



Carolina Power & Light Company

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JUN 28 1990

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Senior Vice President
Nuclear Generation

SERIAL: NLS-90-132

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR-71 & DPR-62
RESPONSE TO NRC CONFIRMATION OF ACTIONS LETTER
LICENSED OPERATOR TRAINING PROGRAM REVIEW

Gentlemen:

By letter dated May 21, 1990, the Nuclear Regulator Commission transmitted to Carolina Power & Light Company (CP&L) a Confirmation of Actions letter concerning the operator requalification examinations for the Brunswick Steam Electric Plant. The NRC requested that by June 30, 1990 the Company provide: (1) the results of a root cause analysis for the failures of the requalification examinations and the operational evaluations and (2) a long term corrective action plan. A summary of the root cause analysis results and the long term corrective action plan are provided in Enclosure 1. An events and causal factors chart is provided in Enclosure 2. The long term corrective actions have been incorporated into the Brunswick Plant Integrated Action Plan (IAP).

Carolina Power & Light Company believes that the major weaknesses and contributors that led to the unsuccessful Licensed Operator Requalification examinations and Operational Evaluations recently conducted at the Brunswick Plant have been identified. As noted in the corrective action summaries enclosed appropriate corrective actions have been completed or initiated which will enable CP&L to recertify its Licensed Operator Requalification Program at the Brunswick Plant. The scheduled corrective actions described herein will result in the Licensed Operator Program being ready for recertification during the upcoming October 1990 examinations.

The Company also recognizes that the recent lessons learned as a result of the examination results at the Brunswick Plant could have applicability to strengthen CP&L's training programs at the Harris Nuclear Project and the Robinson Nuclear Project. As such, the root cause investigation team included management personnel from either the Training Unit or the Operations Unit from these facilities. This was done to allow these facilities to have first-hand knowledge of the weaknesses and problems that caused the Brunswick program to be decertified. In addition to this experience, the Harris Plant and the Robinson Plant will document the review of the results of the root cause investigation report and this submittal for applicability and action, as necessary. The root cause investigation report is being reviewed by the licensed operator training staff at all three nuclear plants and will be reviewed with Operations during their next cycle of Licensed Operator Requalification reviews.

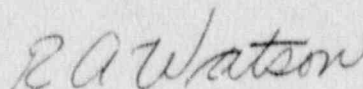
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The Company believes that the Brunswick Plant Licensed Operator Retraining Task Force recommendations are the correct actions for addressing the recent operator requalification problems experienced at the Brunswick Plant. We are confident that implementation of the corrective actions described herein will significantly improve our operator training program at the Brunswick Plant. We also believe that these corrective actions will provide a firm basis for achieving and sustaining recertification of our Brunswick Plant operator training program during the upcoming October 1990 examinations.

Please refer any questions regarding this submittal to Mr. L. H. Martin at (919) 457-2329.

Yours very truly,



R. A. Watson

WRM/wrm (\cor\trngltr)

Enclosures

cc: Mr. S. D. Ebnetter
Mr. N. B. Le
Mr. R. L. Prevatte

ENCLOSURE 1

SUMMARY

On May 29, 1990, a Brunswick Plant Licensed Operator Retraining Task Force was assembled to investigate the following two issues:

- Issue 1: Determine why the management process did not predict excessive operator failures.
- Issue 2: Determine why the Brunswick Plant operators failed the Licensed Operator Requalification examinations and Operational Evaluations.

The team consisted of managers with responsibility for operations or training at each of the nuclear stations and corporate Nuclear Plant Support organization, supplemented by an outside management consultant.

Causal factors were identified for each of the problem areas and the Human Performance Enhancement System (HPES) methodology was used to develop the set of root causes requiring corrective action. The team was supported by the Brunswick Plant HPES coordinator.

The investigation identified two problems which resulted in the management process not predicting the operator failures and four problems which resulted in excessive operator failures during the examinations. These are discussed in the following pages.

Issue 1: DETERMINE WHY THE MANAGEMENT PROCESS DID NOT PREDICT EXCESSIVE OPERATOR FAILURES.

Problem Statement 1 : Management did not fully recognize the significance of changes to the simulator models, dynamic simulator exam format, and evaluation criteria. As a result, an operator readiness verification was not performed.

Root Causes:

- o Available industry training information and experience was not effectively factored into the Brunswick Plant Licensed Operator Requalification (LOR) program.
- o Repeated and concurrent turnover of key personnel occurred.
- o Training management did not fully appreciate the licensed training process or requirements.

Corrective Actions:

1. The Curriculum Development Unit of the Nuclear Training Section will develop self-assessment criteria that will be used to increase the effectiveness of the training program. The criteria will be based on test results at the conclusion of each Hot License Class (HLC) and each year's Licensed Operator Requalification and will serve to identify weaknesses and changes needed in the LOR and HLC programs. The criteria will be implemented in the appropriate unit and section training procedures by March 29, 1991.
2. The use of available information will be improved by establishing guidance to assure that industry information is properly analyzed, disseminated, and used to improve performance. By January 15, 1991, this guidance will be incorporated into the Brunswick Training Unit procedures.
3. Management will establish guidance for observation and participation in industry activities (for example, training activities involving the Harris and Robinson Plants, other non-CP&L nuclear plants, INPO peer evaluations, and industry and NRC meetings). By January 15, 1991, this guidance will be incorporated into the Nuclear Training Section procedures.

4. Management will deal with the impact of turnover consistent with overall management development activities. Integrated Action Plan item A1 required Senior Management to establish expectations and communicate these expectations to the entire nuclear generation organization. These expectations included maintaining and executing succession and rotation plans, and strengthening internal transfer practices. Communication of expectations in these areas is expected to assist in reducing the impact of turnover. To assure management recognition of the importance of controlling the impact of turnover, a supplemental communication will be made to Nuclear Generation Group managers and supervisors, stressing the importance of:
 - a. Ensuring a thorough transfer of information when personnel leave a position.
 - b. Maintaining an effective nuclear generation succession plan and rotational program.
 - c. Allocation of resources in a timely manner, as appropriate, when a key vacancy occurs.
 - d. Investigation and action to the reasons for personnel turnover, as appropriate.
 - e. The controlled timing of internal transfers of key personnel.

The communication will be completed by September 15, 1990.

5. As a result of the investigation, management better recognizes the need for the Training Manager to have a strong background in operationally based training programs, and a sensitivity to operating requirements.
6. An independent evaluation by personnel not directly conducting training of the Licensed Operator Requalification examination readiness will be performed prior to the 1990 examinations. A requirement for independent evaluations of the Licensed Operator Requalification and Hot License examination readiness will be incorporated into the Brunswick Training Instructions prior to January 31, 1991.

Issue 1: DETERMINE WHY THE MANAGEMENT PROCESS DID NOT PREDICT EXCESSIVE OPERATOR FAILURES.

Problem Statement 2: Licensed Operator Retraining/Requalification reports did not indicate that operators' performance in dynamic simulator exercises was deficient relative to current NRC and industry standards.

Root Causes:

- o Simulator evaluations lacked sufficient rigor in identifying operator performance problems.
- o The pass/fail criteria for the annual operating examinations were not objectively defined and were not consistent with the NRC requalification criteria and current industry standards.

Corrective Actions:

1. The appropriate Training procedures will be revised by January 15, 1991 to establish objective simulator performance evaluation criteria for both Licensed Operator Requalification and Hot License examinations at least as rigorous as the NRC's criteria.
2. A remedial training program that addresses the operators' deficiencies, minimizes the disruption to Operations and Training work schedules, and provides rigorous feedback to enhance operator training program will be established by December 15, 1990.
3. Operations and Training will establish rigorous standards, performance expectations, and monitor operator performance via reports and personal involvement, especially for the annual dynamic simulator evaluation. A periodic sample of the results of simulator training will be used to monitor operator performance. Periodic monitoring and assistance in administering annual simulator examinations will be provided by Operations. By October 31, 1990, these requirements will be placed in the appropriate training instructions.

Issue 2: DETERMINE WHY THE BRUNSWICK PLANT OPERATORS FAILED THE LICENSED OPERATOR REQUALIFICATION EXAMINATIONS AND OPERATIONAL EVALUATIONS.

Problem Statement 1: The simulator training portion of the Licensed Operator Requalification program was not updated with changes that were occurring at the Brunswick Plant and in the industry. As a result, the program did not prepare the operators to pass the dynamic simulator portion of the NRC evaluated Licensed Operator Requalification examination.

Root Causes:

- o The impact of simulator model changes on operator simulator performance was underestimated.
- o The impact of changing simulator crew composition from two to three Senior Reactor Operators (SROs) and not utilizing the STA was not correctly assessed.
- o The loss of four Brunswick Training Unit instructors in early 1989 resulted in additional work for remaining instructors, less oversight of ongoing projects, and lower quality training.
- o Licensed Operator Requalification simulator training time was significantly below industry average because the Brunswick Plant simulator training commitment of 40 hours per year was not upgraded to the minimum of 60 hours per year INPO guideline and the practices at the Harris and Robinson Plants.
- o The impact of new NRC examination standards and format were underestimated and resulted in operators not being exposed to the new format or evaluation standards prior to the NRC examination.
- o Insufficient attention was placed on obtaining and effectively factoring available training information and experience into the Licensed Operator Requalification program. Lessons learned from the NRC examination results for the Harris Plant, the Robinson Plant, and from other utilities were not applied.
- o The industry emphasis and improvement on command, control, and communications were not effectively factored into the Licensed Operator Requalification program.

Corrective Actions:

1. The Curriculum Development Unit of the Nuclear Training Section will enhance the process for the identification and incorporation of needed changes to the simulator training process. This will be completed by January 15, 1991.

2. Procedural guidance will be established that provides direction for ensuring simulator modifications are properly identified and appropriate training for these modifications provided to licensed personnel. This will be completed by January 15, 1991.
3. A Training Advisory Committee has been established to coordinate training activities and identify problems and needed approvals. The responsibilities of this committee will be revised to include a review on a quarterly basis of changes in operating philosophy, regulatory requirements, operator crew composition, etc. (other than simulator changes) that might affect the training program. This will be completed starting with the fourth quarter 1990 Training Advisory Committee meeting (scheduled for December 1990).
4. A review of the adequacy of training staffing levels is currently in progress by management. The initial review will identify near term needs and will be completed by July 31, 1990.
5. Following completion of the near term review of the training staffing requirements, and after establishing the impact of the corrective action plan, the Company will review and establish long term resource staffing needs and associated training staffing requirements. In addition, the Company has mechanisms for providing supplemental staffing during periods of high demand or high turnover.
6. Effective with the third quarter of 1990, the number of simulator training hours is being increased to a minimum of 16 hours per quarter per licensed operator, which exceeds current INPO guidelines. The impact of this change on adequacy of training staffing levels will be incorporated in the above review.
7. Training on Emergency Core Cooling System (ECCS) malfunctions and interlocks was completed during recent operator training subsequent to the Licensed Operator Requalification examinations. Scheduling of this training in the future will be incorporated in appropriate documents. This will be completed by January 15, 1991.
8. The use of available information will be improved by establishing guidance to assure that industry information is properly analyzed, disseminated, and used to improve performance. By January 15, 1991, this guidance will be incorporated into the Brunswick Training Unit procedures.
9. Management will establish guidance for Brunswick Training Unit observation and participation in industry activities (for example, training activities involving the Harris and Robinson Plants, other non-CP&L nuclear plants, INPO peer evaluations, and NRC and industry meetings). By January 15, 1991, this guidance will be incorporated into the Nuclear Training Section procedures.
10. Review the policy for Brunswick Operations Unit observation and participation in industry activities (for example, training activities involving the Harris and Robinson Plants, other non-CP&L nuclear plants, INPO peer

evaluations, and industry meetings) and revise as necessary to encourage participation, as appropriate. This will be completed by January 15, 1991.

Issue 2: DETERMINE WHY THE BRUNSWICK PLANT OPERATORS FAILED THE LICENSED OPERATOR REQUALIFICATION EXAMINATIONS AND OPERATIONAL EVALUATIONS.

Problem Statement 2: The simulator training portion of the Licensed Operator Requalification program did not maintain operator performance to the necessary level of proficiency.

Root Causes:

- o Simulator training time was insufficient to maintain proficiency in off-normal situations such as Emergency Operating Procedure (EOP) implementation and dealing with malfunctions in Emergency Core Cooling System equipment controls and interlocks.
- o Total simulator time each year was 40 hours per licensed operator. Because Senior Reactor Operators prior to 1990 trained in two positions, they received only 20 hours in each position.
- o Even though plant line management did periodically observe simulator training and those licensed attended their required simulator training sessions, meaningful feedback to operators on maintaining a high level of performance was not provided. Operations line management did not actively participate in evaluation of their operating crews.
- o The scenario exercise guides used to conduct simulator training were relatively simple compared to those used by the NRC evaluating Licensed Operator Requalification examinations (NRC examination scenarios normally consist of a major casualty with a concurrent multiple ECCS equipment or support system failure).
- o Simulator examinations lacked sufficient rigor in identifying operator performance problems.
- o Long standing simulator model problems inhibited in-depth training in Emergency Operating Procedure execution for those scenarios involving core uncover or anticipated transients without scram (ATWS) events.
- o There was insufficient plant operations management involvement in setting rigorous performance standards for training to implement during Licensed Operator Requalification training.

Corrective Actions:

1. The Curriculum Development Unit of the Nuclear Training Section will develop a self-assessment process that will be used to increase the effectiveness of the training program. This process will be based on test results at the conclusion of each Hot License Class and each year's Licensed Operator Requalification and will serve to identify weaknesses and changes

needed in the Licensed Operator Requalification and Hot License Class programs. This action will be completed by January 15, 1991.

2. Operations and Training will establish rigorous standards, performance expectations, and monitor operator performance via accurate reports and personal involvement, especially for the annual dynamic simulator evaluation. Periodic monitoring and assistance in administering annual simulator examinations will be provided by Operations. A periodic sample of the results of simulator training will be used to monitor operator performance. By October 31, 1990, these requirements will be placed in the appropriate training instructions.
3. Effective starting the third quarter of 1990, the number of simulator training hours is being increased to a minimum of 16 hours per quarter per licensed operator, which exceeds current INPO guidelines. The impact of this change on the adequacy of training staffing levels will be reviewed (See page E1-6, item 6).
4. Training on Emergency Core Cooling System (ECCS) malfunctions and interlocks was completed during recent operator training subsequent to the Licensed Operator Requalification examinations. Scheduling of this training in the future will be incorporated in appropriate documents. This will be completed by January 15, 1991.
5. The appropriate Training procedures will be revised by October 31, 1990 to establish objective simulator performance evaluation criteria for both Licensed Operator Requalification and Hot License examinations at least as stringent as the NRC test criteria. The Nuclear Training Section will develop a formal Simulator Scenario Writers' Guide for all phases of the Licensed Operator Requalification examination, including simulator scenario development. This Simulator Scenario Writers' Guide will be completed by February 28, 1991.
6. A remedial training program that addresses the operators' deficiencies, minimizes the disruption to Operations and Training work schedules, and provides rigorous feedback to enhance operator training program will be established by December 15, 1990.

Issue 2: DETERMINE WHY THE BRUNSWICK PLANT OPERATORS FAILED THE LICENSED OPERATOR REQUALIFICATION EXAMINATIONS AND OPERATIONAL EVALUATIONS.

Problem Statement 3: The conduct of operations in the plant and in the simulator did not meet industry or Brunswick Plant procedurally established standards. The expected plant operating roles during normal operations, training, and simulator Licensed Operator Requalification NRC evaluations were not consistent and well understood by the operators. Training teams did not reflect the actual operating teams. The communication protocol established in Operating Instruction OI-01, "Conduct of Operations" was not enforced in the plant or the simulator. No standard for command and control was defined.

Root Causes:

- o Command and control standards were not explicitly defined. Likewise, the communication protocol was not specific.
- o The standards as written were not enforced by Operations line management or by the Brunswick Training Section instructors and therefore varied from shift to shift and did not meet current industry or NRC standards.
- o Due to insufficient Operations/Training interface, training was not performed with the procedurally defined operator roles.

Corrective Actions:

1. Interim changes have been made to Operating Instruction OI-01, "Conduct of Operations" to better establish command and control standards. A task force is being established to evaluate long-term command and control corrective actions. A completion schedule for their activities will be established by September 28, 1990.
2. A review of the Operations organization is underway with a focus on changes needed to reinforce team concepts, both on shift and in the simulator. This review will be completed by July 31, 1990. Based on the review results, a schedule for any additional corrective actions will be established.
3. Interim changes have been made to Operating Instruction OI-01, "Conduct of Operations" to better define the roles of all shift personnel. A task force is being established to evaluate long-term command and control corrective actions. A completion schedule for their activities will be established by September 28, 1990.

Issue 2: DETERMINE WHY THE BRUNSWICK PLANT OPERATORS FAILED THE LICENSED OPERATOR REQUALIFICATION EXAMINATIONS AND OPERATIONAL EVALUATIONS.

Problem Statement 4: Operators experienced excessive stress during the NRC evaluated Licensed Operator Requalification and Operations Evaluation examinations.

Root Causes:

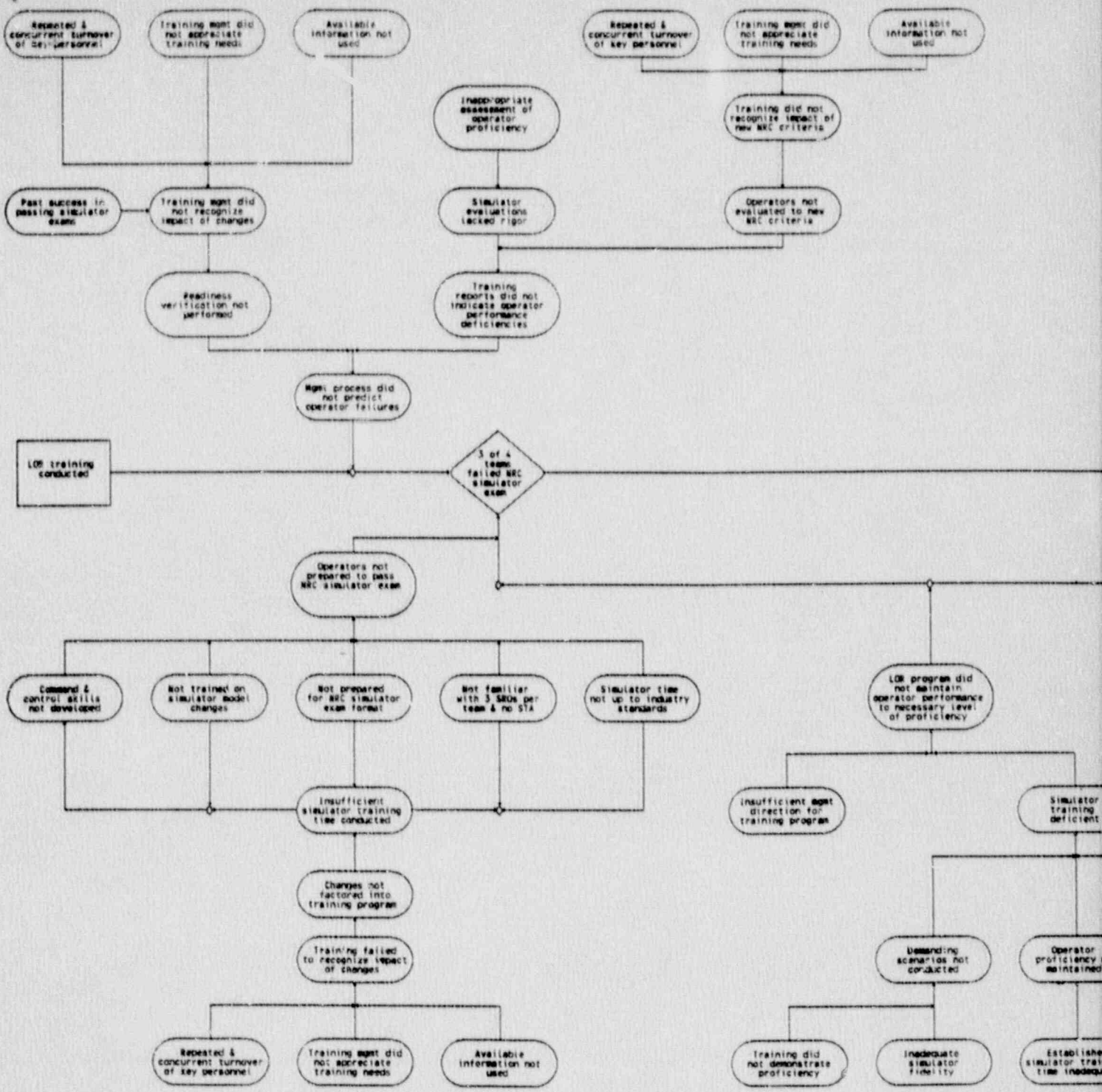
- o The NRC evaluated Licensed Operator Requalification and Operations Evaluation examinations were the first exposure any of the Brunswick Plant licensed operators had to the new, more challenging, dynamic simulator examination format.
- o The decision to use three Senior Reactor Operators per team in lieu of two senior Reactor Operators, as in all pre-1990 training, resulted in each team being evaluated on three scenarios. This required each Senior Reactor Operator to be evaluated in each of the three positions. Only fourteen hours of simulator time were devoted to transition from two to three Senior Reactor Operators.
- o Isolation and delay between dynamic simulator scenarios and several false starts unnecessarily increased the operators' stress levels.
- o The operators were accustomed to passing simulator exams.
- o After the first few examinations and comments by the operators examined, the operators remaining to be tested recognized they had not been fully prepared to meet the new passing criteria.
- o Some Senior Reactor Operators lacked the confidence and experience in filling shift positions other than the one they typically filled.
- o The operators being evaluated in the Operator Evaluations were aware of the potential for a plant shutdown if they failed.
- o In all prior contacts with instructors on the simulator, the trainers were communicative and helpful to the operators. During the simulator examinations, there was very little discussion and the atmosphere was significantly more formal, thus creating a strained environment to which they were not accustomed.
- o Each operator had a Company and a NRC evaluator monitoring his or her movements. This resulted in congestion on the simulator floor.
- o During the Operation Evaluation, the operators wore portable microphones for the first time and were videotaped.

Corrective Actions:

1. Effective starting the third quarter of 1990, the number of simulator training hours is being increased to a minimum of 16 hours per quarter per licensed operator, which exceeds current INPO guidelines, thus increasing the operators' exposure to the new examination format. The impact of this change on the adequacy of training staffing levels will be reviewed (See page E1-6, item 6).
2. The Nuclear Training Section will develop a formal Simulator Scenario Writers' Guide for all phases of the Licensed Operator Requalification examination. This Writer's Guide will include guidelines for the development of more challenging scenarios into Licensed Operator Requalification examination, will identify equipment and training aids to be used in simulator training scenarios, and will include the periodic use of video and audio equipment to allow the operators to become accustomed to them. This Simulator Scenario Writers' Guide will be completed by February 28, 1991.
3. The Operations control room command structure is currently being evaluated. This review will be completed by July 31, 1990. Based on the review results, a schedule for any additional corrective actions will be established.
4. A Simulator Upgrade Program was established in 1986 to manage simulator enhancements. Continued enhancements to the simulator will be implemented to meet simulator certification regulatory requirements. Plans for a modification to install an uninterruptible power supply for the simulator will be incorporated into the prioritized work planning process by December 15, 1990.
5. The Company will continue to work with the NRC examination staff to minimize review time delays between simulator scenario examinations.
6. The Licensed Operator Requalification Training Instruction will be revised to ensure operators receive adequate simulator training time in all licensed positions for which they may be examined. Revision of the Training Instruction will be completed by October 31, 1990.

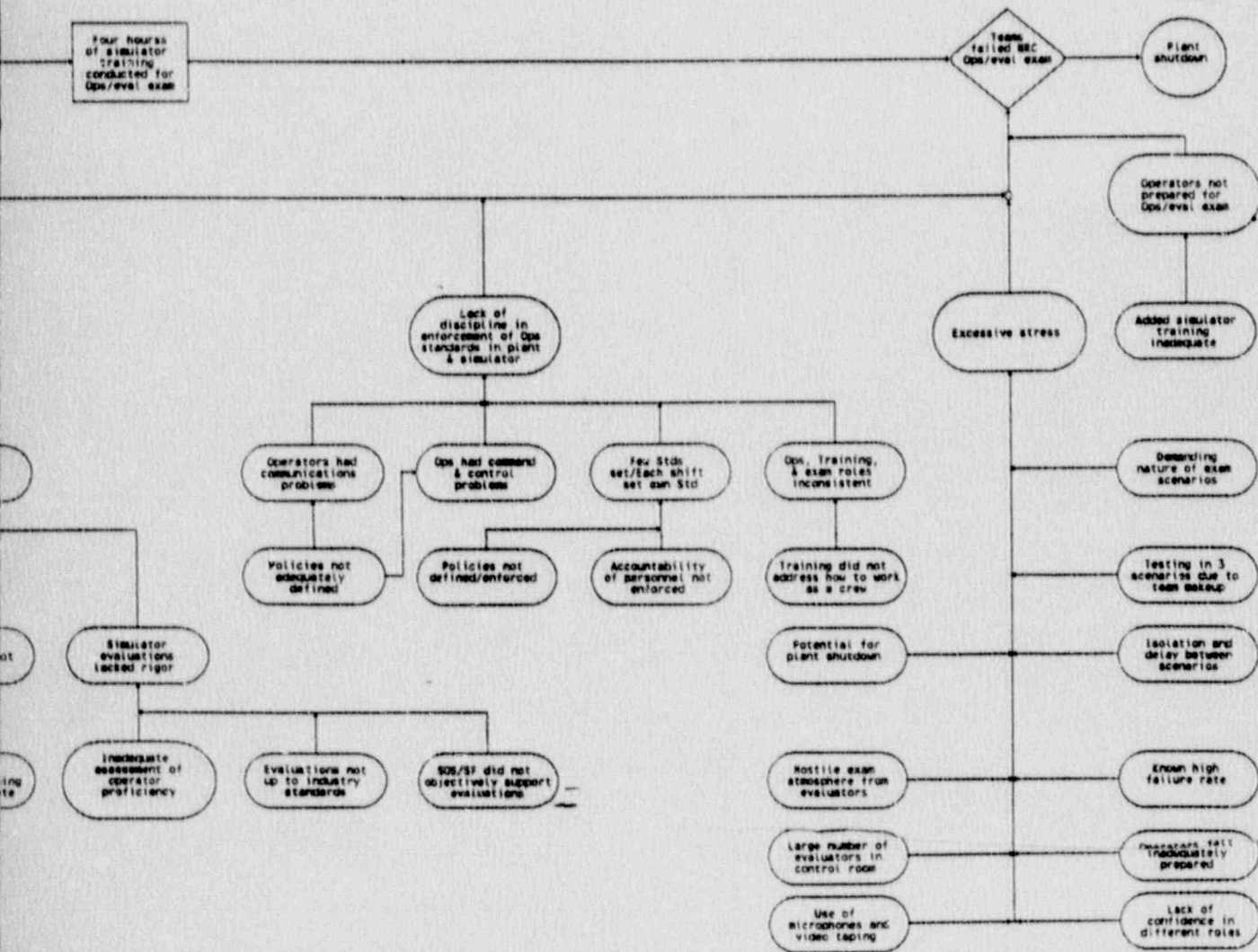
ENCLOSURE 2

**RESPONSE TO NRC CONFIRMATION OF ACTIONS LETTER
LICENSED OPERATOR TRAINING PROGRAM REVIEW
EVENTS AND CAUSAL FACTORS CHART**



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