrier To Contain Uncontrolled Release Of Fission Products In A Multiple Overlapping Successive System

- Regulatory Design Requirements In 10 CFR 50, APP. A
  - Establishment Of A Leak-Tight Barrier
  - Assurance Of Not Exceeding Design Requirements For Postulated Accident Conditions

TYPES OF STRUCTURAL DEGRADATIONS

- Loss Of Tendon prestress in prestressed Concrete Containments
- Corrosion Of Tendons
- Corrosion Of BWR Mark I Drywell Shell
- Corrosion Of BWR Torus
- Corrosion Of PWR Ice Condenser Containment
- Potential Corrosion Of Rebars In Reinforced Concrete Containments
- Corrosion Of Rebars And Spalling Of Concrete In Intake Structures

Session 7
Electrical Systems

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SESSION 7

ELECTRICAL SYSTEMS

1. What should the proposed licensee renewal rule and associated regulatory guidance contain regarding additional criteria for testing, analysis, or replacement of electrical equipment currently included in the 10 CFR 50.49 Equipment Qualification Program which is qualified for a life less than the original license term plus the renewal period but is not subject to periodic replacement?

2. What additional programs are necessary to address aging degradation issues associated with electrical equipment important to safety but located in mild environments? What should the proposed license renewal rule or other associated regulatory guidance require with regard to additional qualification or operability verification for electrical equipment in mild environments which has a design life less than the license renewal period but which is not subject to periodic replacement?

3. Licensees have identified electrical components important to safety that have been assumed to have a life expectancy of 40 years but have been found to fail, or otherwise become unreliable, after 5 to 10 years in service. To what extent has the industry identified electrical equipment that is known to exhibit high failure rates in less than 40 years and what should be done to ensure reliable equipment performance to support license renewal?

4. Most cable has been qualified by manufacturers for 40 years. The 40 year life was predicated on certain installed and application conditions (including environmental stressors, cable electrical loading and cable mechanical loading) for which the cable was designed. Given that manufacturers have provided certain important initial parameters for new cable, what kind of program should be proposed that could be instituted to establish the insitu condition of cables and the potential degradation that would take place beyond the current design life? In addition, what insitu monitoring methods would be useful for an aging assessment of circuit breakers, relays, reactor protection systems, and electrical distribution systems?

5. What requirements should NRC issue as part of a license renewal rule for electrical equipment important to safety?

6. What should the proposed license renewal rule require regarding functional testing of electrical equipment important to safety as a prerequisite for license renewal, recognizing that such functional testing may not have been performed previously as part of the original licensing basis?

APPROACH TO ESTABLISHING SCOPE OF TECHNICAL ISSUES

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2. DEFINES STRUCTURES, SYSTEMS, AND COMPONENTS FOR EVALUATION

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4. DEFINES REQUIREMENTS FOR CORRECTIVE ACTION WHEN DEGRADATION IS NOT BEING MONITORED

LICENSE RENEWAL WORKSHOP

SESSION 7

ELECTRICAL SYSTEMS

1. ADDITIONAL CRITERIA FOR ELECTRICAL EQUIPMENT INCLUDED IN THE E.Q. PROGRAM BUT NOT PERIODICALLY REPLACED

2. ADDITIONAL PROGRAMS TO ADDRESS AGING DEGRADATION OF ELECTRICAL EQUIPMENT LOCATED IN MILD ENVIRONMENTS

3. PROGRAMS TO ESTABLISH THE INSITU CONDITION OF CABLES AND COMPONENTS AND THE POTENTIAL FOR FUTURE DEGRADATION

4. REQUIREMENTS WITHIN THE RULE FOR ELECTRICAL EQUIPMENT IMPORTANT TO SAFETY

5. FUNCTIONAL TESTING OF ELECTRICAL EQUIPMENT AS A PREREQUISITE FOR LICENSE RENEWAL

Session 8
Environmental Effects

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SESSION 8

ENVIRONMENTAL EFFECTS

1. Is there any compelling reason not to permit the NRC the option of preparing an environmental assessment rather than an environmental impact statement (or supplement to) in individual relicensing actions as now required in 10 CFR 51?

2. To what extent might a generic environmental impact statement reduce the number and scope of environmental issues which would need to be addressed in individual relicensing actions?

3. What are the advantages and disadvantages of concurrent NEPA (10 CFR 51) and health and safety (10 CFR 50) rulemakings? Should these rulemakings be combined and pursued on the same schedule?

4. What are the potential sources of environmental effects from relicensing?

5. What are the potential magnitudes and significances of such environmental effects?

6. What experiential knowledge, studies and data are available to perform generic evaluations of potential environmental effects?

7. To what extent would such environmental effects differ from those experienced during the initial term of operation?

8. What should be the focus and scope of analysis of severe accident consequences in a generic environmental impact statement?

9. Should plant specific Level III PRA's be required in the NEPA severe accident consequence analysis?

10. To what extent should future availability of spent fuel storage capacity be a consideration in the generic environmental impact statement?

11. What should be the focus and scope of analysis of alternatives to relicensing the current generation of LWRs?

12. What role might utilities and Federal and State agencies play in the process of developing a generic environmental impact statement?

LICENSE RENEWAL WORKSHOP

Session 8

Environmental Effects

- NEPA Review Is Required for:
  - License Renewal Rule -- NOW!
  - License Renewal Actions -- NOW or LATER?
- Alternative NEPA Documents
- Schedule Implications
- Sources of Environmental Effects
- Analysis

LICENSE RENEWAL WORKSHOP

Session 8

Environmental Effects - Continued

- Significance of Effects
- Severe Accident Consequences
- Spent Fuel Storage Capacity
- Alternatives to Relicensing
- Contribution of Federal and State Agencies to a Generic Review