ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

March 12, 1975

Honorable William A. Anders
Chairman
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: STATUS OF GENERIC ITEMS RELATING TO LIGHT-WATER REACTORS

Dear Mr. Anders:

The Advisory Committee on Reactor Safeguards reported on the "Status of Generic Items Relating to Light-Water Reactors" in its letters of December 18, 1972 and February 13, 1974. The Committee expects to report from time to time on the status of generic items. This is the third such report. The Committee limits its definitions of generic items to those cited specifically in its letters pertaining to projects and related matters. It should not be considered an all-inclusive listing since the Nuclear Regulatory Commission Staff may have additional generic items.

Group I of the attachment is a reiteration of the generic items considered resolved in the first report. Group IA includes those items resolved between December 1972 and February 1974 while Group IB includes those items resolved since February 1974. Following each item is a brief statement of the specific action that resulted in the resolution. Group II lists those items included in the original report for which resolution on a generic basis is still pending. Group IIA includes generic items that were added in the second report. The ACRS and the NRC Staff will continue to consider the safety significance of Group II, IIA and IIB items on a case-by-case basis until generic resolution is reached. Formal actions such as issuance of Regulations or Regulatory Guides are anticipated for many of the Group II, IIA and IIB items.

The Committee reaffirms its position that "resolved" means that a specific conclusion or policy decision has been reached by the NRC Staff and the ACRS. Resolution of an item indicates that the Committee is satisfied in a generic sense; however, this does not

mean that improvements should not be investigated and, possibly, implemented, or that experience has been satisfactory. In fact, requirements may differ for specific plants because of such factors as site characteristics and construction authorization dates, especially as they apply to backfit requirements.

Sincerely,

W. Kerr
Chairman

Attachments:
Generic Items
1) Group I
2) Group IA
3) Group IB
4) Group II
5) Group IIA
6) Group IIB

GENERIC ITEMS

Group I - Resolved Generic Items

1. Net Positive Suction Head for ECCS Pumps: Covered by Regulatory Guide 1.1

2. Emergency Power: Covered by Regulatory Guides 1.6, 1.9, and 1.32 and portions of IEEE-308 (1971)

3. Hydrogen Control After a Loss-of-Coolant Accident (LOCA): Covered by Regulatory Guide 1.7 and Supplement

4. Instrument Lines Penetrating Containment: Covered by Regulatory Guide 1.11 and Supplement

5. Strong Motion Seismic Instrumentation: Covered by Regulatory Guide 1.12

6. Fuel Storage Pool Design Bases: Covered by Regulatory Guide 1.13

7. Protection of Primary System and Engineered Safety Features Against Pump Flywheel Missiles: Covered by Regulatory Guide 1.14

8. Protection Against Industrial Sabotage: Covered by Regulatory Guide 1.17

9. Vibration Monitoring of Reactor Internals and Primary System: Covered by Regulatory Guide 1.20

10. Inservice Inspection of Reactor Coolant Pressure Boundary: Covered by ASME Boiler and Pressure Vessel (BPV) Code, Section XI and Regulatory Guide 1.65

11. Quality Assurance During Design, Construction and Operation: Covered by 10 CFR 50, Appendix B; ASME BPV Code, Section III; ANSI N-45.2-1971, Regulatory Guides 1.28, 1.33, 1.64, 1.70.6 and Proposed Standard ANS-3.2

12. Inspection of BWR Steam Lines Beyond Isolation Valves; Covered by ASME BPV Code, Section XI

13. Independent Check of Primary System Stress Analysis: Covered by ASME BPV Code, Section III

14. Operational Stability of Jet Pumps: Test and operating experience at Dresden 2 and 3 and other jet pump BWRs have satisfied the ACRS concerns

15. Pressure Vessel Surveillance of Fluence and NDT Shift: Covered by 10 CFR 50, Appendix A and Appendix H; and ASTM Standard E-185

16. Nil Ductility Properties of Pressure Vessel Materials: Covered by 10 CFR 50, Appendix A and Appendix G; ASME BPV Code, Section III; ACRS Pressure Vessel Report

17. Operation of Reactor With Less Than All Loops In Service: Covered by ACRS-Regulatory Staff position that manual resetting of several set points on the control room instruments under specific conditions and procedures is acceptable in taking one primary loop out of service. This position is based on the expectation that this mode of operation will be infrequent.

18. Criteria for Preoperational Testing: Covered by Regulatory Guide 1.68

19. Diesel Fuel Capacity: Covered by ACRS-Regulatory Staff position requiring 7 days fuel

20. Capability of Biological Shield Withstanding Double-Ended Pipe Break at Safe Ends: Covered by ACRS-Regulatory Staff position cited in several letters that such a failure should have no unacceptable consequences.

21. Operating One Plant While Other(s) is/are Under Construction: Specific requirements have been established by ACRS-Regulatory Staff. Position will be prepared.

22. Seismic Design of Steam Lines: Covered by Regulatory Guide 1.29

23. Quality Group Classifications for Pressure Retaining Components: Covered by Regulatory Guide 1.26

24. Ultimate Heat Sink: Covered by Regulatory Guide 1.27

25. Instrumentation to Detect Stresses in Containment Walls: Covered by Regulatory Guide 1.18

Group IA - Generic Items Resolved Since December 18, 1972

1. Use of Furnace Sensitized Stainless Steel: Covered by Regulatory Guide 1.44

2. Primary system detection and location of leaks: Covered by Regulatory Guide 1.45

3. Protection Against Pipe Whip: Covered by Regulatory Guide 1.46

4. Anticipated Transients Without Scram: Covered by Regulatory Position Document, "Technical Report on Anticipated Transients Without Scram for Water-Cooled Power Reactors," WASH-1270, September 1973

5. ECCS Capability of Current and Older Plants: Covered by Rulemaking as a general policy decision, although acceptable detailed implementation remains to be developed. Docket RM-50-1, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water-Cooled-Nuclear Power Reactors," December 28, 1973

Group IB - Generic Items Resolved Since February 13, 1974

1. Positive Moderator Coefficient: PWRs presently have or expect to have zero or negative coefficients. Where some Technical Specifications allow a slightly positive coefficient, the accident and stability analyses take this into account. Burnable poison provisions have been designed into PWRs to reduce otherwise excessive positive coefficients to allowable values.

2. Fixed Incore Detectors on High Power PWRs: Fixed incore detectors are not required for PWRs since reviews of potential power distribution anomalies have not revealed a clear need for continuous incore monitoring.

3. Performance of Critical Components (pumps, cables, etc.) in post-LOCA Environment: Qualification requirements of critical components are now covered by Regulatory Guides 1.40, 1.63, 1.73 and 1.89 and IEEE Standards 382-1972, 383-1974, 317-1972, 323-1974.

4. Vacuum Relief Valves Controlling Bypass Paths on BWR Pressure Suppression Containments: On designs prior to GE Mark III containment, resolution lies in surveillance and testing of vacuum relief valves. For Mark III containments, an additional requirement is that the design be capable of accommodating a bypass equivalent to one square foot for a given flow condition.

5. Emergency Power for Two or More Reactors at the Same Site: Resolved by issue of Regulatory Guide 1.81.

6. Effluents from Light-Water-Cooled-Nuclear Power Reactors: Resolved by issue of Appendix I to 10 CFR 50.

7. Control Rod Ejection Accident: Resolved for PWRs by Regulatory Guide 1.77.

GROUP II - Resolution Pending

1. Turbine Missiles: Turbine failures for past 16 years have been evaluated and a statistical probability analysis has been completed. An ACRS letter (April 18, 1973) discusses the problem.*

2. Effective Operation of Containment Sprays in a LOCA: Extensive documentation in topical reports. Review and evaluation are required.

3. Possible Failure of Pressure Vessel Post-LOCA By Thermal Shock: Regulatory Guide 1.2 covers current information. Ultimate position as to significance of thermal shock requires input of fracture mechanics data on irradiated steels from the Heavy Section Steel Technology Program.

4. Instruments to Detect Fuel Failures: Instrumentation exists to detect fuel failures. Continuing work is required.

5. Monitoring for Excessive Vibration or Loose Parts Inside the Pressure Vessel: State-of-the-Art results appear promising. More work may be required prior to decision as to installation of equipment.

6. Common Mode Failures: Requirements for diverse components should be established.

7. Behavior of Reactor Fuel Under Abnormal Conditions: This includes: flow blockage; partial melting of fuel assemblies as it affects reactor safety; and transient effects on fuel integrity. The PBF program will address some of these items.

*A Regulatory Guide is in preparation.

Group II Continued

8. BWR Recirculation Pump Overspeed During LOCA: Decision required by ACRS-Regulatory Staff.

9. The Advisability of Seismic Scram: Further studies required to establish need.

10. Emergency Core Cooling System Capability for Future Plants: Partially resolved by amendments to 10 CFR 50 [50.34(a)(4), 50.34(b)(4), 50.46, and Appendix K]. LOCA evaluation model complete. ACRS feels new cooling approaches should be explored.

11. Main Steam Isolation Valve Leakage of BWRs: Pending Regulatory Guide should resolve this issue.

12. Instrumentation to Follow the Course of an Accident: A Regulatory Guide to be issued should resolve the issue.

GROUP IIA - Resolution Pending - Items Added Since 12/18/72

1. Pressure in Containment Following LOCA: Further criteria and methods are needed to better evaluate local dynamic pressures in a LOCA to establish more definitive design margins.

2. Control Rod Drop Accident (BWRs): Calculations indicate that the reactivity response differs from earlier values. New analyses are required, including three-dimensional effects.

3. Fuel Densification: This is a facet of Item 7 in Group II, "Behavior of Reactor Fuel Under Abnormal Conditions," and Item 5 in Group IA, "ECCS Capability of Current and Older Plants."

4. Ice Condenser Containments: Additional analyses are required to establish response during a LOCA, and to establish design margins.

5. Rupture of High Pressure Lines Outside Containment: The possibility exists that failure of a high pressure line such as a steam pipe can prevent operation of critical safety components.

6. PWR Pump Overspeed During a LOCA: Problem arises in similar manner to that of BWRs (Item 8 Group II).

7. Rod Sequence Control Systems: Further evaluation required to establish conservatism in both BWRs and PWRs. Resolved for BWR-4 Design.

8. Isolation of Low Pressure From High Pressure Systems: Assurance required that low pressure systems cannot inadvertently be interconnected with a high pressure system leading to failure. There are potential interaction problems between Class 1 and Class 2 or Class 3 pressure connections.

9. Steam Generator Tube Leakage: Partially resolved by issue of Regulatory Guide 1.83 which addresses the concern from a preventative point of view.

10. ACRS/NRC Periodic 10-Year Review of All Power Reactors: A more effective, continuous alternative approach to periodic reviews is being proposed. Pending ACRS review, this item is still considered unresolved.

GROUP IIB - Resolution Pending - Items Added Since 2/13/74

1. Hybrid Reactor Protection System: Systems should be qualified for reliability, particularly through in situ tests and under various environmental conditions, prior to use in reactor system.

2. Qualification of new fuel geometries: The 16x16, 17x17 PWR and 8x8 BWR fuels should undergo testing to meet Item 7 in Group II and Item 3 in Group IIA.

3. Behavior of BWR Mark III Containments: Various aspects, including vent clearing, vent coolant interaction, pool swell, pool stratification, pressure loads and flow bypass should be resolved. This is an extension of Item 1 in Group IIA.

4. Seismic Category I Requirements for Auxiliary Systems: Systems such as radioactive offgas, letdown cooling and core auxiliary cooling should be examined to determine if it is necessary to design to Seismic Category I.

5. Stress Corrosion Cracking in BWR Piping: Several failures have occurred in operating BWRs. The ACRS letter of February 8, 1975, discusses possible actions that should lead to generic resolution and extensive programs are underway by industry, ERDA, and NRC.