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March 15, 1985

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289 SP
	)	(Restart Remand on
	)	Management - Training)
(Three Mile Island Nuclear	)	
Station, Unit No. 1)	)	

LICENSEE'S SUPPLEMENTAL PROPOSED
FINDINGS OF FACT IN RESPONSE TO THE
PROPOSED FINDINGS OF UCS (¶¶ 283-287)

In accordance with the understanding reached by the Licensing Board and the parties during a telephone conference call on March 13, 1985, Licensee hereby files supplemental proposed findings of fact which respond to paragraphs 283 through 287 of Union of Concerned Scientists Proposed Findings of Fact and Conclusions of Law on the Issue of Licensed Operator Training at TMI-1 ("UCS Findings").

UCS argues in these paragraphs that, because Licensee does not utilize periodic, formal on-the-job evaluations, it is not possible to conclude that training of control room operators at TMI-1 is accomplishing its intended purpose. As described in detail below, Licensee believes that UCS' position is incorrect because UCS misperceives the important elements of the reactor operator's job which require evaluation, and fails to account for the performance-based training system in place at TMI.

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The job of the reactor operator. While Licensee does not disagree with UCS' premise that the relationship of training to the operator's job performance is very close 1/ and, consequently, that monitoring operational performance will provide "the only reliable means" of measuring the effectiveness of training, UCS Findings, ¶ 282, Licensee does disagree with UCS' interpretation of "job performance" and "monitoring operational performance" as it relates to the position of reactor operator. Licensee further disagrees with UCS' contention that Licensee does not assess the operational performance of its reactor operators. UCS is narrowly defining job performance as the routine skills required in the day-to-day operation of the power plant and, therefore, defines monitoring operational performance as formally monitoring these routine skills. Licensee disagrees with these definitions.

In fact, the operator must be capable of responding appropriately to an extremely wide range of scenarios and events -- scenarios and events for which he must be trained. See, e.g., Licensee's Findings, ¶¶ 137-144 (discussion of scope of requalification training program); cf. 10 C.F.R. §§ 55.21-55.23. This mastery involves the ability to respond properly as a member of a team, as well as the capability to individually perform well under numerous scenarios, both

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1/ In our Reply Findings of March 6, 1985, Licensee noted the absence of record support provided by UCS for this proposition as defined by UCS and the lack of qualifications of Dr. Regan, who in fact addressed this question, to comment on the issue. See Licensee's Reply Findings, March 6, 1985, at 8 n.8.

recognizable and unanticipated. See, e.g., Licensee's Findings, ¶ 141 (discussion of skills training portion of requalification program, designed to enhance individual and team performance).2/ This wide range of capabilities that the operator must be capable of demonstrating contrasts sharply with the daily, monthly, and even annual routine of an operator, which fairly could be characterized as mundane. 3/ Routine on-the-job performance consisting mainly of administrative and monitoring functions does not closely correlate with the bulk of operator training.4/ To be a competent operator, mastery of multiple knowledges, skills, and abilities is necessary. It is this mastery -- not simply, or even primarily, effective routine performance -- which qualifies the operator

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2/ The complexity of the job of the reactor operator and the importance of training operators to master the necessary skills, knowledges and abilities to perform this job has been a recurrent theme in not only the management portion of the restart proceeding, but in the design phase, as well. See, e.g., LBP-81-59, 14 N.R.C. 1211, 1231 (¶¶ 625, 744-746) (discussion of importance of training and use of procedures in feed-and-bleed cooling mode (UCS Contention 1), and in operator interference with safety system operation (UCS Contention 10).)

3/ In the original 1980 OARP Report, in the context of human factors, the Committee observed that 'one problem with many high technologies is that the job of the operator is reduced to that of being primarily a monitor, a monitor who may suddenly have to assume greatly increased responsibility should there be, for example, equipment failure." OARP Report, Licensee Ex. 27 at 87; cf. Duke Power Co. (William B. McGuire Nuclear Station, Units 1 and 2), LBP-81-13, 13 N.R.C. 652, 665 ("Stress levels in operators of nuclear plants are generally low . . . .").

4/ This may be why operators sometimes comment that training does not address what they regularly do. See UCS Tr. Exh. 6 (RHR Report), question 132; Licensee's Findings, ¶ 221 n.74. Much of it doesn't.

to run the plant.5/

The direct consequence of this disparity between the operator's routine and the job's potential demands is that periodic evaluations of the reactor operator (RO) on the job would not add meaningfully to the information Licensee does gather to assess whether the operator is a good operator; i.e., whether the individual has the range and composite of skills, knowledges and abilities that are required for the job. See discussion infra concerning purpose and content of Licensee's performance-based training system; see also Tr. 33,421 (Ross). In short, routine on-the-job performance evaluations are not reasonable or even legitimate indicia of required operator performance and hence, would not provide a meaningful measure of the effectiveness of training. Compare UCS' Findings, ¶¶ 282-283 with discussion infra.

Measuring performance. Licensee agrees with UCS that measuring performance is an extremely important part of

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5/ Dr. Regan's testimony specifically focuses on the difference between measuring job performance of a job that is simple and routine (e.g., keypunch operator, golf club production line worker), in contrast to a job that requires skills that are not elicited fully except in an emergency. Regan, ff. Tr. 33,532, at 9, 13. In the former instance, job output -- e.g., "number of keypunches per unit of time" -- constitutes an effective performance measurement. Id. at 9. Dr. Regan characterizes the latter instance, such as the job of a reactor operator or a pilot, as "some of the most difficult performance to evaluate." Id. at 9. Dr. Regan maintains, however, that there are a number of performance measurements, "one or more" of which could be used to evaluate the effectiveness of training. These include job knowledge tests, simulation, and walk-throughs. Id. at 9-14. As discussed below and in greater detail in Licensee's initial findings, these indicia are among the performance measurements used by Licensee at TMI.

ensuring the effectiveness of training. UCS Findings, ¶¶ 282-283; see, e.g., Licensee's Findings, ¶ 193.6/ However, because daily on-the-job performance is not an effective barometer of training effectiveness, other, direct measures of operator performance requirements must be taken. As discussed in the following paragraphs, if required job performance is measured and is satisfactory, training can gain confidence that it is teaching operators what they need to know. From such information, training also can determine where improvements or changes in the program are necessary or appropriate. The record in this proceeding establishes that Licensee does assess the TMI-1 operator training program against the required operational performance of individuals and crews.7/

Accurately assessing and then measuring required performance is the very essence of performance-based training. Performance-based training mandates the development and implementation of a training program that is based on the

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6/ UCS describes Dr. Regan's "fundamental premise" as the principle that "the training program must be assessed against operational performance of individuals and systems." UCS Findings, ¶ 44, citing Regan, ff. Tr. 33,532, at 9. In UCS' words, Dr. Regan "considers this measurement to be the only reliable means of measuring the effectiveness of training." Id. The question here is, what does this operational performance really mean when the job in question is the job of the reactor operator? See n.5, supra.

7/ During the March 13 conference call, UCS suggested that until it was faced with the Board's concern about UCS Findings, ¶¶ 283-287, Licensee had not given any thought to measuring job performance. See also UCS Findings, ¶ 287. To the contrary, evaluating operator performance has been a key factor in the development of Licensee's performance-based training system. See, e.g., Licensee's Findings, ¶¶ 98-118 (use of TSD model in development of performance-based training).

performance requirements of the job. See, e.g., Licensee's Findings, ¶¶ 101, 103, 114-116, 167-177. In a performance-based training program, such as the program in place at TMI, training examinations themselves correlate with behavioral learning objectives, which in turn are generated on the basis of job performance requirements, which in turn are specified through the job/task analysis process. See Licensee's Findings, ¶¶ 104, 183; see generally id. at ¶¶ 97-118.8/

Consequently, performance-based examinations effectively constitute job performance evaluations -- evaluations of skills, abilities and knowledges required (although perhaps rarely, if ever, used) for the job. See id. at ¶¶ 103-104, 108, 193-197. At TMI-1, written tests (or performance evaluations) are used to test conceptual and procedural knowledge, and knowledge of systems. See id. at ¶ 104; see also id. at ¶¶ 124, 146. Orals examinations (using a tiered system of administration for requalifying operators and using senior management to examine new operators) test concepts, procedures and systems at the control room panel, and test in-depth understanding of systems and procedure application throughout the plant. See id. at ¶¶ 128, 147, 189-190. Simulator usage and testing provide the operator with experience responding to accident and abnormal scenarios, as well as necessary plant evolutions, and allow Operations and Training management to

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8/ For example, each lecture in the training program is based on a lesson plan which is prepared using the behavior learning objectives developed for the subject-matter. Licensee's Findings, ¶¶ 176, 183; Newton et al., ff. Tr. 32,409, at 17.

evaluate operator performance under these conditions. See id. at ¶¶ 73, 127, 141, 142, 175, 196, 218. Moreover, team performance can be realistically assessed under the conditions of greatest importance, from a safety standpoint. See id. at ¶¶ 196, 218; Committee, ff. Tr. 31,749, Special Report at 62. During skills training, which is an integral part of the requalification program, operators are evaluated by Operations management in their ability to respond effectively to abnormal plant manipulations, to properly conduct a broad range of plant evolutions, and to apply basis principles of reactor operations using the BPTS. See Licensee's Findings at ¶¶ 140, 44-47, 112; see also Newton et al.; ff. Tr. 32,409, at Attachments 4, 5 and 6. In addition, operator trainees are meaningfully evaluated by supervisory Operations personnel (SROs) in specific requirements of the job -- OJT checkouts test the trainee's familiarity with equipment and procedures. See id. at ¶¶ 125-126, 128, 134. As a composite, 9/ these evaluations constitute a complete and thorough job performance evaluation for the job of

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9/ The OARP Review Committee focused, with particular approval, on the multiple, and continuous evaluations of operator performance on which Licensee relies. See Licensee's Findings, ¶¶ 309, 312; see, e.g., Committee, ff. Tr. 31,749, at 20, 28-29. It should be noted, as well, that the multiple evaluations of an operator's capability to perform his job are not conducted by the same individual -- a factor which adds to the value of the composite picture gained from these reviews. Cf. Regan, ff. Tr. 33,532, at 12 (subjectivity in non-standardized evaluations). In fact, operators are required to be continuously evaluated by all of the people that logically might be able to contribute to an assessment of their performance capabilities -- instructors, supervisors, Operations and Training management and senior management (e.g., Mr. Hukill). See Licensee's Findings, ¶¶ 128, 134, 140, 142, 147, 168, 183-194, 313.

the reactor operator. 10/ See Licensee's Findings, ¶¶ 109, 118.

Thus, UCS is incorrect that Licensee does not evaluate job performance; such evaluations simply do not take the form which may be customary for less complex jobs. See n.5, supra. Most of the capabilities encompassed by Licensee's performance evaluations, because of their abnormal and accident applications, are not reflected in the RO's routine job; nor would they be reflected in an on-the-job performance evaluation. Instead, they are reflected in the operator's work at the simulator, in the classroom, and during drills and oral exams.11/ Moreover, all of these evaluations are formal, i.e., required elements of the training program. They certainly are not lacking in care, "sketchy," or otherwise conducted in an unreliable manner. Compare UCS Findings, ¶ 284.12/ In short, Licensee comprehensively and formally evaluates the performance required of its operators.

10/ The evidence establishes that Licensee maximizes opportunities that become available to use on-the-job performance as a training experience, as a means of measuring required performance and as an indicator of training effectiveness. See Licensee's Findings, ¶ 174 and Committee, ff. Tr. 31,749, Special Report at 52 (use of restart requalification card upon restart authorization).

11/ An important factor in Licensee's training program, and one perhaps not fully appreciated by Dr. Regan, is that TMI-1 operators are continuously in training. Requalification training therefore provides constant reinforcement of necessary skills, knowledges and abilities, independent of specific weaknesses otherwise identified. See, e.g., Licensee's Findings, ¶ 120.

12/ The existence of subjective elements in some of the evaluation processes used by Licensee was the subject of criticism by Dr. Regan and UCS, and has been addressed previously by Licensee. See Licensee's Findings, ¶¶ 192-194.

Mr. Ross' understanding and use of performance evaluations. UCS misunderstands and, in part, mischaracterizes the testimony of Mr. Ross on which UCS relies to indict Mr. Ross' appreciation of job performance evaluations. See UCS Findings, ¶¶ 284-286. Mr. Ross' testimony simply echoes the view expressed above, namely, that evaluation of the control room operator while engaged in his normal routine will not be particularly informative vis-a-vis training.

As a preliminary matter, Mr. Ross did not state that the reactor operator union contract prohibits written evaluations, compare UCS Findings, ¶ 284, nor did he cite the contract's limitations as anything other than essentially an historic reason why such on-the-job evaluations are completed annually for (non-union) SROs, see, e.g., UCS Tr. Exh. 8 (evaluation of SRO, Mr. Olive) but are not formally done for ROs. It was Mr. Ross' view that the union contract does not provide for the use of such evaluations to make decisions concerning a reactor operator's job status (e.g., dismissal), that there are adequate other methods available for assessing job performance capabilities on which operators are trained, and that consequently, there has been no reason to risk antagonizing the union by instituting such a process. Tr. 33,419-22 (Ross).13/

Licensee also disagrees with UCS' interpretation of Mr. Ross' views about job performance evaluations. This is not

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13/ Although Licensee does not believe routine, periodic on-the-job evaluations are necessary, should the Board consider it necessary to require such evaluations Licensee is not contractually barred from instituting them.

surprising, given UCS' focus on on-the-job evaluations, such as UCS Training Exhibit 8, which would not reflect or correspond with most of the critical skills, knowledges and abilities required of the reactor operator. As Mr. Ross explained, these annual evaluations primarily tell you information about an individual's personality and work habits -- e.g., communication skills, attendance. Tr. 33,420-21 (Ross); see UCS Tr. Exh. 8. Mr. Ross does not believe that these evaluations would provide useful insights into the effectiveness of the training program. Tr. 33,421 (Ross).14/ Mr. Ross' comments reflect the fact, previously stated, that the normal routine of an operator is very limited in contrast to the array of potential capabilities in which the operator must be competent.15/ Contrary to UCS' assertion, Mr. Ross' views do not reflect a lack of

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14/ Mr. Ross noted that informal periodical assessments of an RO's on-the-job performance are done; the record also reflects Mr. Ross' intimate familiarity, and the daily familiarity of shift supervisors, who participate with the shift in training, with the operators they manage. See Tr. 32,897, 32,562 (Ross); Licensee's Findings, ¶¶ 137, 141 n.49, 142.

15/ The value placed by UCS in on-the-job evaluations is not shared by UCS' expert, Dr. Regan. To the contrary, Dr. Regan characterized evaluations by supervisors on-the-job as probably "the least reliable" way to evaluate training effectiveness. Regan, ff. Tr. 33,532, at 12; see Licensee's Findings, ¶ 192. In fact, Dr. Regan believes that, "In whatever form, ratings are not satisfactory as the only way of measuring job performance or as a primary means of doing so. In particular, they are of little use in attempting to make a correlation between training, examination results, and on-the-job performance." Id. at 12-13 (emphasis added). Dr. Regan's concern is with the subjective nature of such evaluations. He points to other more objective mechanisms -- job knowledge tests, walk-throughs, simulations -- as more reliable indicia of a training program's effectiveness. Licensee agrees with Dr. Regan's position although, as previously explained, for reasons other than those articulated by Dr. Regan.

understanding or a "prefer[ence] to ignore" the value of job performance evaluations. See UCS Findings, ¶ 286.

Assessing the relationship between training and job performance. Licensee has described how its performance-based training process, which includes multiple evaluation methods, provides Licensee with the information it needs to evaluate job performance. As described below, part of this process is effective communication to and assessment by Training of performance evaluation results. In addition, there are a number of other feedback mechanisms and communication avenues which provide additional assurance that operator training is compared with job performance and that modifications are made to the program, as necessary, based on these comparisons.16/

Written and oral examination results -- performance evaluations -- are systematically evaluated by Training in order to identify both generic deficiencies among the operators, and significant weaknesses in individual operators. See Licensee's Findings, ¶¶ 190, 197; see also UCS Tr. Exhs. 9-16, concerning Licensee's follow-up on particular weaknesses of an operator (Mr. Olive); Licensee's Findings, ¶¶ 153-155 (concerning

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16/ Dr. Regan identifies the importance of feedback mechanisms from trainees to trainers. Regan, ff. Tr. 33,532, at 21. Dr. Regan's view is shared by the OARP Review Committee. See e.g., Committee, ff. Tr. 31,749, at 17-18. Feedback mechanisms are an important and integral element of Licensee's performance-based training program. See, e.g., Licensee's Findings, ¶¶ 195-211, entitled Program Evaluation and Feedback; Newton et al., ff. Tr. 32,409, at 29 (The "[p]rimary emphasis has been on developing behavioral learning objectives to match job needs and on being responsive to meaningful feedback from trainees and user group supervisory/management personnel.")

follow-up on particular weaknesses of another operator, Mr. Moore); id., ¶¶ 156-164 (Mr. Olive); see also Newton et al., ff. Tr. 32,409, at 32 ("program content . . . also reflects individual needs that have been identified through the operators, training and other management personnel."); id. at 45-46. Simulator exam results -- also performance evaluations -- are formally submitted to Training by the senior managers who evaluate operators at the simulator during requalification training. See, e.g., Licensee's Findings, ¶ 175, 218; Newton et al., ff. Tr. 32,409, at 47. The topics presented in the Fundamental Review series of requalification training reflect the results of the annual exam and the performance of licensed personnel as evaluated by the Manager, Plant Operations and the Operations and Maintenance Director of TMI-1. The depth of coverage in each topic addresses deficiencies identified by the annual exam as well as those identified by Operations. Newton et al., ff. Tr. 32,409, at 15. In short, performance evaluations of the crew and the individual are assessed, and comparisons are made to the training curriculum and to operators' performance in the classroom. Based on these comparisons, the training program may be modified. Licensee's Findings, ¶ 197.17/

17/ For example, feedback from management evaluating simulator performance resulted in supplemental training using Licensee's ATOG procedures. See Licensee's Findings, ¶¶ 175, 218; see also Committee, ff. Tr. 31,749, Special Report at 52; Newton et al., ff. Tr. 32,409, at 35.

There are a number of other mechanisms or checks and balances in place which ensure that performance deficiencies are addressed sufficiently in the training program. Perhaps the most fundamental of these mechanisms is the extensive involvement of Operations management, at all levels, and the operators themselves in the development, implementation and modification of the program.18/ Operations approves the training program curriculum and the schedule for training. Licensee's Findings, ¶¶ 74, 168; see generally id. at 167-177; Committee, ff. Tr. 31,749, at 23. Operations reviews and comments on the behavioral learning objectives that are contained in the Operations Plant Manual (OPM); moreover, all sections of the OPM are formally assigned to plant operators and engineers in order to ensure that it is accurate and current. Licensee's Findings, ¶¶ 74, 113, 176; Tr. 33,423-24 (Leonard).19/ At the completion of each week of requalification training, the shift foreman or supervisor from the crew in training meets with supervisory personnel from the next week's shift, as well as Training management, to comment on the week of training and suggest refinements to the program in the ensuing week(s). Id., ¶ 74; Committee, ff. Tr. 31,749, at 23.

18/ For example, in developing the simulator training portion of requalification training, Operations works with Training to establish a list of topics for classroom training at the simulator as well as an outline for simulator drills. The final program is approved by both Operations and Training. Newton et al., ff. Tr. 32,409, at 20.

19/ Also, instructors submit proposed changes to the OPM as a result of interface with the operators during the training week. Tr. 33,426 (Leonard).

Another important mechanism in place to ensure training corresponds with necessary operator performance is the devotion of a portion of requalification training to selected operational events and reportable occurrences at TMI-1 and elsewhere in the industry. Licensee's Findings, ¶ 144. This training is derived using Licensee Event Reports, audit, evaluation, and inspection reports, publications and periodicals covering nuclear industry information, and NSAC/INPO Significant Event Reports. In this manner, training is conducted on specific, identified generic and site-specific operational performance weakneses. Id.

Furthermore, on an annual basis, Licensee conducts formal evaluations of its training programs. In 1983, this evaluation was conducted by the Operator Training Review Team, a group of individuals (management and staff) from the Training and Operations departments who were formally assigned to review operator training at TMI. See id., ¶¶ 74, 198. As a result of this review, very specific suggestions were made and implemented to enhance the training program's effectiveness, i.e., the program's correlation with job performance requirements. Id.

Other communication avenues between Operations and Training provide additional assurance that the program is relevant and effective. For example, the Vice-President of TMI-1, Mr. Hukill, meets annually with each operator. Licensee's Findings, ¶ 67. Management interface meetings with crews are held. See id. at ¶ 70-71. Mr. Ross and, at times, Mr. Hukill are involved in the development of individualized training

programs designed to address weaknesses displayed by individual operators. See, e.g., UCS Tr. Exh. 10 (reflects Mr. Hukill and Mr. Ross's involvement in Mr. Olive's upgrade program). Mr. Ross attends training and schedules his attendance so that he participates in training with different crews. Newton et al., ff. Tr. 32,409, at 62. Mr. Hukill also periodically attends training. Id., Licensee's Findings, ¶¶ 68, 73. The close working relationship between Operations and Training is evidence of the effective line of communication between these two groups, which share the common goal of operator competency. 20/

Finally, a number of external audits of TMI-1 have confirmed Licensee's confidence in the effectiveness of its training program -- i.e., its correlation with required job performance. These reviews include the NRC's Operational Readiness Evaluation, which found that personnel, including operators, were knowledgeable and well-trained. See Licensee's Findings, ¶ 207; Newton et al., ff. Tr. 32,409, at 52-53. Similarly, INPO has found TMI-1 personnel well qualified. Licensee's Findings, ¶ 202. In fact, there are no facts -- and UCS presents none -- which suggest a contrary finding.

20/ In response to the fact that Operations is very involved in the training program, UCS faults Licensee for blurring the independence of these two organizations. See UCS Findings, ¶¶ 148 [sic-166], 176. Contrary to UCS' suggestion, the close working relationship between Training and Operations in no way violates the QA concept of organizational independence, with separate management reporting chains and discrete responsibilities. See, e.g., LBP-81-32, 14 N.R.C. 381, 407 (Figure 3); Licensee's Findings, ¶ 31. In fact, the interface between Operations and Training was specifically noted with approval by the NRC in its 1984 SALP Report. Newton et al., ff. Tr. 32,409, at 53.

In summary, in order to decide whether Licensee appropriately evaluates and measures operator job performance, the performance of interest first must be identified. This performance is not routine, on-the-job performance; it is required operator performance. Consequently, formal on-the-job evaluations would not be particularly useful performance measurements. The evidence presented in this case establishes that through the job/task analysis process, Licensee has identified operator performance requirements, correlated the requirements with operator training, and measured operator performance with respect to these requirements. Performance-based training, which includes a composite of evaluation processes, ensures that operator performance of interest is the subject of appropriate training. The effectiveness of the performance-based training system at TMI is further enhanced by the numerous feedback mechanisms between Operations and Training. Moreover, periodic internal and external checks on the effectiveness of the system substantiate its effectiveness.

Respectfully submitted,

Deborah B Bauser

Ernest L. Blake, Jr., P.C.
Deborah B. Bauser

SHAW, PITTMAN, POTTS & TROWBRIDGE
1800 M Street, N.W.
Washington, D.C. 20036
(202) 822-1215

Counsel for Licensee

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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CERTIFICATE OF SERVICE

I hereby certify that copies of "Licensee's Supplemental Proposed Findings of Fact in Response to the Proposed Findings of UCS (¶¶ 283-287)" were served this 15th day of March, 1985, by hand delivery to the parties identified with one asterisk, by Express Mail to the parties identified with two asterisks, and by deposit in the U.S. mail, first class, postage prepaid, to the other parties on the attached Service List.

Deborah B Bauser

Deborah B. Bauser

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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METROPOLITAN EDISON COMPANY	)	Docket No. 50-289 SP
	)	(Restart Remand on Management)
(Three Mile Island Nuclear Station, Unit No. 1)	)	

SERVICE LIST

Nunzio J. Palladino, Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Thomas M. Roberts, Commissioner
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

James K. Asselstine, Commissioner
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Frederick Bernthal, Commissioner
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Lando W. Zech Jr., Commissioner
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
Gary J. Edles, Chairman
Atomic Safety & Licensing Appeal Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
John H. Buck
Atomic Safety & Licensing Appea
Board
U.S. Nuclear Regulatory Commiss
Washington, D.C. 20555

Administrative Judge
Christine N. Kohl
Atomic Safety & Licensing Appea
Board
U.S. Nuclear Regulatory Commiss
Washington, D.C. 20555

* Administrative Judge
Ivan W. Smith, Chairman
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commiss
Washington, D.C. 20555

* Administrative Judge
Sheldon J. Wolfe
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commiss
Washington, D.C. 20555

* Administrative Judge
Gustave A. Linenberger, Jr.
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docketing and Service Section (3)
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety & Licensing Board
Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety & Licensing Appeal
Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

* Jack R. Goldberg, Esq. (4)
Office of the Executive Legal
Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

** Thomas Y. Au, Esq.
Office of Chief Counsel
Department of Environmental
Resources
505 Executive House
P.O. Box 2357
Harrisburg, PA 17120

Mr. Henry D. Hukill
Vice President
GPU Nuclear Corporation
P.O. Box 480
Middletown, PA 17057

Mr. and Mrs. Norman Aamodt
200 North Church Street
Parkesburg, PA 19365

** Ms. Louise Bradford
TMI ALERT
1011 Green Street
Harrisburg, PA 17102

*Joanne Doroshow, Esquire
The Christic Institute
1324 North Capitol Street
Washington, D.C. 20002

Lynne Bernabei, Esq.
Government Accountability
Project
1555 Connecticut Avenue
Washington, D.C. 20036

*Ellyn R. Weiss, Esq.
Harmon, Weiss & Jordan
2001 S Street, N.W., Suite 4
Washington, D.C. 20009

Michael F. McBride, Esq.
LeBoeuf, Lamb, Leiby & MacRa
1333 New Hampshire Avenue, N
Suite 1100
Washington, D.C. 20036

Michael W. Maupin, Esq.
Hunton & Williams
707 East Main Street
P.O. Box 1535
Richmond, VA 23212