UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 11 1980

Docket Nos: 50-311, 50-339, 50-275,
50-327, 50-369, 50-364,
50-395, 50-361, 50-390

APPLICANTS: Public Service Electric & Gas Company
Virginia Electric & Power Company
Pacific Gas & Electric Company
Tennessee Valley Authority
Duke Power Company
Alabama Power Company
Southern California Edison & San Diego Gas & Electric Company
South Carolina Electric & Gas Company

FACILITIES: Salem 2, North Anna 2, Diablo Canyon 1, Sequoyah 1, McGuire 1, Farley 2, Summer 1, San Onofre 2, Watts Bar 1

SUBJECT: SUMMARY OF DECEMBER 13, 1979 MEETING TO DISCUSS WITH PWR APPLICANTS REVISION 2 TO REGULATORY GUIDE 1.97, "INSTRUMENTATION FOR LIGHT-WATER-COOLED NUCLEAR POWER PLANTS TO ASSESS PLANT AND ENVIRONS CONDITIONS DURING AND FOLLOWING AN ACCIDENT"

Mr. Benaroya summarized the development of Regulatory Guide 1.97 from 1973 to the present Revision 2, which was issued for comment in December 1979.* The Three Mile Island accident demonstrated the need for additional qualified instruments and instruments having a much wider range (e.g., radiation monitors and core exit thermocouples) in order to effectively assess plant conditions and the actual and potential offsite release of radioactive effluents during accidents. In response to this need, the nuclear industry is developing ANS Standard 4.5 "Functional Requirements for Accident Monitoring in a Nuclear Power Generating Station." Draft 4 of ANS 4.5 was issued in November 1979.** The scope of ANS 4.5 is limited to information needed by the control room operator to bring the plant to a planned stable condition. Revision 2 to Regulatory Guide 1.97 endorses most of ANS 4.5 and extends the scope to include information needed to initiate unplanned action should the plant not respond as expected and to initiate action to protect the public. Regulatory Guide 1.97 also extends the scope of ANS 4.5 to include specific guidance for the range and design criteria of instruments to measure specific variables during an accident. The specification of design criteria in Regulatory Guide 1.97

*Available from the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director of Technical Information and Document Control.
**Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, LaGrange Park, Illinois 60525.

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is required to assure that qualified instruments will be installed and operational in all reactors by December 1981, as indicated in the Staff's Draft Action Plan (Memo Denton to Commissioners, December 11, 1979, Task II.F).

The December 13, 1979 meeting was the first of several meetings with applicants and licensees to answer questions regarding the design criteria for these instruments and to obtain advance comments for the final issue of Revision 2 to Regulatory Guide 1.97. This meeting was held with those applicants that expect to have PWR plants ready for operation in 1980. A list of attendees at the December 13, 1979 meeting is enclosed.

On December 14, 1979, a similar meeting was held with operating license applicants that expect to have BWR plants ready for operation in 1980. In January, similar meetings will be held with licensees of operating reactors and their representatives. The results of these meetings will be considered in determining the portion of the requirements in the guide that will be implemented for near term operating license plants and for operating reactors. The full scope of instruments listed in the active guide will be required for new plants that are docketed after April 15, 1980.

Although guidance was provided by the staff in this meeting, final positions will only be developed after all written comments are received. Among other changes, positions in Regulatory Guide 1.97 will be made consistent with those positions that will be approved for other post-Three Mile Island matters.

Mr. John Davis (Virginia Electric & Power Company) summarized major comments by utility representatives attending the meeting. (1) Revision 2 to Regulatory Guide 1.97 gives detailed design requirements for specific instruments rather than general requirements to provide increased in-plant safety and the utilities believe this is inappropriate. (2) The requirements in Regulatory Guide 1.97 appear to conflict in many places with draft requirements for control room design studies; utilities believe that integrated design requirements should be developed on a priority basis so that clutter and misinformation to the operator will not result from the redesign of control rooms for near term operating license plants and operating reactors. (3) The criteria of the guide appear to be inflexible, and may cause undesirable reduced accuracy of measurements for normal operating functions. (4) The 200 day long term cooling qualification time interval eliminates the validity of presently purchased equipment that was qualified to 100 day time interval. (5) Many of the specified design instrument ranges are beyond the state-of-the-art.

Applicants requested that the reasons for selecting certain variables, the range of the measurement, the design criteria and the purpose be provided to them so they can better meet the intent of the staff's requirements. In response, the staff said that the reasons for selecting specific measurements were generally stated in the discussion and tables of the guide. There is an

engineering basis for the range specified for each instrument. However, since it would be a monumental task to provide written detailed bases, further discussion and response to questions on specific applications may be obtained by telephoning V. Benaroya (301) 492-8057. The guide uses general terms to envelope the range of designs used by different reactor manufacturers and architect engineers. In the interpretation of the requirements, applicants should use a reasonable interpretation, based on their knowledge of accidents and engineering judgement.

The staff recognizes that most of the instruments listed are already designed and installed in nearly completed and operating plants, and that they may not meet all the design criteria specified in Table 1 of the guide. For these instruments, it may be possible to show that the instrument will perform satisfactorily during accidents by analysis or by tests of environmentally sensitive components of the measurement system. For example, the guide requires that instrumentation by qualified to function for 200 days following an accident if it will be inaccessible for replacement or repair. Currently purchased instruments have been tested in accident environments for 120 days. It may be possible to demonstrate their acceptability for a shorter period than 200 days by analysis, additional tests of sensitive components, or even by cost effectiveness.

Table 1 of the guide requires "continuous recording" for Type A, B and C instruments, including valve positions. It is not intended that such information, that does not vary with time, be placed on chart recorders; a typeout from the computer may be acceptable.

The specific instruments listed in Tables 2 & 3 have been grouped within five categories, according to the function to be performed during an accident. (Types A, B, C, D or E). The criteria for these categories are listed and defined in Table 1. Many of these instruments perform other functions during normal operation and so are designed to other criteria. Obviously, all applicable criteria need to be met for these instruments. Sometimes a separate instrument needs to be provided. For example, it may be necessary to use an additional instrument to measure natural circulation flow of reactor coolant in the forward and reverse direction.

Revision 2 of Regulatory Guide 1.97 issued for comment in December 1979 does not address instrument display location. Location of accident monitoring instrument displays in the control room will be considered by the staff when it reviews control room design, that is a part of the staff's draft Action Plan. Section C. 1 of Task 1.D.1 requires a review by each licensee of control room design, taking into consideration lessons learned from the Three Mile Island accident. Some instruments may use local indication (e.g., emergency ventilation damper position) and others by appropriately displayed in the emergency center (e.g., environs radioactivity exposure rate); however, local indication and displays located outside the control room should be installed where they can be read in a timely manner under accident conditions without exceeding acceptable limitis for radiation exposure provided in staff's Short Term Lessons Learned requirements.*

*November 9, 1979 letter from D. B. Vassallo to all pending operating license applicants enclosing "Discussion of TMI Lessons Learned Short Term Requirements; pages 19, 20, 21.

The applicants provided comments and questions on the specific instrument criteria listed in Table 2 of Regulatory Guide 1.97. Significant comments and clarification by the staff follow:

1. Core Exit Temperature - Applicants stated that "continuous recording" recording by Types B and C is interpreted by instrument engineers to mean a continuous chart recording for each of the 50 thermocouples. They suggested that a computer display or typeout should be adequate. Staff indicated that a flow, multipoint recorder with a computer display may be adequate. It is not necessary to meet single failure criteria for each thermocouple - 50 thermocouples provide ample redundancy. Thermocouples currently installed in some PWR's may be satisfactory; however, the recorder should cover the range of 150°F to 2300°F.

2. Control Rod Position - Applicants said that control rod position indicators may not survive for 5 days; further there appeared to be no need for them beyond 5 seconds - when rods are inserted. Applicants believed five minutes a suitable environmental qualification period. Staff said the purpose was to provide an indication for an operator to try to insert the rods by some action in the event some of the rods fail to insert for an automatic trip, as has some times occurred.

3. Neutron Flux - Several applicants propose to use 2 compensated in chambers instead of the fession counter listed in the guide.

4. Reactor Coolant System Hot/Cold Leg Temperature - The upper limit of the range (750°F) was selected to include the critical temperature (705.4°F); therefore, a temperature between 705.4°F to 750°F may be justifiable. Since the RCS contains redundant loops, one instrument on each loop may be acceptable (redundancy on each loop not needed).

5. Reactor Coolant System Pressure - The upper limit of pressure range (4000 psig) was selected to include the peak transient pressure calculated for anticipated transients without scram (ATWS) using staff assumptions. Applicants said there is only one manufacturer for qualified instruments to measure pressure greater than 3000 psig; and that deliveries of these instruments would be after 12/81.

6. Degree of Subcooling - The 35°F superheat requirement was based on the TMI-2 experience. Actually a wider range would be better.

7. Reactor Coolant Loop Flow - Instruments are not expected to measure flow with fine accuracy in the low flow range (-12% to +12%). A rough accuracy may be acceptable. The intent is to know when there is forward or reverse flow under natural circulation or accident conditions. The applicants indicate that natural circulation flow rates will not be measurable with these instruments.

8. Radiation Level in Primary Coolant Water - Staff said that instruments to measure radiation in the range of 10 μCi/cc to 10 Ci/cc are within the state-of-the-art; however, they may not be widely available. The purpose is to measure gross activity - extreme accuracy is not intended to be required. The type of failed fuel monitors on the let down lines of Westinghouse reactors may be satisfactory if located on a line that

9. Containment Hydrogen Concentration - The upper limit of the range was selected to provide margin above the explosive range (4% - 8%). A wider range is feasible with a decreased accuracy.

10. Containment Isolation Valve Position - One position indicator per valve meets the intent of the single failure requirement if there is a second isolation valve in the containment penetration or a backup means for isolation.

11. High Range Containment Area Radiation Monitor - Staff said that radiation monitors having a range of 1 to 10^7 R/hr are within the state-of-the-art; two manufacturers offer such instruments and, as an example, Wyle Laboratories is capable of qualifying them in an accident environment.

12. Steam Generator Pressure - A range to 10% above safety valve setting may be acceptable.

13. Steam Generator Level - The wide range level instruments currently used on steam generators may be satisfactory: The intent of the specified range ("from tube sheet to separators") is to assure that level can be measured over the full height of the tube bundle; e.g., a bottom water level tap one foot above the tube sheet is satisfactory.

14. Radioactivity in Effluent from Steam Generator Safety Relief Valves or Atmospheric Dump Valves - The location of monitors should permit measurement of efflux activity; readout should be in control room.

15. Condensate Storage Tank Level - This instrument was designated Type B because it is the primary measurement of quantity of water available as auxiliary feedwater.

16. Flow in Ultimate Heat Sink Loop - Staff indicated that this measurement was intended for small man-made water reservoirs (cooling tower basin or cooling pond) where makeup water supply is required after 30 days.

17. Sump Level in Spaces of Equipment Required for Safety - If the sump is subject to overflow (due to abnormal relief valve flow, pump seal failure, or pipe failure) the water level in the room should be measured.

18. Temperature of Space in Vicinity of Equipment Required for Safety - The intent is to measure temperature in spaces where heat sources exist and make possible to exceed design temperature (e.g., by failure of a heating, ventilating and air conditioning system, or a high energy line break). The range for BWR's (Table 3) has a typographical error - the range should be the same as for PWR's (Table 2) i.e., 30^0F to 180^0F. Also the design criteria for BWR's should be the same as for PWR's, i.e., Type D.

19. Post Accident Sampling Capability - Provide separate guidance for sumps inside the reactor building and the auxiliary building.

The staff recommended that plant specific comments on Tables 1 and 2 of Regulatory Guide 1.97 be provided on the docket by each applicant and that generic comments on Regulatory Guide 1.97 applicable to several plants be provided to V. Benaroya by a representative of the utilities.

Plant specific comments should describe instruments proposed in that plant that are different from those required by Revision 2 to Regulatory Guide 1.97, issued for comment in December 1979. Alternate designs or design requirements should be justified on the basis of capability to meet the intent of the guide or excessive cost for the potential benefit derived. In the latter case only realistic cost estimates will be considered. Plant specific comments on backfitting should be provided by January 15, 1980 to be considered for incorporation into the effective guide to be issued in May 1980.

Generic comments, which are expected to be fewer in number, will be considered for incorporation into the effective guide if they are received within the 60-day comment period ending in February 1980.

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Enclosure:
As Stated

cc:
See following pages

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