

ACRS MEETING SUMMARY/MINUTES OF THE  
IMPROVED LWRS SUBCOMMITTEE  
DECEMBER 4, 1990  
BETHESDA, MARYLAND

**CERTIFIED**

12-21-90  
by C. Wylie

PURPOSE

The purpose of this subcommittee meeting was to review the latest NRC staff's proposal regarding the level of design detail under 10 CFR Part 52 (SECY-90-377).

ATTENDEES

ACRS

C. Wylie, Chairman  
J. Carroll, Member  
C. Michelson, Member  
D. Ward, Member  
E. Wilkins, Member  
M. El-Zeftawy, Staff

NRC

G. Imbro, NRR  
M. Virgilio, NRR  
R. Nease, NRR  
M. Slosson, EDO  
R. Borchardt, NRR  
T. Cox, NRR  
A. Viette Cook, OCM  
J. Guttmann, OCM  
J. Scarborough, OCM  
J. Mitchell, OCM  
V. Ferrarini, Consultant  
J. Leivo, Consultant

OTHERS

C. Lewe, NUS  
R. Stark, NUS  
P. Comella, N&H  
D. Airozic, McGraw Hill  
R. Ng, NUMARC  
W. Kaisen, NUMARC  
A. Heymer, NUMARC  
L. Rib, AECLT  
R. Curry, Stone & Web.

MEETING HIGHLIGHTS, AGREEMENTS AND REQUESTS

1. Mr. Wylie, Subcommittee Chairman, stated the purpose of the subcommittee meeting and introduced the other ACRS members. He indicated that the subcommittee members are interested to know the recent staff's determination and recommendations regarding the scope of design issue.

RS  
011

2. Mr. Virgilio, NRR, indicated that on August 22, 1990, the Commission has requested a paper from the staff that describes the advantages and disadvantages of the two-tier approach that is proposed by NUMARC. The Commission also requested staff's recommendations on those structures, systems, and components for which it may not be feasible or practical to achieve a level of design detail in the application consistent with levels 1 and 2.

On October 31, 1990, the ACRS Improved LWRs Subcommittee met with the staff to discuss and review the latest staff's proposal on this issue. The staff has indicated at that meeting of its intention to finalize a SECY-paper to the Commission (SECY-90-377).

Currently, SECY-90-377 has been issued and is publicly available. In this SECY, the staff indicates that the information developed by an applicant for design certification shall be considered to be in one of three categories:

- a) Design material submitted in an application and certified through rulemaking (Tier 1) will include information completed during the conceptual phase of the design such as design criteria and bases, and certain information developed during the preliminary and detailed design

phases, as detailed in the proposed regulatory guide. Tier 1 can be changed by a rulemaking to amend the certification, an exemption pursuant to 10 CFR 52.63, or a rule waiver pursuant to 10 CFR 2.758. Changes resulting from a rulemaking become binding on all licensees referencing the certified design. Applicants for Combined Operated License (COL), COL holders, or licensees referencing a design certification may submit exemption requests pursuant to 10 CFR 52.63 or waivers pursuant to 10 CFR 2.758 for changes to Tier 1. Such exemptions or waivers would not change the requirements of the certification for other licensees.

- b) The remaining design information in the application and not certified (Tier 2) will include information demonstrating how Tier 1 criteria are implemented and will be of sufficient detail for the staff to perform its safety review of the adequacy of Tier 1. The design certification will include a provision whereby Tier 2 information cannot be changed except through an amendment rulemaking by the holder of the design certification, or by an exemption to the rule or a waiver from the rule certifying the design by a COL applicant after the NRC issues a design certification. The COL will be conditioned such that the COL holder may make changes to

Tier 2 design information pursuant to provisions paralleling that of 10 CFR 50.59 until such time as 10 CFR 50.59 becomes effective. The findings and conclusions of the staff's safety evaluation report (SER) that supports the certification rulemaking and COL will identify those matters resolved in accordance with 10 CFR 52.63. Changes to Tier 2 design information may be subject to hearing before the NRC grants permission to operate depending on whether compliance with acceptance criteria is implicated by the change.

- c) Information developed and available for NRC audit may be changed provided the change does not violate the provisions of the application and certification. The staff will perform audits of this design material to ensure that the design products meet the commitments of the design certification and supporting design details (Tiers 1 and 2). If such information forms the basis for the staff's formal safety determination regarding the adequacy of Tier 1, it will be docketed as part of the application. The finding and conclusions of the staff's SER that support the design certification or COL will identify those matters resolved.

The staff is currently recommending to develop and issue a regulatory guide that describes for applicants the contents of an application for design certification and COL, the design products expected to be developed and available for audit, and the process for making changes to the design. In addition, this regulatory guide will provide guidance on the formulation of an inspection, tests, analyses and acceptance criteria (ITAAC) program.

Mr. Virgilio indicated that pursuant to 10 CFR 52.47, an applicant for design certification will have to develop a design sufficient to enable the staff to reach a final conclusion on all safety matters, permit the preparation of acceptance criteria and inspection requirements by the staff, and permit the preparation of procurement specifications and construction and installation specification by the applicant. The staff is proposing to use a graded approach to determine design detail to be developed by an applicant. The level of detail will vary from system to system based on safety (including the additional safety benefits from standardization) and will recognize the limits set by what is feasible and practical. The applicant will submit in the application a depth of detail similar to that in an FSAR at the operating license (OL) stage for a recently licensed plant (1985-1990) except for site-specific and as-built information.

The applicant will develop and retain for staff audit additional design information such as that normally contained in certain procurement specifications and construction and installation specifications. This information translates the design criteria set forth in the application into design products. If a portion of this additional information forms the basis for a safety determination by the staff, it will be docketed.

3. Mr. Imbro, NRR, briefed the subcommittee members in regard to four phases of design evolution. These are conceptual, preliminary, detailed, and final. The detailed phase of design evolution will include specific definition of design configuration within the scope of the certified design (and refined analyses). This definition includes installation standards, test plans, ITAAC, technical specifications, interface requirements for non-certified portions of the design, procurement requirements, and detailed layouts.

The final phase of evolution will include design configuration completed in sufficient detail to develop construction and manufacturing drawings and can be used for fabrication and start-up activities (reconciliations of vendor specified data, and detailed test procedures for start-up).

The staff analyzed the feasibility of completing the design process. From this analysis, the staff determined that the feasibility varies with the system grouping as follows:

- Nuclear island (primary system/containment) - final design in process (greater than Level 2)
- Balance of nuclear island and turbine island - detailed design complete (Level 2)
- Site-specific systems, structures, and components - conceptual design and design interfaces complete (Level 4)

Mr. Imbro cited examples of "Tier 1" information such as: Design bases and criteria, Simplified piping and instrumentation diagrams, Simplified electrical single-line diagrams class 1E AC/DC, General arrangement drawings, Locations of equipment, Routing of all piping, and Routing of cable tray systems.

Tier 2 information would be that contained in the standard safety analysis report (SSAR) as required by the scope of the standard review plan and standard format and contents document but not specified as Tier 1. All of the completed design

products provide supporting information that demonstrates (1) the appropriate implementation of the Tier 1 and Tier 2 SSAR commitments, and (2) allows NRC reviewers to audit the design documents as they would at the FSAR stage of review in the 10 CFR Part 50 process.

Mr. Imbro presented viewgraphs that express the degree of design finality as a function of the engineering hours expended. These viewgraphs show that approximately one-half of the engineering hours expended in design during design and construction of a nuclear power plant are expended in the final design and field engineering phase.

4. Mr. W. Raisen, NUMARC, presented the industry's general comments on SECY-90-377. He indicated that the industry recognizes and appreciates the effort the staff has made in drafting the SECY. However, the industry has general concerns in regard to the following.

- SECY-90-377 recommends new and substantial requirements for design certification beyond 10 CFR Part 52 (e.g., independent design certification, Tier 2 availability for audit and prototype testing).

- The finality statements as recommended by the staff are ambiguous and could lead to an unpredictable licensing process and schedule.
- The "feasible and practical" standard that is introduced in the level of detail is not clear and does not demonstrate safety benefits.
- There is no need to develop a regulatory guide on level of detail, since the current regulations are sufficient, e.g., Section 50.34(g) references the SRP as the acceptance criteria.
- There will be additional costs to meet the level of detail required by the subject SECY. The industry estimates are in excess of \$500 million for 4 ALWR projects.

Mr. Raisen indicated that there is an extremely low probability of financing the additional work without an order.

- The implementation of SECY-90-377 will cause schedule extensions; approximately 3 to 5 years for

the evolutionary plants. This will also impact the passive plants designs.

In conclusion, Mr. Raisen recommended that the Commission should not approve SECY-90-377 as written. He commented that if SECY-90-377 is endorsed, the Nuclear Power Oversight Committee (NPOC) strategic plan and nuclear option will be jeopardized. The industry intends to provide detailed comments on the subject SECY to NRC staff and the Commissioners, as soon as possible.

5. As a result of the Subcommittee's discussion, some of the members expressed concern in regard to the following:

- Mr. Michelson expressed some concern on the interpretation to 10 CFR 50.59. Mr. Carroll shared the same concern and indicated that different utilities would have different interpretation.
  
- Mr. Michelson commented that in SECY-90-377, the staff proposes to treat Tier 1 and Tier 2 information in a similar fashion up to the COL issuance and operation. He stated that the staff should allow a process similar to that of 10 CFR 50.59 for making changes in Tier 2 beginning after design certification. Mr. Wylie agreed with Mr. Michelson.

- Mr. Carroll commented that additional information is needed to describe the staff's criteria for computer software verification and validation (V&V) for the new reactor for the proposed approach. The staff is working on this.
- Mr. Michelson cautioned that hazard analysis (e.g., fire, flooding and pipe breaks outside containment) should be looked at very carefully for the future plants. He indicated that the staff does not have a clear criteria to review such items.
- Mr. Carroll recommended that the staff should update the Standard Review Plan to support design certification reviews and to include severe accident issues.
- Mr. Michelson indicated that potential interactions between safety and non-safety systems and equipment need to be considered by the staff in its safety determinations.
- Mr. Michelson indicated that essential service water (ESW) system and non-essential service water systems are identified by the staff as site-specific

requiring a level 4 design detail. However, those portions of the ESW and non-ESW systems located within nuclear island or the turbine island need to be detailed and considered in the staff's safety determinations. Mr. Wylie and Mr. Carroll agreed and shared the same sentiment.

- Mr. Michelson commented that the ACRS would expect the level of information for staff review to include that required to specify the environmental qualification requirements for all components that are important to safety, including those located outside the primary containment. He added that it is not clear if SECY-90-377 has provided the level of detail for all events which are identified in the SRP for mandatory analysis. If not, the issue of how to specify the environmental qualification requirements for those components which assure reactor shutdown and suitable mitigation during such events appears to be unresolved.
- Mr. Ward expressed concern in regard to the information provided by the staff for the design finality issue and the expenditures of engineering hours. He indicated that such information is not

based on real experience or data from the industry.  
The staff agreed.

- Mr. Michalson questioned the relationship between the proposed regulatory guide and the GE/ABWR efforts and the ramifications on the schedule for design certifications.
- Mr. Ward commented that the staff should explore more on what it means by "feasible and practical" in its proposal.
- Mr. Wylie asked the staff to explore more on the issue of prototyping. The staff indicated that these design products for innovative systems will include representative software and hardware system prototype performance data.
- Mr. Carroll expressed concern that the staff is still using the RESAR-414 acceptance criteria for the Integrated Protection System previously evaluated by the staff 11 years ago.

FUTURE ACTION

Mr. Wylie, the Subcommittee Chairman, is planning to brief the full Committee in the December 6-8, 1990 ACRS meeting regarding the subject. The NRC staff and NUMARC representatives will also give presentations on this issue. The Committee may wish to write a report to the Commission regarding this matter.

Reference:

SECY-90-377 dated November 8, 1990 from James M. Taylor, Executive Director for Operations, to NRC Commissioners, Subject: "Requirements for Design Certification Under 10 CFR Part 52"

\*\*\*\*\*

NOTE:

Additional meeting details can be obtained from a transcript of this meeting available in the NRC Public Document Room, 2120 L Street, NW, Washington, DC 20006, (202) 634-3273, or can be purchased from Ann Riley and Associates, Ltd., 1612 K Street, NW, Suite 300, Washington, DC 20006, (202) 293-3950.

**NRR STAFF PRESENTATION TO THE ACRS  
STANDARDIZATION AND PART 52 LICENSING**

**DECEMBER 4, 1990**

***M. VIRGILIO, ASSISTANT DIRECTOR***

***REACTOR PROJECTS, NRR***

***301-492-1353***

***G. IMERO, SECTION CHIEF***

***SPECIAL PROJECTS BRANCH, NRR***

***301-492-0954***

**SUBCOMMITTEE ON IMPROVED  
LIGHT WATER REACTORS**

## **OVERVIEW**

- \* **GRADED APPROACH TO DESIGN FINALITY**
- \* **CONTENT OF THE APPLICATION AND CERTIFICATION**
- \* **CHANGE PROCESS FOR MATERIAL IN APPLICATION, CERTIFICATION AND HELD FOR AUDIT**

**SECY 90-241**

- CONTENTS OF THE APPLICATION  
TIER 1 & TIER 2**
- CERTIFICATION - TIER 1**
- MATERIAL AVAILABLE FOR AUDIT**
- LEVELS 1, 2, 3, & 4**

***FOUR LEVELS FROM SECY 90-241***

- 1. IDENTICAL PHYSICAL, FUNCTIONAL & PERFORMANCE CHARACTERISTICS**
- 2. PHYSICALLY SIMILAR / IDENTICAL FUNCTIONAL & PERFORMANCE CHARACTERISTICS**
- 3. IDENTICAL FUNCTIONAL & PERFORMANCE CHARACTERISTICS**
- 4. FUNCTIONALLY IDENTICAL / SIMILAR PRINCIPAL FEATURES**

## ***STAFF PROPOSAL - DETAIL***

- LEVEL OF DESIGN DETAIL
  - \* GRADED APPROACH BASED ON SAFETY
- APPLICATION
  - \* FSAR MINUS AS-BUILT & SITE INFORMATION
  - \* ORGANIZED INTO TWO PARTS/TIERS
  - \* SUPPORTS SAFETY DETERMINATION
- AVAILABLE FOR AUDIT
  - \* FROM PROCUREMENT & C&I SPECS
  - \* CONFIRM TRANSLATION OF SAFETY CRITERIA INTO DESIGN

## **STAFF PROPOSAL - DETAIL**

### **- GRADED APPROACH BASED ON SAFETY**

- \* > LEVEL 2 FOR CERTAIN NUCLEAR ISLAND FEATURES**
- \* LEVEL 2 FOR KEY NUCLEAR ISLAND FEATURES**
- \* LEVEL 2 FOR KEY TURBINE ISLAND FEATURES**
- \* LEVEL 4 AT CERTIFICATION AND LEVEL 2 AT COL FOR SITE SPECIFIC FEATURES**

## ***STAFF PROPOSAL - FLEXIBILITY***

- CERTIFIED PORTION OF THE DESIGN/TIER 1**
  - \* RULEMAKING TO AMEND CERTIFICATION**
  - \* EXEMPTION PER SECTION 52.63**
  - \* WAIVER PER SECTION 2.758**

## **STAFF PROPOSAL - FLEXIBILITY**

- IN APPLICATION BUT NOT CERTIFIED/TIER 2
  - \* BETWEEN DESIGN CERTIFICATION AND COL  
AMENDMENT RULEMAKING, EXEMPTION, WAIVER
  - \* BETWEEN COL AND AUTHORIZATION TO OPERATE  
PROVISIONS PARALLELING SECTION 50.59
  - \* FOLLOWING AUTHORIZATION TO OPERATE  
SECTION 50.59

## ***STAFF PROPOSAL - FLEXIBILITY***

### **- INFORMATION AVAILABLE FOR AUDIT**

- \* 10 CFR PART 50, APPENDIX B**
- \* TIER 1 & 2**
- \* COST OF REDESIGN**

## **RECOMMENDATIONS**

**— AGREE WITH THE GENERAL APPROACH ON:**

- \* GRADED APPROACH TO DESIGN FINALITY**
- \* CONTENT OF THE APPLICATION AND CERTIFICATION**
- \* CHANGE PROCESS FOR MATERIAL IN APPLICATION, CERTIFICATION AND HELD FOR AUDIT**

**— AUTHORIZE DEVELOPMENT OF REG. GUIDE**

**NUCLEAR INDUSTRY'S PRESENTATION TO THE  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
ON  
LEVEL OF DETAIL & COMMENTS ON SECY-90-377  
REQUIREMENTS FOR DESIGN CERTIFICATION UNDER PART 52  
BILL RASIN, DIRECTOR, TECHNICAL DIVISION, NUMARC**

## NUMARC PRESENTATION TO ACRS ON SECY-90-377

1. INTRODUCTION
2. INDUSTRY POSITION ON LEVEL OF DETAIL.
3. COMMENTS ON SECY-90-377
4. CONCLUSIONS

## INDUSTRY POSITION ON LEVEL OF DETAIL

- o TIER 1, FSAR SECTION 1.2, AMPLIFIED TO A LEVEL EQUATING TO A CURRENT SER
  
- o LEVEL OF DETAIL WILL VARY DEPENDENT UPON SAFETY SIGNIFICANCE OF SYSTEM

- o DESIGN MUST BE SUFFICIENTLY DETAILED TO ENABLE NRC TO:
  - COMPLETE SAFETY EVALUATIONS
  - ASSURE CONSTRUCTION CONFORMANCE
  - PREPARE INSPECTION PLANS AND SCHEDULES
  
- o LEVEL OF DETAIL IN A DESIGN CERTIFICATION FROM PART 52:  
"AN ISSUE THAT WILL HAVE TO BE RESOLVED IN EACH CERTIFICATION  
RULEMAKING"

## COMMENTS ON SECY-90-377

### GENERAL COMMENTS

- o INDUSTRY RECOGNIZES AND APPRECIATES THE EFFORT STAFF HAS MADE IN DRAFTING THE DOCUMENT.
- o INDUSTRY NOTES NRC ACCEPTANCE OF:
  - TWO TIER APPROACH.
  - FLEXIBILITY PROVISION, THE USE OF 50.59 DURING CONSTRUCTION FOR TIER 2 ITEMS.
  - PHILOSOPHY OF A GRADED APPROACH TO LEVEL OF DETAIL.
  - PHILOSOPHY OF THE LEVEL OF DETAIL SHOULD EQUATE TO: FSAR MINUS AS-BUILT & AS-PROCURED INFORMATION.

## GENERAL CONCERNS

- o **LEVEL OF DETAIL**
  - **"FEASIBLE AND PRACTICAL" STANDARD INTRODUCED**
  - **COMMENSURATE SAFETY BENEFITS FROM INCREMENTAL LEVEL OF DETAIL NOT DEMONSTRATED**
  
- o **NEW AND SUBSTANTIAL REQUIREMENTS FOR DESIGN CERTIFICATION BEYOND PART 52**
  - **INDEPENDENT DESIGN CERTIFICATION**
  - **TIER 3/AVAILABLE-FOR-AUDIT**
  - **PROTOTYPE TESTING**

CONCERNS CONT'D

- o **FINALITY STATEMENTS ARE AMBIGUOUS**
  - **FINALITY FOR TIER 1 INFORMATION ONLY**
  - **LEADS TO UNPREDICTABLE LICENSING PROCESS AND SCHEDULES**
- o **DEVELOPMENT OF REGULATORY GUIDE ON LEVEL OF DETAIL**
  - **SECTION 52.47(A)(1)(I) REFERENCES PART 50 - - REFERENCE FOR APPLICATION FOR DESIGN CERTIFICATION**
  - **SECTION 50.34 ADDRESSES CONTENTS AND REQUIREMENTS FOR FDA/DESIGN CERTIFICATION 50.34(G)**
  - **SECTION 50.34(G) REFERENCES THE SRP AS THE ACCEPTANCE CRITERIA FOR REGULATIONS**

CONCERNS CONT'D

- o ADDITIONAL COSTS TO MEET THE LEVEL OF DETAIL REQUIRED BY THE SECY:
  - INDUSTRY ESTIMATES IN EXCESS OF \$500 MILLION (4 ALWR PROJECTS IN PROGRESS)
  - EXTREMELY LOW PROBABILITY OF FINANCING THE ADDITIONAL WORK WITHOUT AN ORDER
  - NO POSSIBILITY OF AN ORDER UNTIL DESIGNS ARE CERTIFIED.
- o SCHEDULE EXTENSIONS:
  - EVOLUTIONARY 3 TO 5 YRS
  - PASSIVE UNCERTAIN BUT WILL BE IMPACTED BY DELAYS IN EVOLUTIONARY SCHEDULES

## CONCLUSIONS

1. COMMISSION SHOULD NOT APPROVE SECY-90-377 AS WRITTEN.
  - o CONCEPT OF FEASIBLE AND PRACTICAL IS A NEW REQUIREMENT BEYOND PART 52
    - REQUIRES SUBSTANTIAL ADDITIONAL COST WITH NO TIE TO SAFETY
  - o IF SECY-90-377 IS ENDORSED NPOC STRATL " PLAN AND NUCLEAR OPTION JEOPARDIZED
  
2. INDUSTRY INTENDS TO PROVIDE DETAILED COMMENTS ON SECY-90-377 TO NRC STAFF AND COMMISSIONERS AS SOON AS POSSIBLE