DATE ISSUE: 6/28/83

ACRS MEETING MINUTES OF THE

ELECTRICAL SYSTEMS SUBCOMMITTEE MEETING,

MAY 26, 1983 - WASHINGTON, D.C.

The purpose of the meeting was to discuss the generic implications of the Salem scram breaker failure event. A task force to assess the generic implications of the Salem incident was formed with representatives from various offices of the NRC. The task force submitted a report, NUREG=1000, Vol. 1, in April 1983 which was the subject of the meeting discussion. The meeting was entirely open to the public, and no requests were made for time to make statements from members of the public. The meeting convened at 8:30 a.m. and adjourned at 1:15 p.m.

The meeting attendees included the following:

ACRS

W. Kerr, Chairman
J. Ebersole, Member
S. Ditto, Consultant
E. Epler, Consultant
W. Lipinski, Consultant
C. Mueller, Consultant
G. Quittshreiber, Staff*
S. Seth, Fellow
L. Wainer, Fellow

NRC

R. Capra, NRR
W. Hodges, NRR
G. Holahan, NRR
W. Kennedy, NRR
W. Lanning, AEOD
R. Mattson, NRR
J. Partlow, IE
D. Pyatt, RES
E. Rossi, NRR
P. Shemanski, NRR
H. Silver, NRR
D. Smith, RES

Attached to the office copy of the minutes are a complete list of attendees, a meeting handout, and a copy of the agenda.

*Designated Federal Employee

Meeting Discussion - Opening Session

W. Kerr commended the Generic Implication (GI) Task Force on their work in NUREG-1000. He also asked that the GI Task Force consider and answer the following questions and comments on NUREG-1000:

- In the report, it was identified that the failure to achieve automatic scram at Salem was a common mode failure due to poor maintenance and poor management. The GI Task Force in the report, identified as a principal fix to the Salem problem, the addition of a diverse scram system to Westinghouse reactors. How does this fix match the problem?

- There was not a convincing evaluation of how reliable existing reactor trip systems are and what reliability the NRC would like to achieve as a result of its requirements for the generic implications of the Salem ATWS events.

- There was not a suggestion in the report to reduce the ATWS contribution to the core melt probability by reducing the probability of anticipated transients.

- Will there be a change in the NRC Staff's evaluation of the ATWS contribution to the core melt probability as a result of Salem?

J. Ebersole suggested that the NRC Staff rather than directing its effort to examining the reactor trip system common mode failure potential should examine the common mode failure potential for all reactor safety systems.

Status of the Generic Implications Task Force Activities (Meeting Handouts, Pages 1-4).

R. Mattson, NRR/DSI, first summarized the action taken by the NRC in response to the Salem incident. He noted that the three major efforts by the NRC were generated in response to the Salem incident; the first was the short order fact finding effort by Region I, NUREG-0977, the econd was an in-depth review of the breaker problem and management at Salem, Salem Restart Review SECY 83-98E, and the third effort was the Generic Implications Task Force effort NUREG-1000. Along with the three major reports were two IE bulletins and an IE Notice (83-01, 83-04, and 83-18) which notified other plants licensees of the problems at Salem with the DB-50 breaker and the subsequent problems with the W DS-416 (at McGuire) and the GE Ak-2 (at San Onofre) breakers. The IE bulletins and notices advised licensees to increase the awareness of ATWS procedures for their operators, and to increase the testing and maintenance on these breakers.

The second volume to NUREG-1000 will have as its subject the requirements and actions developed by the GI Task Force to address the generic implications developed in Volume 1. The GI Task Force has submitted requirements for licensee action to the CRGR and CRGR has reviewed and approved the requirements. The GI Task Force will submit to the Commissioners by July 2, 1983 the requirements approved by the CRGR and reprogramming plans within in the NRC to address the Generic Implications.

R. Mattson next described the make up, the objectives, and the approach of the GI Task Force. He noted that the approach of the Task Force was to review the work of the previous two NRC efforts to identify the problem at Salem, and then to

use information from meetings with INPO, Regulatory Response Groups, NSSS vendors, operations personnel, reactor trip breakers manufacturers, ATWS Rulemaking Owners Group, and the NRC regional staff along with information obtained from SALP, INPO, licensee response to IE bulletins, and FRC reports to determine the generic nature of the Salem problem. In addition to determining the generic implications of Salem, the GI Task Force developed actions to be taken by the NRC Staff, NSSS vendors and the licensees to address the generic implications.

R. Mattson then summarized the GI Task Force discussions with the reactor trip breaker manufacturers (RTB) and the Franklin Research Center regarding the performance and design of reactor trip breakers. He noted that out of discussion with these groups, the NRC found that the under voltage devices on the reactor trip breakers left a small margin between performance and design tolerance. He indicated that the torque delivered by the UV trip attachment to the RTB bar was more than required to trip the bar, however, only to a small amount more than required. The GI Task Force also concluded after their discussions with the RTB manufacturers that there had been no consideration of the reliability of the undervoltage trip type breaker other than that the breaker has extensively used in non-nuclear applications. In response to W. Kerr's question, E. Rossi, NRR/DSI, replied that the position taken by the RTB manufactures that the breakers were reliable because of their extensive use in non nuclear applications was based on the experience with the shunt trip device rather than the UV device. J. Ebersole asked that why did Westinghouse in their design of the reactor trip system used breakers rather than contactors to intercept the power supply to the control rods. E. Rossi replied

that Westinghouse felt that higher current used in the W Reactor Trip system design required the use of breakers rather than contractors. J. Ebersole then commented that breakers were not designed as well as contactors were for frequent load interception. R. Mattson replied, to J. Ebersole's comment, that the NRC Staff would consider the use of contactors in the requirements for diverse scram systems in Westinghouse reactors. W. Lipinski asked whether there has been any effort made to determine the lifetime of reactor trip breakers. R. Mattson replied that there had been no life cycle testing conducted on the W and CE breakers and as a result of the Salem, the NRC Staff will request that each individual licensee perform life cycle testing on their breakers.

Generic Implications Task Force Findings, NUREG-1000 (Meeting handout pages 5-10)

R. Mattson next summarized the GI Task Forces findings relative to management. The GI Task Force found at Salem a breakdown in overall management performance to the extent that the GI Task Force felt that characteristics used to describe the TMI-2 management at the time of their incident was similar to those used to describe Salem's management. The GI Task force also found that such symptoms of management break down were apparent to a smaller extent at other plants. The GI Task Force identified the SALP and INPO management assessment programs as the only ways the NRC could identify and alleviate such breakdowns in management performance. In order to increase the effectiveness of the SALP program, the NRC Staff plans to increase the participation of NRR In SALP reviews and to a minor extent use the findings of INPO's management assessment program in SALP reviews. W. Kerr asked whether SALP assessed management performance based on how well management met with regulations or how well management pursued safety.

- Determine seal failure mechanism,
- Correlate consequences of failure with mode of failure,
- Determine resultant core melt probability, and
- Evaluate need for modifications to licensing criteria.

J. Jackson, NRR, discussed the status of the NRC concerns regarding possible RCP seal LOCAs following a loss of seal support functions. He stated that small break LOCAs can result from RCP seal failure. Some preliminary conclusions on the RCP seal failure issue are listed below:

- With a complete loss of seal support function, as in a station blackout condition, the loss of seal integrity is not likely to occur for several hours.
- Primary failure mode for the seal integrity against leakage appears to be the failure of O-rings.
- NRC concerns have been limited to the station blackout condition where the RCP is in a static condition.

D. Sellers, NRR discussed the bolt integrity action plan being performed for NRC by Brookhaven National Laboratory. He stated that the plan will provide bolting integrity guidance in the areas of bolting applicability, material and lubrication, preload/torque control, testing requirements, bolt locking devices and inspection. In addition, parallel efforts on this matter are being pursued by Atomic Industrial Forum and Material Properties Council which includes membership from the utilities, NSSS vendors and EPRI. It was stated that this effort will be completed and a position formulated by the NRC by the end of July, 1983.

J. Partlow, IE, replied that SALP assessed performance based on how well regulations were met by management. W. Kerr then suggested that SALP should not restrict itself to assessing how well management meets with regulations, instead, it should determine if management ensures the operation of a safe plant.

R. Mattson next discussed the GI Task Force findings relative to post trip review. He referred to the failure of Salem's personnel to notice the RPS failure of February 22 prior to restart on February 25. He noted that most U.S. plants failed to provide detailed restart procedures (i.e., procedures distinct from normal restart procedures), conservative restart criteria, and indepth and independent post trip evaluation. He noted that an exception to the above was the post trip program at the Oconee Nuclear Power Plant. He also mentioned that although most plants have some form of control room computer capability, most fail to use their computer in the analysis of trip events. He noted that the GI Task Force will recommend that the NRC provide some form of guidance on how plant computers are to be used in post trip reviews. The Task Force, however, will not ask that plant computers be required in post trip reviews. He also noted that the Task Force examined the role of the NRC in post-trip evaluations. He noted that in response to a question from Congress as to why the NRC does not approve every restart, the NRC responded that the large number of reactor trips for U.S. nuclear power plants prevented the NRC from doing a restart evaluation for every plant. He indicated that a majority of trips were low-power feedwater control trips. W. Kerr stated that he felt there should be some action to improve feedwater control in U.S. PWRs and he wondered why the utilities had not taken such action in the past to improve feedwater control design.

R. Mattson next discussed the GI Task Force's findings relative to equipment classification. The GI Task Force findings in this area referred to the failure at Salem to clarify, for testing, surveillance, and maintanance purposes, the undervoltage trip device as safety-related. The GI Task Force found that this failure stemmed from Salem's inadequate control of their Master Equipment and Qualification lists. It was noted by the GI Task Force that similar lack of control in the distribution update and verification of these lists (and the failure to verify the safety nature of components and devices) is apparent to various degrees of other plants. R. Mattson noted that the GI Task Force in order to address the problem with equipment classification will not recommend that the NRC review the Q list and MEL for all U.S. plant, rather, it will recommend that the NRC review the equipment classification program for all U.S. plants to ensure that the safety classification of systems is translated to the component and subcomponent levels.

R. Mattson next tried to answer the questions raised by W. Kerr at the opening of the meeting. His response included the following:

- There was a change in the NRC Staff's evaluation of the ATWS contribution to a core melt probability as a result of Salem. Previous to the Salem incident, the ATWS Task Force estimated the probability of failure per demand of the RTS to be 3×10^{-5} for W reactors. After the Salem failure, the probability was estimated to be 1.8×10^{-4}. The NRC Staff feels that if all the fixes and programs requested by the GI Task Force are implemented, then the failure probability will return to the estimate made previous to Salem. If this concludes, that after fixes are in place the ATWS contribution to core melt probability will be what it was estimated to be before the incident.

- The diverse fix does, in certain aspects, respond to the common mode failure of the reactor trip breakers due to poor maintance problem at Salem. The W breakers without automatic shunt trip are sensitive to common mode failure, and thus the addition of diversity would address one aspect of the Salem problem. Other programs recommended by the GI Task Force will address the maintenance and management problems posed by Salem.

- In NUREG-1000, the GI Task Force estimated the overall failure probability of the reactor trip breakers to be 1×10^{-3} per demand (for all U.S. plants and exclusive of the Salem events). The NRC Staff will not judge the acceptability of the reactor trip system for a U.S. plant on the basis of a reliability number. The NRC Staff will leave it up to the designers and plant owners in developing their own reliability assurance program to determine what reliability should be achieved for the reactor trip system.

G. Holahan, NRR/DSI next presented the GI Task Force findings relative to vendor-licensee relations. He noted that Westinghouse failed to ensure that maintanance information (specifically, the lubrication of the DB-50 breaker) was sufficiently controlled at the Salem plant. Also, such information was not controlled at other Westinghouse plants. Other NSSS were more likely to make sure that their plants incorporated vendor information into their maintenance and Quality Assurance programs. He noted that Westinghouse is currently upgrading their vendor information program in response to Salem. He mentioned that along with their findings relative to the Westinghouse licensee relation, the

Task Force found that the control and flow of vendor information tended to decrease as the size and importance of the piece of equipment decreased and as the number of vendors handling a piece of equipment increased. He noted that the GI Task Force is currently considering ways to improve the flow and control of information in such situations.

G. Holahan next discussed the GI Task Force findings relative to preventive maintenance. The Task Force found that Salem failed to implement a preventive maintenance program on their DB-50 breakers. They also found that preventive maintenance on other systems was given a lower priority than corrective maintenance, and that this situation existed at other plants. He also noted that EPRI and the Pacific Northwest Laboratories studies on the maintenance programs at nuclear power plants identified preventive maintanance as a general area needing improvement. The GI Task Force will request that each plant provide and implement a preventive maintanance program. W. Lipinski asked if tne GI Task Force found that plants were giving priority to corrective maintenance, which keeps plant availability high rather than to corrective maintenance to safety systems. G. Holahan replied that did not have any specific information to make such a distinction, but he added that it may be the situation at certain plants. W. Kerr stated that rather than concentrating on improving the preventive maintenance program of nuclear power plants, the NRC and the operators should try to improve the entire maintenance program.

G. Holahan next discussed the GI Task Force findings relative to Quality Assurance. The Task Force found that although Salem had an adequate quality assurance program written down, and that they had comitted to the 1976 Reg. Guide 1.33 Standards on

QA, they failed to implement their program. In trying to determine the generic nature of the Salem QA problem, the GI Task Force found that although most plants have implemented a QA program based on Reg. Guide 1.33, most are committed to the 1972 Reg Guide rather than the more detailed and demanding 1976 ANSI version. The GI Task Force indicated that the Regional Offices have been encouraging the licensees to convert their QA programs from the 1972 to the 1976 version of Reg Guide 1.33.

G. Holahan next summarized the GI Task Force findings on the Reactor Trip Breaker (RTB) vendor performance. He noted that the GI Task Force concluded that there was no specific research or laboratory program conducted by the RTB vendor to establish the reliability of the undervoltage device. He also noted that to modify the breakers for use in safety related nuclear application Westinghouse would do only two things to distinguish a breaker from non safety applications:

- Supply certification which would say that the breaker was manufactured according to specifications in the blue prints, and,
- Modify the breaker in accordance with earlier IE bulletins calling for smoothing edges and rounding corners.

W. Kerr asked the NRC Staff whether they had considered whether there would have been a difference in the reliability of the Westinghouse UV breakers if there was no QA program on the breakers. W. Kennedy, NRR/DSI, replied that if a QA program had been properly implemented at Salem, maintenance would have been better and the possibility of the Salem breaker failures would have been less.

G. Holahan noted that Westinghouse has decided to make the following changes in the processing of the undervoltage trip type breaker; additional tolerance testing, cycle testing (75 times before leaving the W vendor) and testing and inspection of every UV device rather than sample testing.

G. Holahan next discussed the GI Task Force findings relative to the ATWS event and operator response. He indicated that the GI Task Force did not find any new insight into the ATWS event itself, however, they did find new insights into operator response from Salem. He noted that for both the February 25 and the February 22 events the operators failed to realize that there was a failure to automatically scram the reactor. For the February 22 event the operators did not realize there was automatic scram failure because a manual scram was initiated almost simultaneously with the automatic signal. The failure of the automatic reactor scram was not identified until February 26. For the February 25 event the operators manually scrammed the reactor after noticing a steam generator level below its reactor trip set point, and after discounting that there was a failure to automatically scram. The operators, at the time of the second event, thought that there was a problem with the scram demand indication rather than that they had an ATWS and an automatic scram failure. The GI Task Force identified the generic implication of this to be that there may be a greater amount of confusion in the identification of an ATWS than was previously understood. The GI Task Force also noted that in the review of plant procedure for ATWS, they found that although most plants provide sufficient procedures to deal with a transient up to the initial pressurization of the Reactor Coolant System, most do not have procedures to deal with a transient after the initial pressurization. The GI Task Force will recommend to the NRC that such procedures be developed.

W. Kerr asked what about the Salem event led to the GI Task Force to give attention to the post-pressurization part of the ATWS procedures. G. Holahan replied that Salem indicated that the probability of an ATWS was higher than that previously calculated by the NRC. This has led to greater concern about the surviability of the Westinghouse plant during an ATWS event. W. Kerr then stated that he had an impression fron the NRC Staff's review of the Westinghouse ATWS that the plant would be able to go through an ATWS without serious damage, and he was still curious as to why the NRC changed its position on the ability of the Westinghouse plant to survive an ATWS. He later added that the Salem event was not an ATWS because although there was a failure to automatically scram, the reactor was manually scrammed. He noted that an ATWS was a total failure of the RPS to scram, and the GI Task Force should have considered this when they ascertained that Salem indicated a higher ATWS probability.

W. Kennedy, NRR/DSI next mentioned that the NRC Staff was considering the following options for operator action, in view of Salem:

1. Trip the reactor manually when the operator observes scram demand without trying to determine whether an automatic scram has occurred.
2. Check later to determine if an automatic scram occurred upon scram demand, and whether further investigation is required.

E. Epler made a comment that it was dangerous of the NRC to advocate the knee-jerk type of operator action suggested in the first option because an automatic scram followed by an immediate manual scram would conceal the failures of the automatic protection system. W. Kennedy responded that the NRC Staff had considered the consequences of automatic scram failure being masked by the manual

scram. They concluded that the operator should not try to trouble shoot with the reactor at power. When there is an indication of scram demand the reactor should be shutdown to determine if there has been a failure to automatically scram. W. Kerr stated that he did not agree with this reasoning. He noted that shutdown of a reactor is not entirely free of risk.

G. Holahan next discussed the GI Task Force findings on reactor trip system reliability. He noted the GI Task Force found that in comparison with the B&W and CE reactor trip system design, the Westinghouse system was the most vulnerable design to common mode failure because it relied on the smallest number of breakers to trip the system, and because the Westinghouse design, without the automatic shunt trip, lacked diversity. He noted that the CE and B&W reactor trip system design provided some form of diversity.

G. Holahan finished the GI Task Force's presentation with the Task Force's findings relative to ATWS rulemaking. He noted that at the time of the Salem event, the ATWS rule was within 6 weeks of being presented to the Commission. He stated that the GI Task Force, in light of Salem, recommended that the ATWS rule be modified so that a diverse scram system for Westinghouse be required and that a Reliability Assurance program for all U.S. plants be implemented. He also stated that the GI Task Force had met with the CRGR the previous day to discuss the Task Force's recommendations, and that the CRGR questioned the need for such modifications to the ATWS rule.

W. Kerr asked what further ACRS action was requested by the NRC Staff on NUREG-1000. G. Holahan replied that the NRC Staff will ask for an ACRS letter relative to Volume 2 of NUREG-1000, on the GI Task Force's recommendations for NRC and licensee actions relative to Salem.

ACRS Consultants Comments

At the close of the meeting, W. Kerr requested the ACRS Consultants to comment on the Generic Implication of Salem. The consultants made the following comments:

S. Ditto was concerned that failure rates for the reactor trip system were being assessed from testing failures rather than from information on live operational failures, such as failures in redundant systems. He also felt that the use of breakers in the Westinghouse design was not an appropriate application. He suggested that the NRC push for a better trip device and an improved system design for Westinghouse plants.

E. Epler stated that he would like to see more effort taken by the NRC and the industry to prevent transients.

W. Lipinski made the following suggestions:

- The sequence-of-events recorder in nuclear power plants should be modified and used as to demonstrate that a given safety path is functional.
- The NRC should have the responsibility to look at the safety equipment classification lists for every nuclear plant to verify the completeness of such lists.
- There should be a very unambiguous indication of scram demand in the control room.

C. Mueller made the following comments:

- He was interested in how the Reliability Assurance program for the reactor protection system would be implemented at an annual cost of $25K.

- The principal problem with Salem was the over sensitivity of the reactor trip system to maintenance.

- In response to a comment made earlier in the meeting that the Department of Defense, NASA and the FAA specify quantitative reliability requirements for their systems and components, he noted that although these agencies do specify reliability numbers, they do not specify numbers for all systems, and for the majority of those system for which they do specify numerical reliabilities, they do not strictly enforce such reliabilities.

- He mentioned that out of surveys of NASA and Department of Defense equipment specification programs it appeared that requirements in these programs were controlled better than in similar program for the nuclear power industry.

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NOTE: ADDITIONAL MEETING DETAILS CAN BE OBTAINED FROM A TRANSCRIPT OF THIS MEETING AVAILABLE IN THE NRC PUBLIC DOCUMENT ROOM, 1717 H STREET, N.W., WASHINGTON, D.C., OR CAN BE PURCHASED FROM TAYLOE ASSOCIATES, 1625 I STREET N.W., SUITE 1004, WASHINGTON, D.C. 20006, (202) 293-3950.

STAFF ACTIONS IN RESPONSE TO SALEM 1 ATWS EVENTS

- FACT-FINDING REPORT BY REGION I (NUREG-0977, MARCH 1983)
- SALEM RESTART SAFETY EVALUATION REPORT (SECY 83-98E, APRIL 1983)
- IE BULLETINS AND INFORMATION NOTICE (83-01, 83-04, 83-18)
- TASK FORCE TO DETERMINE THE GENERIC IMPLICATIONS OF THE ATWS EVENTS (NUREG-1000; APRIL, 1983)
- GENERIC REQUIREMENTS
  - SUGGESTED BY THE TASK FORCE
  - BEING DEVELOPED BY THE PROGRAM OFFICES
  - UNDERGOING CRGR REVIEW
  - EDO REPORT TO COMMISSION ON GENERIC REQUIREMENTS

SALEM ATWS GENERIC IMPLICATIONS TASK FORCE

- TASK FORCE CHARTER:
  - DETERMINE WHAT SHORT TERM GENERIC ACTIONS WERE REQUIRED
  - ARE NRC AND ITS LICENSEES LEARNING THE SAFETY-MANAGEMENT LESSONS?
  - PRIORITY AND CONTENT OF THE ATWS RULE
- TASK FORCE MAKEUP:
  - INTER-OFFICE & INTERDISCIPLINARY GROUP
  - CHAIRED BY DIRECTOR, DSI, NRR
  - MEMBERS FROM NRR, IE, AEOD, REGION I
  - MANAGEMENT OVERSIGHT GROUP FROM NRR, IE, AEOD, RES, REGIONS I AND II

METHOD OF OPERATION

- IDENTIFY PROBLEM AT SALEM
- ANALYZE CAUSE (DOUBLE CHECK SALEM RESTART REVIEW)
- EXAMINE THE GENERIC OCCURRENCE
  - INPO (REPORTS AND DISCUSSION)
  - REGULATORY RESPONSE GROUPS (W, CE, B&W, GE)
  - SALP REPORTS
  - DISCUSSION WITH REGIONAL & HEADQUARTERS STAFF
  - REVIEWED LICENSEE RESPONSES TO IE BULLETINS
  - MEETING WITH ATWS RULEMAKING OWNERS GROUP
  - MEETING WITH TRIP BREAKER MANUFACTURERS
- SUGGEST A RESPONSE TO HARDWARE AND MANAGEMENT ISSUES WITH FULL INVOLVEMENT OF AFFECTED NRC OFFICES
- NRC OFFICES DEVELOPING FINAL ACTIONS INCLUDING CRGR REVIEW

SHORT TERM ACTIONS

1. INSPECTION AND ENFORCEMENT BULLETIN 83-01
2. INSPECTION AND ENFORCEMENT BULLETIN 83-04
3. INFORMATION NOTICE 83-18

TASK FORCE FINDINGS RELATIVE TO MANAGEMENT

1. OVERALL MANAGEMENT CAPABILITY & PERFORMANCE (PG 2-2 TO 2-6)

   - SYMPTOMS AT SALEM INDICATED A FAILURE TO PROVIDE A COMMITMENT TO DILIGENCE, ATTENTION TO DETAIL, AN INTUITIVELY QUESTIONING ATTITUDE AND CLEAR ASSIGNMENT OF DUTIES AND ACCOUNTABILITY
   - SYMPTOMS OF SIMILAR PROBLEMS AT OTHER PLANTS

2. POST-TRIP REVIEW (PG 2-7 TO 2-12)

   - INCOMPLETE POST-EVENT ANALYSIS AT SALEM AND OTHER PLANTS
   - INDEPENDENT ANALYSIS AT ONLY A FEW PLANTS
   - DETAILED PROCEDURES AT ONLY A FEW PLANTS
   - CONSERVATIVE RESTART POLICY AT ONLY A FEW PLANTS
   - ADEQUATE USE OF SEQUENCE-OF-EVENTS RECORDERS AT ONLY A FEW PLANTS

TASK FORCE FINDINGS RELATIVE TO MANAGEMENT (CONTINUED)

3. EQUIPMENT CLASSIFICATION (PG 2-13 TO 2-15)

   - MISCLASSIFICATION OF SAFETY RELATED EQUIPMENT FOUND AT THE COMPONENT LEVEL IN REACTOR TRIP SYSTEMS IN A FEW INSTANCES
   - METHODS OF TRACKING SAFETY RELATED EQUIPMENT VARY WIDELY AND ARE GENERALLY TOO SUSCEPTIBLE TO HUMAN ERROR

4. VENDOR-LICENSEE RELATIONS (PG 2-15 TO 2-18)

   - WEAKNESSES WITH WESTINGHOUSE PLANTS
   - GENERIC WEAKNESSES WITH VENDORS OTHER THAN NSSS

5. PREVENTIVE MAINTENANCE (PG 2-18 TO 2-23)

   - MANY PLANTS HAVE DIFFICULTY KEEPING UP WITH CORRECTIVE MAINTENANCE
   - PREVENTIVE MAINTENANCE GIVEN SECOND PRIORITY OR NOT DONE AT ALL
   - IMPROVEMENTS NEEDED IN AREAS IDENTIFIED BY EPRI & PNL STUDIES

TASK FORCE FINDINGS RELATIVE TO MANAGEMENT (CONTINUED)

6. POST-MAINTENANCE OPERABILITY AND SURVEILLANCE TESTING (PG 2-23 TO 2-24)

   - GENERIC PROBLEMS WITH POST-MAINTENANCE OPERABILITY TESTING

   - TECHNICAL SPECIFICATIONS REQUIRE TESTING BUT THE QUALITY OF THE TESTING NOT ALWAYS GOOD ENOUGH TO ASSURE AVAILABILITY OF THE SAFETY FUNCTION

7. QUALITY ASSURANCE (PG 2-24 TO 2-26)

   - AT SALEM THERE WAS A FAILURE TO IMPLEMENT A COMMITMENT TO REG GUIDE 1.33, ANSI 18.7/ANS 3.2 1976

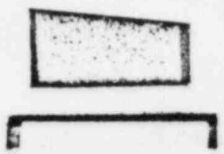
   - AT SOME OTHER PLANTS THERE IS ONLY A COMMITMENT TO THE 1972 STANDARD WHICH HAS MANY RECOMMENDATIONS BUT FEW REQUIREMENTS; IT ALSO LACKS DETAILS; NRC INSPECTIONS ARE GEARED TO THE 1976 STANDARDS

TASK FORCE FINDINGS RELATIVE TO VENDOR PERFORMANCE (PG 2-27 TO 2-28)

- GENERIC PROBLEM WITH QUALITY ASSURANCE IN DESIGN AND MANUFACTURE
- PROBLEMS IN MANUFACTURING TOLERANCES
- LACK OF LIFE CYCLE TESTING AND PERHAPS OTHER DESIGN VERIFICATION TESTING
- POOR CONTROL OF MODIFICATIONS AND INFORMATION BY WESTINGHOUSE

TASK FORCE FINDINGS RELATIVE TO ATWS EVENTS & OPERATOR RESPONSE (PG 4-1 TO 4-20)

- NO NEW ENGINEERING INSIGHTS TO ATWS TRANSIENTS
- OPERATORS AT SALEM DID NOT FULLY UNDERSTAND ATWS PHENOMENA
- OPERATOR RESPONSE
  - TIME AVAILABLE VARIES WITH DESIGN FROM 40 TO 100 SECONDS AT FULL POWER
  - CONTROL ROOM INDICATIONS OF ATWS EVENTS ARE NOT UNAMBIGUOUS
  - EMERGENCY PROCEDURES ARE INCOMPLETE



TASK FORCE FINDINGS RELATIVE TO REACTOR TRIP SYSTEM RELIABILITY (PG 3-1 TO 3-54)

- DESIGN WEAKNESSES IN THE UNDERVOLTAGE DEVICES
- NOT ALL VENDOR MODIFICATIONS CAN BE VERIFIED AS COMPLETE
- PREVENTIVE MAINTENANCE NOT ALWAYS SPECIFIED OR FOLLOWED
- LACK OF A SHUNT TRIP AND USE OF ONLY 2 BREAKERS IN W PLANTS MAKE THE W SYSTEM THE LEAST RELIABLE
- SOME DIVERSITY EXISTS IN THE CE AND B&W DESIGN; BWRs (AND PALISADES & FORT CALHOUN) DO NOT USE REACTOR TRIP BREAKERS
- OPERATING EXPERIENCE
  - SUMMARIZED BREAKER FAILURES IN RTS
  - REVIEWED OTHER FAILURES IN RTS
  - IDENTIFIED NEED TO LOOK AT SIMILAR EQUIPMENT IN OTHER SAFETY RELATED SYSTEMS
  - REVIEWED REPORTING AND ANALYSIS OF COMPONENT FAILURE DATA

TASK FORCE FINDINGS RELATIVE TO THE ATWS RULE (PG 5-1 TO 5-8)

- PROMPT ACTION NEEDED TO FINALIZE THE ATWS RULE
- RULE PENDING BEFORE CRGR AT TIME OF SALEM EVENTS WAS ABOUT RIGHT
- DIVERSITY SHOULD BE ADDED FOR ALL REACTOR TRIP SYSTEMS
- A RELIABILITY ASSURANCE PROGRAM SHOULD BE REQUIRED