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JULY 3, 1984



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION



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

Notice to the Commission, Appeal Board, Licensing Board and Parties

I enclose for the information of the Commission, Appeal Board, Licensing Board and parties a report entitled "Special Report of the Reconstituted OARP Review Committee," copies of which counsel received this date. Following issuance of ALAB-772 on October 24, 1983, Licensee reconstituted a group of expert training consultants who had reviewed Licensee's Operator Accelerated Retraining Program in 1979-80, and whose views were relied on by the Licensing Board in its original management PID. The reconstituted OARP Review Committee's views of Licensee's training program, taking into account the Appeal Board's concerns expressed in ALAB-772, are set out in the enclosed Special Report.

Respectfully submitted,

Ernest L. Blake, Jr.

Ernest L. Blake, Jr.,
Counsel for Licensee



Enclosure

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JULY 3, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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| METROPOLITAN EDISON COMPANY | ) | Docket No. 50-289 |
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CERTIFICATE OF SERVICE

I hereby certify that as of this date, July 3, 1984, copies of the "Special Report of the Reconstituted OARP Review Committee" have been delivered via Federal Express mail service to all persons on the attached service list indicated by an asterisk. I further certify that copies of the aforementioned report will be hand delivered to the remaining parties on July 5, 1984.

Respectfully submitted,

Ernest L. Blake, Jr.
Ernest L. Blake, Jr.,
Counsel for Licensee

DATED: July 3, 1984

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION



Before the Commission

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

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# SPECIAL REPORT

# OF THE

# RECONSTITUTED OARP REVIEW COMMITTEE

JUNE 12, 1984

Julien M. Christensen

Eric F. Gardner

Frank L. Kelly

William R. Kimel

Robert E. Uhrig, Chairman

SPECIAL REPORT

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TABLE OF CONTENTS

## PREFACE

On May 24, 1984, the Atomic Licensing Appeals Board (ALAB-772) issued a decision in the matter of restarting the Three Mile Island (TMI) Nuclear Generating Station Unit 1. It remanded the issue to the Atomic Safety and Licensing Board (ASLB) for additional hearings in three specific areas: training (with special emphasis on the licensed operator training program in view of the cheating incident), alleged leak-rate falsification at TMI-1, and the Dieckamp Mail-o-gram. This report addresses only the training issue.

In the fall of 1979, the Training Department of Metropolitan Edison Co. convened a committee of five individuals with expertise in the various aspects of nuclear training to review the Operator Accelerated Retraining Program (OARP) with respect to its adequacy in meeting the NRC-imposed requirements, as well as meeting the needs of the operators to operate TMI-1 in a safe and competent matter. This committee (generally called the OARP Review Committee) consisted of Dr. Julien M. Christensen, an experimental psychologist and human factors specialist; Dr. Eric F. Gardner, an educational psychologist; Dr. William R. Kimel, Dean of the College of Engineering, University of Missouri-Columbia; Mr. Richard J. Marzec, a training official for Duke Power Company; and Dr. Robert E. Uhrig, Vice President, Advanced Systems and Technology, Florida Power & Light Company, who served as Chairman. The OARP Review Committee issued its report (generally known as the OARP Review Report) on June 1, 1980. It is clear from reading the ASLB partial initial decisions and the ALAB decision that both groups gave considerable weight to the OARP Review Report. The ASLB

cited the generally positive recommendations of the OARP Review Committee and gave special emphasis to the many OARP Review Committee recommendations that had been implemented by Metropolitan Edison and GPU Nuclear.

In its partial initial decision dated July 27, 1982, the ASLB ruled that the GPU Nuclear Training Program was adequate to support the restart of TMI-1 in spite of the cheating which had occurred. The ALAB, however, remanded the issue of training to the ASLB for additional hearings. They asked many questions regarding the adequacy and integrity of the licensee's entire training and evaluation program and stated that the impact of the findings regarding the cheating on the Licensing Board's earlier decision and on the licensee's training program was not given the full consideration that it warranted. More specifically, the ALAB indicated that the ASLB should have sought further testimony in light of the cheating incidents from the OARP Review Committee "whose views the Board previously found so persuasive."

In response to this request, GPU Nuclear asked the individual members of the OARP Review Committee to meet at TMI during the week of May 28, 1984, and at Parsippany, N.J., during the week of June 4, 1984, to respond to the issues raised by the ALAB. Since Mr. Richard Marzec, one of the Committee members, was not available, the Committee was reconstituted by replacing Mr. Marzec with Mr. Frank L. Kelly, a private consultant who previously had served as a Chief of the Operator Licensing Branch of the Atomic Energy Commission (now the Nuclear Regulatory Commission). Mr. Kelly was a witness for GPU Nuclear during the TMI restart hearings and, in fact, served along with Drs. Christensen and Gardner as a member of a three-man expert witness panel during those hearings. Mr. Kelly brought to the Committee expertise in the examining and licensing of nuclear reactor

operators. Hence we believe that the reconstituted Committee served the role envisioned by the ALAB.

In our initial meeting, the reconstituted Committee saw two roles that it could serve in contributing to the record of the TMI-1 restart hearings. First, the Committee could provide a "quick response" that would be available in time to contribute to the NRC meeting at which the Commission has indicated it will formally consider the issue of restarting TMI-1. Second, the Committee could undertake a more definitive study of the issues raised by the ALAB and provide a report on this study in a time frame consistent with the ASLB hearings. This report has been prepared specifically for the impending Nuclear Regulatory Commission meeting. Because of the limitations of time, there was not an opportunity to undertake an in-depth study of the type that was undertaken by the OARP Review Committee in 1979-80. Whether or not the Committee undertakes the more definitive study is a matter for GPU Nuclear to decide at a later date.

GPU Nuclear provided to the Committee full access to any reports, procedures, training records, examination results, etc. and the opportunity to interview any personnel selected by the Committee from the various GPU Nuclear Divisions. The Committee interviewed as many instructors, supervisors, and administrators and inspected as many training facilities as time permitted. Individuals contacted by one or more of the Committee members are listed in Table A-1. We also reviewed a large number of documents (See list in Table A-2) made available to us by the GPU Nuclear. Although many probing and clarifying questions were asked and answered, no attempt was made to conduct a quality assurance check on these documents. Based on the review, interviews and facilities' inspections, the Committee

reached its own conclusions and wrote its report. The Committee determined the approach, the method of review and the structure of this report. GPU Nuclear provided secretarial support and reviewed the manuscript for technical accuracy only.

Where the ALAB asked specific questions of the Committee, answers have been provided consistent with the limitations of time. The Chairman of the Committee assigned areas of responsibility to the individual Committee members consistent with their areas of expertise, and the individual reports and views have been integrated into a single document which has been adopted by all of the Committee members.

In this report the name GPU Nuclear and the abbreviation GPUN are used in a generalized way to mean the organization which has the responsibility for the TMI plant. At the time of the TMI-2 accident, training for TMI personnel was carried out by Metropolitan Edison Company at Three Mile Island. Later, all nuclear related training functions were centralized by GPU and assigned as the responsibility of the GPU Nuclear Corporation in Parsippany, New Jersey. GPU Nuclear maintains training facilities at both the TMI and Oyster Creek sites as well as the Parsippany Headquarters.

The Committee did not hesitate to address certain philosophical issues which have permeated the ASLB and ALAB decision reports. Indeed, many of the questions raised by the ALAB are more philosophical than factual. The conclusions and views expressed are those of the Committee members and do not necessarily represent the views of GPU Nuclear or its management or of the organizations which employ the members of the Committee.

"The cheating and related incidents called into question the adequacy and integrity of the Licensee's entire training and testing program. Although we found that the reopened record of the cheating itself was as fully developed as possible, the impact of those findings on the Licensing Board's earlier conclusions on Licensee's training programs was not given the full consideration it warrants. In particular, the board should have sought further testimony, in the light of the cheating incidents, from the OARP Review Committee, whose views the Board previously found so persuasive."

P 155, ALAB Decision, May 24, 1984

"It is apparent that the generally positive testimony of the OARP Review Committee and licensee's other independent consultants was of decisional significance to the Board's initial, equally positive judgment on licensee's training program. Once the cheating incidents raised questions about that judgment, it was incumbent upon the Board to seek further testimony from the independent experts upon which it so heavily relied in the first instance."[49]

"[49] ...the underpinnings of the Board's earlier decision (i.e., the consultants' predictive testimony) were shaken. If that testimony is to have any real weight, it must be reevaluated in light of actual events."

P 65, ALAB Decision, May 24, 1984

This report provides the information sought in the above requests and makes it available in a timely manner to the GPU Nuclear management and to the Nuclear Regulatory Commission. The ALAB asked many questions, some demanding factual answers and some demanding philosophical answers. Within the limits of time and resources available, the Reconstituted OARP Review Committee (the Committee) will attempt to respond to the ALAB concerns.

The Committee is in complete agreement with all parties to the TMI-1 Restart Hearings that the cheating incidents which occurred in April 1981 were extremely serious and reflect unfavorably on the organizations as well as the individuals involved. It is easy to jump to the conclusion that this behavior

on the part of a very few individuals negates the Herculean efforts of so many during the past five years. Indeed, the principal question which the Appeals Board has raised is whether or not the existence of this cheating would have changed the views that the OARP Review Committee expressed in its 1980 report.

To address this issue in its proper perspective, we have to go back to the 1979-1980 time frame and reconstruct the environment which then existed. In an order dated August 9, 1979, the Nuclear Regulatory Commission in Section II.1(a) ordered the licensee to:

> "Augment the retraining of all Reactor Operators and Senior Reactor Operators assigned to the control room including training in the areas of natural circulation and small break loss of coolant accidents including revised procedures and the TMI-2 accident. All operators will also receive training at the B&W simulator on the TMI-2 accident and the licensee will conduct a 100 percent reexamination of all operators in these areas. NRC will administer complete examinations to all licensed personnel in accordance with 10 CFR 55.20-23."

The licensee developed the OARP in response to the above directive. It was a one-time program designed to meet the specific needs articulated in the Commission order. The OARP Review Committee was asked by Metropolitan Edison to review this program with respect to its adequacy not only in terms of meeting the NRC-imposed requirements but also in terms of the necessary requirement for the operators to operate TMI-1 in a safe and competent manner. An analogy was made to the accreditation procedure widely used in engineering education to determine the adequacy of engineering curricula. It should be noted that the Institute of Nuclear Power Operations (INPO) had been created only a few months earlier and simply was not in a position to

undertake such a task in the time frame deemed essential. (When the Committee began its deliberations in the fall of 1979, Metropolitan Edison expected to bring TMI-1 back on line some time in mid-1980.)

The OARP Review Committee was encouraged by Metropolitan Edison to consider the scope of its activities to be broader than just reviewing the OARP program. Indeed, the report addresses such related matters as the decision analysis training program, man-machine interactions, the use of simulators in operator training, and the education and training requirements for a nuclear facility staff. Strengths and weaknesses were identified in the training program, and a number of recommendations that went well beyond the scope of the OARP was included. On balance, the OARP Review Committee endorsed OARP and expressed its confidence that the ongoing training program was adequate in 1980 to support the restart of TMI-1. While the OARP Review Committee did not qualify its views in any way, these views were based on confidence in the innovative approach being taken by Metropolitan Edison, confidence in the qualifications of the people involved in the training program, and above all, confidence in the commitment made by Metropolitan Edison and GPU, its parent organization, to develop excellence in its training program. The Committee is delighted to see that its confidence in the training program, the training staff, and the operating company (now GPU Nuclear) have been amply justified.

The issue of cheating is very difficult to consider rationally. It is addressed by some professional groups through canons of ethics enforced to varying degrees by different professional organizations. By the time a person becomes a professional (e.g., a doctor, a lawyer, a registered professional

engineer, a certified public accountant, etc.) the individual has already survived a large number of screening processes and is expected to behave in an ethical manner. Even so, those accrediting and certifying organizations take precautions to assure that the ethics and standards of the group are well understood by those whom they examine and those who practice in the profession. Clearly, the role of a reactor operator also has a significant bearing on the health and safety of the public. Laxness on the part of any organization involved (the licensee, the Nuclear Regulatory Commission, various government agencies, etc.) simply cannot be tolerated.

The question that the Committee has been asked regarding its views on the GPU Nuclear training program in light of the subsequent cheating goes well beyond the OARP, a one-time program that has been succeeded by subsequent developments. The OARP constituted a total of 248 hours of instruction (exclusive of training at the B&W simulator). During the past four years, each reactor operator and senior reactor operator has participated in about 1000 hours of additional classroom and simulator training. This has been made possible by the use of a six-shift rotation in which each shift routinely spends every seventh week in training. The pertinent question for the Committee today is not the impact of the cheating upon the 248-hour OARP or the GPU Nuclear training program of 1980; rather, it is the impact of the cheating upon a vastly improved 1984 training program that has provided approximately 1250 hours of classroom and simulator training to the reactor operators in the last five years.

In addition to many specific questions, the Appeals Board has also raised the following general issues:

1. Whether or not the deficiencies in operator testing, as manifested by the cheating episodes, may be symptomatic of more extensive failures in the licensee's overall training program.
2. Whether or not those deficiencies still exist or have been remedied sufficiently to ensure the health and safety of the public.

The best way to answer these questions is to evaluate the steps that have been taken by, and the performance of, GPU Nuclear during the four years since our initial report was issued. To the extent possible and in the time available, we will try to do this later in this report. Suffice to say at this point that the answers to such questions do not depend upon a single activity, a single event, a single success, or a single failure. Rather the answers depend upon a systematic preparedness to address any problem or situation that might occur. The history of the nuclear power industry records the occurrence of many unforeseen operational and technological problems (fuel densification, core barrel vibration, the Davis-Besse transient, the St. Lucie steam bubble, the Ginna steam generator tube failure, etc.). The ability of the reactor operators and their utility support teams to deal with such problems constitute the essence of a program for protecting the health and safety of the public.

## Chapter II. CURRENT STATUS

### A. STATUS OF THE GPU NUCLEAR TRAINING PROGRAM

The recommendations of the OARP Committee were taken seriously by GPU Nuclear management, and steps to implement a number of them were in progress prior to the completion of the 1980 OARP Report. The initial progress observed by the Committee in 1980 has been accelerated. A new training department organization has been established by Dr. Richard P. Coe, Director of Training and Education, that develops and administers a uniform method of operation for the training programs at each of the three sites. The details concerning the various aspects of the training programs have been described in the self-evaluation document that has been submitted for INPO accreditation.

A November 1983 summary of the development and current status of the GPU Nuclear Training program has been presented by Admiral H. G. Rickover in a report entitled, "An Assessment of the GPU Nuclear Corporation Organization and Senior Management and its Competence to Operate TMI-1." The section dealing with training comprehensively summarizes the development of the training activities since 1979-1980 when the OARP Review Committee was preparing its report. It will provide the background for our later comments regarding specific aspects of the GPU Nuclear Training Program. The Committee endorses the presentation and views given by Admiral Rickover. The section of his report entitled, "The Importance of Training" is reproduced here.

**The Importance of Training.** After the technical design of the plant itself, the most important element in assuring reliable and safe operation of a nuclear power plant is the training of the crew who will operate the plant. A key indicator of management's understanding of safe nuclear plant operation is the degree to which high-level attention is given to training. Despite evidence from the Naval Nuclear Program as to its importance, this procedure had apparently not been widely accepted by the commercial nuclear power industry at the time of the TMI accident.

In the history of the Naval Nuclear Program, training was one of the early actions, even before many of the basic technical decisions had been made in the development and construction of the plant. This emphasis on early and thorough training of the crews of the nuclear submarines and surface ships made it possible to assign a fully-trained crew to operate the plant during every phase of construction and testing, including sea trials. Theretofore, the custom in shipbuilding had been to perform the tests and sea trial with a civilian trial crew. The naval crew took over after the trials, but lacked the valuable familiarity with the plant that operation in the testing period would have given them.

In 1979, before the TMI accident, training placed heavy reliance on the fact that considerable numbers of the operating and maintenance crews were former members of the Naval Nuclear Program. The basic training which those people had received in the Navy was useful in shortening the time needed to qualify them as commercial plant operators. In the many investigations which have been made into the training aspects of the TMI accident, it has been brought out that TMI training tended to concentrate on the narrow objective of getting the operators successfully through the NRC operator examination. If the NRC exam failed to cover all the elements of plant theory, safe operation, and casualty procedures, as applicable to the commercial plants, the training program might well miss them also.

At the time of the accident, there was only a small commitment of physical resources and operator time to training. Furthermore, the place of training in the organization was not high: the seven-person training organization reported to the Superintendent of Three Mile Island, competing for his attention with all of the problems of operating a site with 219 employees, one commercially operating nuclear power plant, and one plant in the final stages of start-up testing. Evidence of the secondary postion which training occupied can be found in the training attendance records at the time. Operational considerations prevented as much as 50% of the scheduled attendance at training lectures; those not attending were assigned take-home packages for self-study.

In the commercial nuclear power industry's analysis of the lessons of TMI, training has been identified as one of the key items needing greater management attention. The charter of the Institute of Nuclear Plant Operation (INPO) reflects this emphasis.

GPU Nuclear's upgrading of the corporate and TMI training program is quite dramatic. It reflects an unreserved determination by GPU management to create a training program second to none in the nuclear industry. The following paragraphs, which are only examples, illustrate the fundamental character of some of the improvements which have been made.

- Organization. With the organization of all nuclear activities of GPU into one company — the GPU Nuclear Corporation — direct responsibility for all nuclear plant training was assigned to the corporate level. The Corporate Director of Training reports to the Vice-President, Nuclear Assurance, a position now filled by the person who was directly responsible for organizing the upgraded training program at TMI. This position of high visibility for training meets the requirement that top management must be involved in and take responsibility for the proper training of nuclear plant personnel. Further, GPU Nuclear management has taken a positive position in favor of improved training facilities and personnel, and requiring the training organiation to be accountable for its performance.

- Facilities. A large new training building has been built at TMI with space for 16 classrooms, maintenance training labs, library, staff offices, and modern training aids, particularly in electronic and audio-visual equipment. Further training in maintenance and radiation control is done within the plant itself and in laboratory trailers adjacent to the plant.

- Staff. The training staff, which was only seven in number in 1979, has been expanded to 55, with further increases to 62 planned when the two nuclear simulators are installed at TMI. For operator training, licensed and unlicensed, the staff numbers 15. The remaining personnel are involved in the several other types of training which have been added to make this a complete training facility, such as maintenance, Rad Con, water chemistry, and general employee training.

  Not only has the number of training staff been increased, but also the quality of the instructors has been given critical attention. Considerable effort has gone into obtaining experienced instructors with background ex-

perience in the TMI plants or in other plants of a similar type. At present, four instructors in reactor operator training are licensed by NRC, two as Senior Reactor Operators (SRO) and two as Reactor Operators (RO). An Instructor Development Program is also in place. One objective is to have five operator instructors licensed as SROs on TMI-1, with completion expected in early 1984. A continuing program is in effect to ensure that the instructors advance in instructional skills and knowledge of their area of specialization. Similar expansions of staff, an upgraded program, and extensive new facilities were observed at Oyster Creek.

- Operator Training. One of the significant actions taken to enhance operator training by TMI management is the organization of operations personnel into six shifts. This permits training to be given to every operator for one full week in seven, a plan which substantially exceeds NRC training minimums. This is unusual in the industry, and is a good demonstration of the commitment of GPU Nuclear's management to become one of the best in training.

  There are other refreshing elements of management involvement in training, such as emphasis on manager-level training in nuclear theory, in the details of plant design, and in operation and maintenance. Managers also participate in the briefing of many of the cyclic training periods for each crew, and have become involved in simulator training at Babcock & Wilcox, Lynchburg, Virginia.

- Entry Level Training. TMI-1 management is changing its previous emphasis on the hiring of Naval Nuclear experienced personnel to fill vacancies in the operator ranks. They have found that both availability and retention of ex-Navy personnel is not promising in the long run. The competition for them is becoming ever greater as the presently programmed commercial nuclear plants come on line in the next five years. The program which has been started at TMI takes promising entry level operating people directly from high school. They will require two years to become auxiliary (non-licensed) operators and more years to qualify as control-room operators. Once the program is in place, and with careful guidance, it will give stability to that group for many years.

- Simulator Training. The program to install two simulators in the training facility at TMI is well underway. Basic Principles Simulators will be delivered in early 1984 to both TMI-1 and Oyster Creek; preparations at each site for using it in training are on schedule. This simulator does not duplicate the physical layout of the plant, but demonstrates its dynamics of operation; students can readily see the effects of changes which they can make at the control board, and become intimately familiar with the principal plant variables, and the relationships between them.

  The Replica Simulator for TMI-1, due to be in place at the end of 1985, is a physical duplication of the plant operating console and is controlled by sophisticated computer programs that will faithfully model the fundamentals of plant operations. It will duplicate a very wide variety of transient conditions with accurate representation of what the plant itself will do under the plant conditions and operator actions which are chosen. At the outset, the Replica Simulator will be able to model some 200 plant failure sequences, with the possibility of expanding, through additional programming, to 500 failure sequences.

Two of the most important and significant changes which have been made by General Public Utilities to upgrade the TMI-1 nuclear plant operations have been the formation of GPU Nuclear Corporation, with its centralized mode of management, and the upgraded training program which has been in place there. The management change is, indeed, part of the reason that such a large step increase in training could be made.

The management of the training activity at the TMI-1 plant fully meets the requirement that top managers be directly involved with the training activities in observing classes, setting high standards, providing resources, and monitoring the progress of the program to assure its continued performance and improvement.

## B. ORGANIZATION AND MANAGERIAL HIERARCHY OF THE GPU NUCLEAR TRAINING

### ORGANIZATION

The position of the Training and Education (T&E) Department within the GPU Nuclear Corporation is shown in Figure 2-1. The Director of T&E reports to the Vice President - Nuclear Assurance who in turn reports directly to the Office of the President. The fact that T&E is on the same level as Quality Assurance, Nuclear Safety Assessment, and Emergency Preparedness is an indication of the importance attached to T&E by top management.

The division of responsibilities within the T&E Department is shown in Figure 2-2. Each plant (TMI and Oyster Creek) has its own plant training organization. This is clearly appropriate since Oyster Creek is a BWR and TMI-1 is a PWR. The Corporate Training and the Educational Development Sections serve both nuclear plants and the Corporate Headquarters.

The GPU Nuclear Training and Education Department includes 106 staff members plus six contractors, and its 1984 budget is $7.6 million. This is more than an order of magnitude increase in both staff and budget since the TMI-2 accident. The Committee knows of no other utility that assigns such a large fraction of its resources to nuclear training. Again, this reflects the commitment of GPU Nuclear top management to excellence in training.

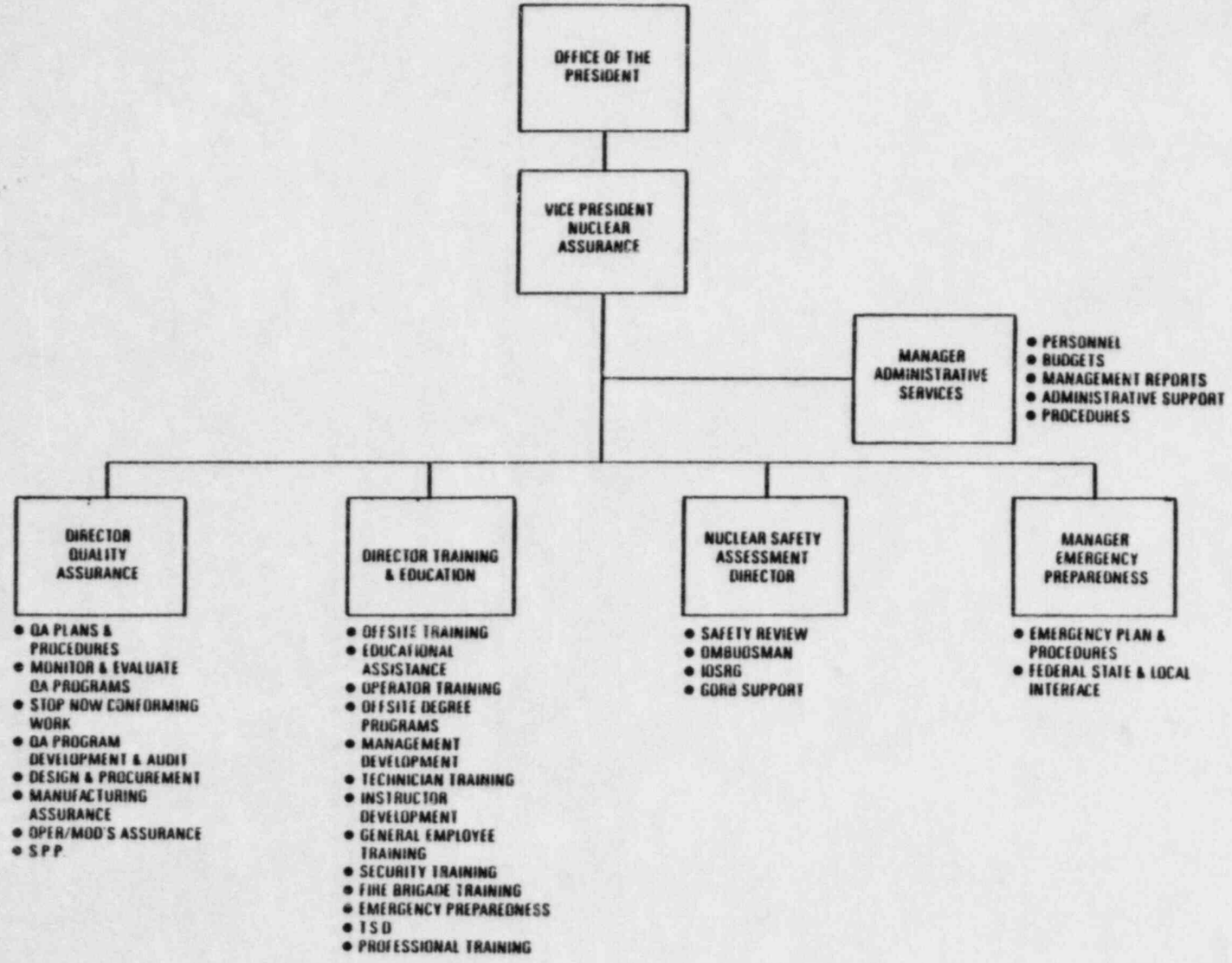


**Figure** 2–1

NUCLEAR ASSURANCE DIVISION

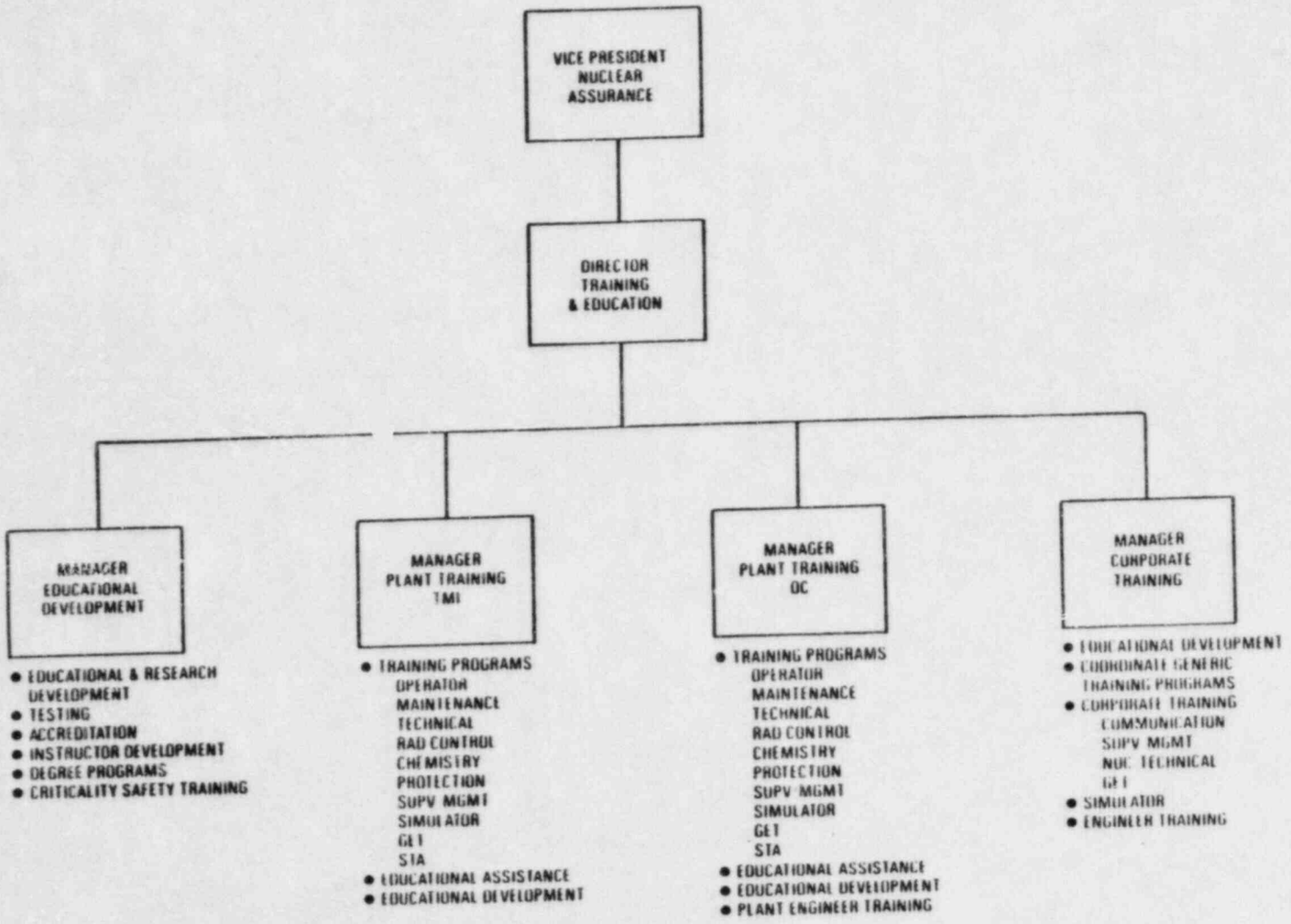


**Figure 2-2**

**TRAINING & EDUCATION DEPARTMENT**

MANAGERIAL HIERARCHY

> "In reconsidering its earlier appraisal of the OARP, the Committee should take account of several important personnel changes within the Training Department. For example, Dr. Robert Long, who was Director of Training and Education during the cheating incidents, has been promoted to GPUN Vice President for Nuclear Assurance. Dr. Richard P. Coe has replaced him. Samuel Newton, former Operator Training Manager, is now Manager of Plant Training. Edward J. Frederick, a control room operator assigned to TMI-2 at the time of the accident, has been promoted to Supervisor of Licensed Operator Training. Letter from D. B. Bauser to Appeal Board (May 6, 1983) at 2-3. In view of what occurred, are these appropriate assignments?"
>
> Footnote 56, p. 71, ALAB decision, May 24, 1984

In the above citation, the Board has raised the issue of whether personnel in responsible charge of the training activities during the cheating incidents should have been promoted or even should have been retained in the Training and Education Department. The Committee members are not privy to the basis for assignments and promotions within GPU Nuclear. Hence the Committee is not in a position to "second guess" GPU Nuclear management's decisions. The primary basis upon which the Committee can assess whether these assignments are appropriate is the quality and performance of the program today.

The individuals named in the above quotation are all in the direct line that has the responsibility for operator training. However, in an organization that is responsible for effective training on a broad scale (with operator, technician, engineer, management, and general employee training being administered), a special mix of management, education, and experience is most beneficial to the conduct of training operations.

Educational Backgrounds Within the GPUN organization, Dr. Robert L. Long (Vice President, Nuclear Assurance) possesses a B.S. in Electrical Engineering

and both an M.S. and a Ph.D. in Nuclear Engineering. Dr. Richard P. Coe (Director, Training & Education) holds a B.A., an M.A., and a Ph.D. degree in the field of Industrial Education and Administration. Samuel L. Newton (Manager, TMI Plant Training) has a B.S. degree from the U.S. Naval Academy, M.S. degree from the U.S. Naval Post Graduate School, and is a graduate of the Navy Nuclear Power Program. Edward J. Frederick (Supervisor, TMI Licensed Operator Training) provides the TMI training program with extensive education and experience in nuclear power plant operation. He is a graduate of the Navy Nuclear Power Program and has completed courses to qualify him as a certified TMI-1 senior reactor operator instructor and is a licensed TMI-2 senior reactor operator.

Experience Dr. Long has nearly twenty-five years of directly related experience in nuclear engineering, design, operation, and training, several of these years in the teaching and administration of university nuclear engineering programs. As Director of the TMI-2 Accident Assessment Team which began its investigation during the morning of March 29, 1979, he became intimately acquainted with the TMI-2 accident. Prior to assuming his present position, Dr. Long was Director, GPU Nuclear Training & Education Department.

Dr. Coe has twenty-three years of relevant educational and industrial experience in the fields of education and human resource development. In his assignments as a high school administrator and university professor he was directly involved in the development and certification of professional staff members and student teachers. He was also extensively involved in the design, development and delivery of numerous training programs for several large

corporations both as a training manager and as a private consultant. Dr. Coe is certified as a Chief School Officer and Director of Vocational Education in Pennsylvania and several other states. As Director of GPU Nuclear Training & Education Department, he has applied these educational principles to the day-to-day conduct of the operator training, both initial and requalification, as well as non-licensed operator training, professional, General Employee Training and Management Development.

During his twelve years of commissioned naval service, Mr. Newton, in addition to Engineering Officer of the Watch qualification, qualified and served as a Chief Engineer Officer in a nuclear submarine and completed qualification for command of a submarine.

Some of the licensed RO's and SRO's at TMI possess extensive experience in the US Navy Nuclear Power Program, such as Engineering Officer of the Watch (EOW), Engineering Watch Supervisor (EWS), Electronic Technician (ET), Reactor Operator (RO), Machinist Mate, (MM) and Electricians Mate (EM).

Since Messrs. Newton and Frederick understand the details of the Navy training Program, they were able to structure TMI operator training programs to take advantage of the previous training and experience of the Navy personnel. In particular, Mr. Frederick, as an experienced licensed TMI station operator, directs and monitors the TMI-licensed operator program so as to ensure orderly transition from the Navy program to the TMI program. Additionally, his experience during the TMI-2 accident and his subsequent education and training on small break LOCA phenomena qualifies his credentials in this area.

In addition to those individuals discussed above, Mr. Bruce P. Leonard, TMI Operator Training Manager, assists the Manager-Plant Training by the development and implementation of licensed and non-licensed operator training programs. Mr. Leonard is a graduate of the U.S. Naval Academy with a B.S. in Naval Architecture and is a graduate of the Navy Nuclear Power Program. He has five years of Nuclear Navy experience in submarine operation and has served as a prototype Navy training staff department head, responsible for implementing navy operator and technician training programs.

The T&E management in place is performing very well and has been innovative and effective in development of the GPU Nuclear training program. The individuals cited by the ALAB have the variety of backgrounds recommended in the OARP Report. They possess the complementary skills that are so essential to the smooth functioning of the GPU Nuclear training program. The Committee believes that any deficiencies that existed at the time of the cheating have been corrected. Any disruption now would be counter-productive to the stability that GPU Nuclear has established in its organization and operation.

The Committee emphasizes the importance of the managerial hierarchy developed within the T&E Department. The Committee believes that the organization as it exists ensures that training matters are dealt with on a priority level comparable to that provided to plant operations, engineering, and licensing. Based upon our review of the education, experience, and especially the recent performance of Drs. Long and Coe and Messrs. Newton, Frederick, and Leonard, the Committee concludes that their present assignments in the GPU Nuclear managerial hierarchy are both appropriate and highly beneficial to the training program at TMI.

C. INSTRUCTOR DEVELOPMENT AND QUALIFICATIONS

> "The Licensing Board's decision requires licensee to establish criteria for training instructors. Licensee has submitted these new criteria, and the staff has approved them. But in view of the weaknesses in this area previously identified in the OARP Report, the Committee as well should review licensee's new training instructor criteria."
>
> PP. 68-69, ALAB Decision, May 24, 1984

> "The important consideration is the qualification of the training instructors. And that is what the OARP Review Committee should address again in the context of the licensee's new instructor criteria."
>
> P. 69 ALAB Decision, May 24, 1984

An extensive program for the training and further development of instructors has been undertaken by GPU Nuclear at each of the three sites. This highly integrated program is being conducted in accordance with a strategy developed by the Director of Training and Education, Dr. Richard P. Coe.

The following documents provide a standardized method for instructor development and the conduct of effective performance-based training:

1. "Operator Training Instructor Indoctrination/Qualification Training Program" describes the procedures for the indoctrination, training, and certification of instructors involved in training licensed and non-licensed operators and shift technical advisors.

2. "GPUN Instructor Development Program" describes and prescribes a process for the initial and continuing certification and qualification of instructors.

3. "Training Systems Development" describes a method for systematically managing and conducting training within GPU Nuclear.

4. "TMI Training Department Instructor Evaluation Procedure" describes the TMI Training Department's Instructor Evaluation Program and assigns specific responsibilities pertaining thereto.

A detailed rating sheet has been developed that permits the evaluation of an instructor on a number of the important factors related to teaching, such as familiarity with technical information, adequate preparation and presentation of materials, establishment of sound learning objectives, selection of appropriate instructional methods, proper use of instructional aids, proper treatment of explanations and questions, classroom management, and instructor characteristics such as voice, diction, enthusiasm, and appearance.

In addition, the following specific steps have been taken with respect to the selection and training of instructors:

1. GPU Nuclear Training and Education has developed and adopted a formal Instructor Mode of Progression that clearly outlines the criteria for instructor job descriptions and specifications.

2. Initial instructor development programs as well as advanced instructor development modules are offered as on-going programs administered uniformly by the Manager of Educational Development.

3. Required on-going instructor evaluations are carried out by training management. Depending on the individual instructor's schedule, as many as eight documented evaluations may be made in one year.

4. Unannounced documented classroom visits are made by the Vice President/Director of Nuclear Assurance and the Director of Training and Education.

5. A plan for the integration of appropriate programs and the three site training staffs is being developed by Dr. Richard Coe, Director of Training and Education.

6. Licensed instructors are required to visit the plant on a regular basis while other instructors are scheduled as appropriate.

7. Off-site programs for educational and career development are utilized.

8. Regular staff meetings are held with several organizations to discuss current company and educational issues.

9. A GPU Nuclear Training Advisory Council that meets regularly has been formed to advise the Director of Training and Education on broad educational and personnel issues.

D. EXAMINATION - STRUCTURE AND CONTROL

A TMI document, "Control of Examinations for Units 1 and 2", provides the guidance needed at the section level for the preparation, administration, and grading of examinations for operator training. A comparable corporate document covers all other areas of testing. Precautions to prevent cheating are described, and the general conditions under which the examinations are to be administered are presented.

The detailed procedures to be used in constructing operator training comprehensive examinations at TMI are specified in a memorandum dated January 27, 1984 from B. P. Leonard, Operator Training Manager, to the Operator Training Section. It specifies:

> "In all phases of the exam we must insure that we are in compliance with rules and regulations, both internal and external. There must also be a conscious effort to create an exam which comprehensively evaluates those knowledge areas that are emphasized during the requalification year."
>
> "Attachments 1-6 detail guidelines that will be used for comprehensive exams in both Units 1 and 2. In the case where an annual exam is required for non-licensed operators or STA's these guidelines also apply. Attachment 7 provides some hints in writing operator exams."

The first six attachments are:

Attachment 1 - Exam Assembly. The detailed responsibilities of the written exam coordinator, exam writers, and technical reviewers are specified.

Attachment 2 - Exam Question Coding. An explanation with illustrations of the coding and a two dimensional matrix to summarize the characteristics of the examination questions are presented.

Attachment 3 - Exam Review and Approval. The required and review approval process, along with access authorization for security purposes is specified.

Attachment 4 - Annual Requalification Administration. This section reaffirms and expands upon the Control of Examinations procedure (6200-ADM-2600.01) with regard to proctors, allowable exam copies, answer sheets and scrap paper, seating and accommodations, changing or clarifying questions while the exam is in progress, and general rules of conduct.

Attachment 5 - Exam Grading. This section references the grading criteria established in the Control of Examinations for Units 1 and 2 procedure (6210-ADM-2604.01) and delineates qualification requirements, grading time frames, reports, and exam dissemination guidelines.

Attachment 6 - Exam Exemption. The section specifies who must approve exemptions from examinations.

The Manager, Plant Training TMI, indicated that the specifications in Leonard's memorandum were carried out during the recent requalification examinations with one exception - completion of the coding of all examination questions. The coding of examination questions can be done either after the examination has been constructed or during its construction. It is most useful and effective if it can be done while the examination is under construction so that the examination will be consistent with a two-dimensional matrix specifying content as one dimension and skill/ability as the other. However, the coding provides valuable information about the examination in either situation.

The procedures as outlined and described constitute an excellent set of parameters for the construction, administration, evaluation, and interpretation of important written examinations.

E. SECURITY OF EXAMINATIONS

GPU Nuclear has developed and implemented the most secure procedure that the Committee has ever seen for the prevention of cheating. The program covers all aspects of examination preparation, storage, and administration. The responsibilities of the Director of Training and Education, Managers of Training, Section/Group Supervisors, examiners, and proctors are carefully defined. New instructors meet with the Director of Training and Education who emphasizes, among other things, the importance of preventing cheating. At TMI the VP/Director of TMI-1 personally interviews all operators, stressing the importance of knowledge honestly gained. All new trainees are apprised of the importance of honesty in the program. In addition supervisors check on the administration of examinations on a random basis.

Examinations at GPU Nuclear are placed in the following four categories, and each category has appropriate requirements for guarding its security:

Category I. Written examinations on which the grades form all or part of the basis for certifying satisfactory completion of required training.

Category II. Diagnostic instruments that the instructor uses to detect and correct deficiencies.

Category III. Oral examinations conducted by individual examiners or by a board of examiners.

Category IV. Evaluation of skill levels in performance of actual or simulated tasks.

Security provisions for Category I cover every aspect of preparation, storage, administration, grading, and retirement. Materials are kept under lock and key, with admission to the area open only to authorized individuals. Every copy of an examination is numbered and must be accounted for at the termination of an examination. Question banks are used to vary the content of examinations (e.g., successive examinations on the same topic must have at least 50 percent different content for non-cyclic repetitive programs. For cyclic programs the requirement is that there be a different examination for each week with at least 40% of the content different for consecutive weeks). Question order is varied. Surplus materials are shredded.

The administration of Category I examinations is equally well controlled. The examinee is told whether the examination is "open book" or "closed book". (All licensed operator requalification examiniations are "closed book".) Authorized materials (e.g., calculators, tables, etc.) are specified, and specific handling requirements are given to the students. Specific instructions are read to the students, and they are warned about the disciplinary action that the company will take against cheaters. The proctor assures himself that students are separated as much as practical and that they have only authorized materials with them. No unauthorized materials are allowed on blackboards or wall charts, and authorized materials are free of notes, etc. A seating chart is prepared for later reference, if needed. At least one proctor must be available at all times during the examination, and students are allowed to leave the room only in emergencies and then only one at a time. A toilet has been installed in the testing room for the students' convenience and to strengthen the security for NRC, Operator Annual Requal and GPU Nuclear Mock Examinations. If one leaves, his/her examination is left with the proctor. If a student has a question, the proctor goes to the

student rather than vice versa. At the completion of the examination, the proctor collects the examination at the student's location and ensures that the student has signed the certification on the cover sheet to the effect that all of the work is his own and that he has not used unauthorized materials, etc. Instructors are required to check for suspicious degrees of parallelism while grading Category I examinations, and provisions are made for investigating all such instances.

Less stringent but equally appropriate measures are taken for Category II, III, and IV examinations. The Committee members reemphasize that this is the most detailed, comprehensive system that they have ever seen for preventing cheating in academia or elsewhere. While no system is completely foolproof, this one comes as close to that objective as is possible without violating the rights of the students.

## Chapter III IMPLEMENTATION OF THE RECOMMENDATIONS OF THE OARP REVIEW REPORT

In its report dated June 1, 1980, the OARP Review Committee made a number of recommendations for improvement of those activities normally handled by the Training Department. It concluded:

> "The OARP is superior to other Operator Training Programs at TMI, and a number of its elements should be incorporated in the other basic training programs. The Committee specifically recommends adoption of many of the quality controls initiated for the OARP."

The specific recommendations made by the OARP Review Committee (pp. 142-149 of the Committee Report) along with the action taken by GPU Nuclear are briefly summarized below:

Recommendation A The Committee made two recommendations regarding the OARP:

1. Specific subjects from the OARP should be added to other operator training programs. These subjects included: a) heat transfer, fluid flow, and thermodynamics, b) small break LOCA, c) plant transient training, including anticipated transient operating guides, d) simulator training, incorporating depressurization and natural circulation.

   GPUN Response - Curricula incorporating all of these topics have been developed, and their inclusion in the licensed operator training and retraining program has been reported to the Committee.

2. Continuous, internal self-examination and periodic external review were recommended for future programs.

GPUN Response - The description of the new GPU Nuclear administrative reorganization of the Training and Education Department includes the mechanisms for both internal and external reviews. The NRC has reviewed many aspects of the program, and GPU Nuclear is preparing for an INPO accreditation review of its Operator, Rad Con Technician and STA Training programs during 1984. In addition, Data-Design Laboratories (DDL) prepared an assessment report of selected TMI-1 training programs in 1982.

Recommendation B

Attention should be directed to the development of career paths for degreed personnel in the control room. Assistance should be available to the GPU Nuclear staff for self-improvement and career advancement.

GPUN Response - The Training Department is planning and studying ways to facilitate employees improving in their skills and knowledge, including the obtaining of academic degrees. On-site degree programs have been installed at both TMI and Oyster Creek. T&E is working closely with the Human Resources Department in the development of career path programs for GPU Nuclear personnel. T& E has recently adopted its own "mode of progression" which identifies potential career paths for training and non-training personnel.

Recommendation C

GPUN should replace the current temporary training facilities with a permanent training facility more conducive to learning.

GPUN Response - A 20,000 sq. ft. training building has been constructed and occupied at TMI. A building addition, doubling that space, has been approved and will be completed in 1985. It will house the replica simulator and provide additional office space for Training and Communications. Similar facilities have been created at Oyster Creek through the remodeling of buildings at the Forked River site, adjacent to Oyster Creek.

Recommendation D

GPU Nuclear shculd take steps to insure that the content and conduct of B&W Simulator Programs they procure are exactly what they want, are complementary to other operator training, and are responsive to change that may occur in TMI Control Room design and/or procedures.

GPUN Response - See Table 3-1 at the end of this chapter.

Recommendation E

In developing its plans for operator training facilities and programs, GPU Nuclear should carefully consider the proper function of each instructional element and procedure as well as the interrelationships among them. Management must overtly support the importance of simulator training.

GPUN Response - GPU Nuclear has secured and placed into operation a Basic Principles Training Simulator (BPTS) built to their own specifications based on their studies. GPU Nuclear has also ordered a replica simulator for TMI-1 which will be delivered in late-1985. See Section B of Chapter IV.

Recommendation F

Human Engineering principles should be incorporated in the modification of TMI-1 Control Room.

GPUN Response - GPU Nuclear secured the services of MPR and two human factors specialists to redesign the TMI-1 control room. Special attention was given to making the alarm system compatible with the perceptual and information-handling capabilities of the operators. Training objectives have been established which reflect these changes in the control room. (See also Section A of Chapter IV.)

Some of the changes made to improve the TMI-1 control room from a Human Factors perspective include:

- The complete relabeling of control panels to improve readability, reduce glare and implement a hierarchical labeling scheme.
- Addition of demarcation lines to group functionally related controls and indications and the addition of mimic lines to indicate component relationships within systems.
- Replacement of lenses for pushbutton control and light indicators to improve readability.
- Replacement of meter scales to correct deficiencies in scale divisions, improve readability, indicate meter failure position and display normal and off-normal bands.
- Reduction in glare through the use of low glare label plates and panel paint and installation of light baffles.
- Rearrangements of controls and indications to improve information display on selected panels including: 1) an Emergency Feedwater System rearrangement into a mimic, 2) replacement of the ESAS status panels.
- Alarm system changes to improve tile readability, to relocate tiles to more optimum locations, to aid in determining alarm significance and to improve the audible characteristics of the system.

Recommendation G Among the recommendations made by the Committee for the GPU Nuclear Training and Education Department were:

1. An Instructor Program should be identified and implemented for those assigned full or part-time teaching duties. The program should include such topics as curriculum development, development of behavioral

objectives, preparation of lesson outlines and lesson plan formats, utilization of audio-visual aids, instructing/teaching techniques, preparation of examinations, evaluation techniques, and counseling techniques.

GPUN Response - A program for instructors developed and implemented since the fall of 1980 now has all of the above topics. As an example of on-going activities, a seminar on examination construction has been offered to the instructors by an outside consultant, and the skills learned have been applied to the construction of their own course examinations. The instructor development program, which is being administered consistently at all three sites, has been centralized under the control of the Manager of Educational Development.

2. Formal instruction (especially classroom teaching techniques) and educational psychology (classroom learning) should be initiated for members of the permanent training staff. Training personnel need specific training on how to deal with heterogeneous classes (twenty to sixty year olds). They also need instruction in the most efficient use of class time, taking into account motivational and fatigue factors.

GPUN Response - The Instructor Training Program which has been developed and implemented includes all of the above topics.

3. Instructor schools need to be established and all training personnel qualified in accordance with clearly stated criteria.

GPUN Response - A qualification program for instructors has been established to enhance their technical skills and teaching ability and to make sure that they understand and implement all of the procedures on conducting classes and handling examinations.

Recommendation H

A modern sophisticated training aids section should be developed to support the immediate requirements for the identification and development of additional training aids.

GPUN Response - A modern video studio has been established at Oyster Creek where training tapes can be prepared for both TMI and Oyster Creek. Standards for the development of classroom instructional aids have been adopted. A Basic Principals Training Simulator (BPTS) has been delivered and is being used at TMI. Plans are being made to further integrate its use into the classroom course work on power plant systems.

Recommendation J

Decision analysis training should be included in the normal operator training.

GPUN Response - Decision analysis training is included as part of senior reactor operator training. The original program offered in 1980 by Management Analysis Corporation has been modified and has become an integral part of the initial SRO training program.

Recommendation J

The practice of changing an operator's work schedule every week should be modified so that changes are made every four to six weeks.

GPUN Response - This recommendation was studied, but GPU Nuclear decided not to implement such a change.

Recommendation K

GPU Nuclear should consider participation in the Institute for Nuclear Power Operations (INPO).

GPUN Response - GPU Nuclear is an active member of INPO. TMI-1 operations have been inspected by INPO. GPU Nuclear has submitted the appropriate "self evaluation" reports to support its request for accreditation of its training program for Operators, Rad Con Technicians and Shift Technical Advisors.

Recommendation L

A detailed table of specifications for oral examinations with specific proportions of questions and time assigned to each category should be developed.

GPUN Response - GPU Nuclear has developed guidance for the preparation of both oral and written examinations, which includes a matrix of subject content and type of response required.

Recommendation M

Task Analysis for the tasks of the control room operators should be prepared and used to establish both training requirements and human engineering requirements.

GPUN Response - GPU Nuclear has worked with INPO in the preparation of a generic task analysis list for utilities that have operating nuclear plants. T&E is presently using the INPO task analysis in the development of the Basic Principles Trainer Simulator (BPTS) Program. The applicable INPO/B&W task analyses are also being used to upgrade the specifications for the classroom and OJT portions of the operator training programs.

Recommendation N

GPU Nuclear management philosophy with respect to nuclear power plant operation should be clearly articulated and made known to all personnel.

GPUN Response - GPU Nuclear management philosophy with respect to nuclear power plant operation has been well developed and has been disseminated to GPU Nuclear personnel through a variety of memoranda and corporate publications. (See discussion in Section D of Chapter IV.)

The Committee is highly pleased with the actions which have been taken to implement its recommendations. Indeed, it is, in the Committee's view, a true indication of the dedication of the GPU Nuclear Training and Education Department and its management to the achievement of excellence in training.

TABLE 3-1
RECOMMENDATIONS IN THE OARP REVIEW REPORT REPORT REGARDING
SIMULATOR USAGE AND GPUN RESPONSES TO THOSE RECOMMENDATIONS

| RECOMMENDATION | GPUN RESPONSE |
|---|---|
| 1. Evaluate training aids and part-task trainers and their proper place in the training program (p. 97) | a. Designed, developed, and acquired the Basic Principles Trainer (BPTS)<br>b. Upgraded control room mock-up<br>c. Simulation on CRT of P/T plot<br>d. Currently reviewing part-task simulators for both operator and maintenance training programs<br>e. Use of part-task simulators included in five-year plan<br>f. Expanded use of computer-assisted instruction planned |
| 2. Optimal use of full-mission simulator (i.e., integral part of training program) (pp. 98 & 143) | a. Full-replica simulator is scheduled for delivery in the fourth quarter of 1985. After testing is completed, this simulator will replace the B&W simulator in the integrated training program.<br>b. Using the GPUN Training Systems Development Model (based on needs analysis, task analysis, behavioral learning objectives, etc.) an integrated training program is being developed with assignment of appropriate training resources to each part of the program. |
| 3. Difference between simulation and actual operations (pp. 98, 101, & 144) | a. The Basic Principles Trainer (BPTS) simulator emphasizes basic principles and, as such, trains operators on matters that are essentially independent of any particular plant; i.e., principles that apply generally to nuclear power plant operations.<br>b. The exact-replica simulator will be capable of minimizing simulation-operation differences by initially providing a capability of modeling approximately 200 plant failure sequences with the potential to expand this number to 500.<br>c. Instructor emphasis on differences. |

Table 3-1

| RECOMMENDATION | GPUN RESPONSE |
|---|---|
| 4. Training for simulator instructors (pp. 98 & 146) | a. Simulator training management has been intimately involved in the design and development of the TMI simulators.<br>b. A program for Instructors who are SRO certified or licensed to be provided 320 hours of specialized training on the BPTS has been initiated to enhance the interactive instructor-student relationships.<br>c. A similar amount of specialized training will be given to those SRO's who will instruct on the exact-replica simulator. |
| 5. Practice on identification and integration of information for response to emergencies (p. 100) | a. See response to items 1, 2, 4, 6, 8, 11, and 13 in this Table.<br>b. The BPT simulator provides principle-based training; initially the exact-replica will have the capability of providing practice scenarios on approximately 200 sequences with expansion as required. |
| 6. Improvement of understanding of basic physical principles (pp. 100 & 101) | a. Design, development & acquisition of the BPT simulator at TMI have been completed.<br>b. On-going process of improving lesson plans, visual aids, etc. |
| 7. Negative transfer effects (p. 100) | a. While the B&W simulator is good, it is recognized that it is not an exact replica of the TMI-1 control room. The new simulator will be an exact replica. In addition, a configuration control process is being established to assure that changes made in the actual plant are immediately reflected in the simulator. |
| 8. De-briefings (p. 101) | a. Well-organized de-briefings are held.<br>b. When appropriate, scenarios are stopped to maximize student analysis of the process and evaluation of proposed responses.<br>c. The BPTS has the ability to stop and backtrack operations so that operator errors can be identified, stressed and corrected. |

Table 3-1

| RECOMMENDATION | GPUN RESPONSE |
|---|---|
| 9. Crew "contests" (p. 102) | a. Crew-to-crew competition on simulators has not been introduced; however, crew comparisons are made on a scenario by scenario basis. |
| 10. Management support of training (p. 102) | a. GPUN management is fully committed to training as evidenced by training facilities, size of training staff, instructor qualification programs, purchase of two simulators at TMI, and the direct involvement of management in the training program. This includes direct personal involvement by the V.P.'s of Nuclear Assurance and TMI-1 and the Directors of Training and Education and Operations and Maintenance in the evaluation of instructor performance, content of curricula, and simulator training exercises, etc. Observations and deficiencies are noted with recommendations for immediate corrective action. |
| 11. Performance Measurement System (p. 103) | a. This will be included as an integral part of the replica simulator. |
| 12. Ensure relevancy of B&W training to TMI (p. 107) | a. See responses to items 2 and 3 in this Table.<br>b. GPU Nuclear instructional staff works closely with B&W personnel in the development of objectives and lesson plans for the simulator program. |
| 13. Simulator training incorporating depressurization and natural circulation (p. 142) | a. All of the OARP recommendations have been included in the simulation program as well as in the classroom program; in addition, components of the ATOG Program are included. |
| 14. Crew training as well as individual training (p. 144) | a. See also responses to items 4 and 8 in this Table.<br>b. GPU Nuclear trains operators, by crews, at the B&W exercises. |

Table 3-1

| RECOMMENDATION | GPUN RESPONSE |
| --- | --- |
| 15. Task Analysis (p. 148) | a. The GPU Nuclear Training Systems Development Model serves as the basis for the development of all future GPUN training programs. Task analysis is to be used to validate and refine these programs. INPO rated the commitment to this model as "excellent" and stated that it exceeds the requirements of the NRC model. (See Ref. 26 Table A-2) |

## CHAPTER IV. COMMITTEE RESPONSE TO QUESTIONS AND ISSUES RAISED BY ALAB-772.

In its Decision dated May 24, 1984, ALAB-772 remanded the TMI-1 restart hearings and suggested that the ASLB "...should have sought further testimony, in the light of the cheating incidents, from the OARP Review Committee...". The ALAB sought the Committee views on many specific issues throughout its decision. Within the limitations of time and information available, the Committee will respond to these inquiries.

The format used here is to quote directly from the ALAB decision (with reference deleted) and to answer the questions or respond to the statement immediately below the quotation. As indicated in the Preface, the Committee has based its responses on information made available by GPU Nuclear personnel, supplemented by a limited amount of personal observation, and, of course, earlier involvement in the OARP Review Committee Report, the ASLB hearings, and individual consulting activities for GPU Nuclear by some of the Committee members.

Those issues that the Committee perceives as being of primary concern to the ALAB have been arranged in four general categories. The Committee believes that it has addressed the primary training issues associated with restart of TMI-1. The Committee further believes that it is most appropriate that these issues be addressed as of the present, because training within GPU Nuclear has been a dynamic process. The commitment of additional resources and the dedication to building a quality program during the time since the OARP Review Report (or even since the ASLB's Partial Initial Decisions) have been impressive.

A. TRAINING AND TESTING EFFECTIVENESS

"...we believe that the Board could have elaborated more on the areas the [OARP Review] Committee identified as needing improvement (e.g., description of control room operator tasks, the training facility, instructor training, communication between management and staff)."

P. 21 ALAB Decision, May 24, 1984

During the period of time that has elapsed since the testimony presented by the OARP Review Committee and other licensee consultants, the TMI-1 licensed operator training and requalification programs have been improved by the addition of training facilities and equipment, additional and better qualified training staff, implementation of more effective training programs and procedures, initiation of an effective management auditing process, and establishment of a multi-disciplined GPUN Headquarters training support organization. Additionally, there continues to be a strong GPU Nuclear Management commitment to training at the TMI and Oyster Creek Stations.

Training Facilities - Late in August, 1981, the TMI training staff moved into spacious new quarters (20,000 sq. ft.) adjacent to the TMI Visitor's Center. This move provided more office and classroom space, as well as library space to accommodate various training programs and allowed for more efficient personnel access to the training operation because the facilities are outside of the plant security area.

Additionally, the Basic Principles Training Simulator (BPTS) was delivered to TMI and became operational in early 1984. This simulator provides licensed operators with ongoing refresher training in PWR basic operating principles in an environment that encourages learning. Simulator design, checkout, and training program development were supervised by an experienced TMI licensed SRO who continues to supervise the simulator training programs.

Training Staff - It should be noted that the number of instructors assigned to operator training at the TMI Station is nearly double the average number of similarly assigned instructors at other nuclear power plants in the United States. Moreover, the fact that most of the TMI operator training instructors have or will hold either RO or SRO licensees or certificates provides invaluable knowledge and experience input to the training programs and establishes an all-important instructor credibility with the operators in training.

The Operator Training Program staff has continued to increase its numbers of qualified instructors. As of June 1, 1984, sixteen instructors and supervisors were assigned to conduct licensed and auxiliary operator training. The majority of the operator training staff are experienced operators. Six of the operator training staff have degrees. Those instructors who are not currently licensed or certified as RO's or SRO's are currently in training or scheduled for training programs for licensing or certification as RO or SRO's prior to the end of 1985. Additionally, efforts are in place to fill the remaining authorized positions with similarly qualified instructors. The addition of these licensed personnel will further enhance the TMI Operator Training Requalification Programs.

Training Programs and Procedures - Beginning in 1982, several new programs, designed to maintain or improve operator competence, have been implemented. In addition to the BPTS program, special B&W simulator training programs were developed to provide operators experience with the use of major TMI procedural changes, steam generator tube rupture emergency procedures, and other Licensee Event Report (LER) lessons learned.

The TMI-1 Plant has undergone several heatups and cooldowns as part of hot functional testing, providing the operators with plant operational experience.

Procedurally, the Training Department utilizes instructor lesson plans to conduct all its training sessions. These plans require supervisory approval before being used. As a means of maintaining Operations Department feedback to the training process, weekly meetings with shift supervisors and the Training Department are held to review all program revisions and schedules and to resolve any special problems that may arise.

Management Auditing Process - Presently, all TMI training programs are subject to auditing by GPU Nuclear management. For example, the licensed operators undergoing requalification training on the B&W simulator are observed at least once during each cycle by the VP/Director of TMI-1, the VP/Director of Nuclear Assurance, and/or the Director of Training and Education during the administration of operational examinations that feature TMI scenarios and procedures. These audits provide the operators with the confidence that management is truly concerned that the training activities are carried out effectively.

Headquarters Training Support Organization - Figures 2-1 and 2-2 outline the organization of the Nuclear Assurance Division and the Training and Education Department, respectively. The training operation at the TMI Station is supported in matters both technical and administrative by the Corporate Training and the Educational Development groups and Technical Functions who provide technical review of lesson plans upon request. In addition, it has a direct communication channel to the office of the President through the

VP/Director of Nuclear Assurance, thus ensuring that training matters can be addressed on a priority level equal to that provided for plant operations, engineering, and licensing.

Training and requalification are necessary processes in the developing and maintenance of a competent nuclear power plant operator. During the past three years, the TMI licensed RO's and SRO's have participated in a continuous training program, and their competence has been evaluated periodically in the classroom, on simulators, and in the TMI plant itself. It is therefore the Committee's position that, from the standpoint of the training of the RO's and SRO's, TMI-1 can be started up and operated in a manner that provides safety to the general public and produces electricity efficiently and economically.

This conclusion is further amplified and documented in the presentation of the following results of the most recent NRC examinations. During the spring of 1983 and again in the winter of 1984, NRC operator licensing examiners administered written, oral and simulator demonstration examinations (at the B&W simulator) to twelve RO and four SRO (upgrade from RO license) license candidates. As a result of these examinations, the NRC issued licenses for eleven of the twelve RO candidates and all four SRO candidates. The twelfth applicant was returned to his former position as an Auxiliary Operator.

As a result, GPU Nuclear has a total of 38 licensed operators. This total of 19 SRO and 19 RO license holders is far more than the minimum number necessary for six-shift operation. Equally impressive is the high morale of the operators, as evidenced by the fact that only one operator has resigned in the past two and one-half years.

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"In sum proper training is essential to the safe operation of the plant and requires the closest scrutiny.[61]

[61]The record in this proceeding is replete with examples of where it is essential for an operator to be fully conversant with plant design and procedures. ... We note in this connection a recent Notice of Violation citing numerous instances where licensees' personnel failed to follow proper operating procedures. The staff noted that licensee had admitted and identified most of these violations and took corrective action. Nevertheless, because of the large number of violations within a relatively short time, the staff determined that a $40,000 civil penalty should be imposed. ... Licensee has apparently decided to pay this fine."

p. 76, ALAB Decision,May 24, 1984

With regard to the Notice of Violation, the Committee notes in that GPU Nuclear's response to the original Notice of Violation and Imposition of Civil Penalty dated February 29, 1984, none of the violations were attributed to improper or inadequate training. Furthermore, in the corrective actions and steps taken to prevent recurrence, which from all indications, have been accepted by NRC Staff, additional training was required for only one of the nine specific violations (violation #3). This training was required only because part of the response was to change a procedure, with training to be conducted on the change. That training, on revisions to the RCS leak rate procedure, has been conducted by the Operations Staff.

Training for Auxiliary Operators on valve line up and verification procedures and on valve construction and position indication has also been conducted by the Training Department, both in response to violations 1a and 1b and to procedure changes brought about by GPU Nuclear's response to an INPO evaluation finding.

Training at a nuclear power station is of utmost importance to the safe and effective operation of the plant. GPU Nuclear management recognizes that the

safe and efficient operation of a nuclear power plant involves total management support of the operators, who not only must undergo years of rigorous training to obtain an NRC license but also are required to maintain this level of competence continuously by means of requalification programs. The Committee further notes that GPU Nuclear has conducted training on the examples cited by the ALAB. The ATOG procedures, which have been the subject of extensive training, address most of them.

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"Encompassed within this topic are issues concerning the adequacy of the testing procedures to measure training effectiveness and the related cheating matter."

P 14, ALAB Decision, May 24, 1984."

Subsequent tc the cheating incident, the TMI Training Department has continued to administer and monitor written, oral, and simulator demonstration examinations for the licensed TMI-1 RO's and SRO's. The required NRC annual licensed RO and SRO requalification examinations were administered annually by the licensee for calendar years 1982 (Cycle 9) and 1983 (Cycle 10). All licensed RO's and SRO's who were required to take the examination either completed it successfully or if some portion of the examination was failed, subsequently were re-trained and were successful on re-examination.

Following completion of the 1982 and 1983 TMI-1 licensed RO and SRO requalification programs, Mr. Frank Kelly evaluated the 1982 and 1983 written RO and SRO requalification examinations, the answer keys, and individual results on these written examinations as part of an overall review. He concluded that the scope and content of the written examinations was adequate

to judge the effectiveness of the training program and that the operators have maintained high levels of qualification.

The cheating incidents on the NRC examination and certain licensee administered quizzes occurred prior to the requalification examinations discussed above. No cheating incidents were found during the administration of these examinations. Therefore, those cheating incidents did not have any bearing on the results of these examinations.

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"Does the training program actually enhance the operators' knowledge or simply encourage memorization for test taking purposes?"

P. 63, ALAB Decision, May 24, 1984

"The Licensing Board as well stressed the important relationship between training and operator competence."

P 14, ALAB Decision, May 24, 1984

The Committee believes that the training programs currently conducted at TMI enhance the operator's ability to maintain licensed operator competence. Each annual requalification training program builds upon the knowledge of the operators, so that they become more knowledgeable and therefore are able to operate the plant more safely and effectively. The examinations they are required to pass are designed to test this knowledge. The requalification examinations cover subject matter that provides evidence that an operator is competent to operate the plant.

The scope and content of the industry's operator license examinations have been developed and refined over the past twenty years. They are structured to measure retained knowledge of technical subject matter and have been developed from consideration of task analyses of routine and non-routine operator duties. Following the TMI accident in 1979, the NRC, INPO, and the industry committed resources to an analysis of what an operator needs to know to operate nuclear power plants safely and effectively. This analysis has significantly influenced the structure of RO and SRO license examinations.

With respect to testing procedures, it is, of course, important that an operator be able to express himself on written and oral examinations. This enables examiners more easily to assess the extent of each operator's knowledge. It also means that many questions must be developed in each subject area. If a RO or a SRO has successfully completed four or five requalification periods following his initial licensing examination, he has probably experienced most methods of evaluating the subject matter. During the examinations, he may recognize certain key points that have been asked of him previously, and this will facilitate both his written answer and his oral answer. However, if an operator thoroughly understands the subject material, questions that are representative and un-ambiguous will elicit correct answers.

With regard to the requalification oral examinations, Dr. Eric F. Gardner accompanied two examiners at TMI during the 1980 requalification oral examinations. He observed that although each examiner addressed the scope of examination differently, they both asked questions in all of the appropriate subject areas. The licensees were knowledgeable operators, and, as a result, they were deemed to be qualified and were passed on the oral examinations.

Although they had no idea of the specific questions the examiners would employ, they responded satisfactorily, demonstrating that they thoroughly understood the material. We conclude, therefore, that the operators at TMI are safe, competent operators, and that they understand the examination subject matter.

GPU Nuclear has included in its training program for instructors a seminar on test construction developed with the help of a consultant. The initial sessions consisted of both classroom presentation and a workshop. During the workshop participants developed a taxonomy of learning objectives and used it to evaluate examinations in terms of a two-dimensional blueprint that includes both content and the variety of types of mental process needed by the examinee. More recently sessions on this matter has been incorporated into the "Fundamentals of Instruction" Course. Following such a blueprint will ensure that the test questions will sample more broadly the kinds of mental operations that are required for a demanding job such as that of the Control Room Operator. Hence the training program does enhance the operators' knowledge and does not simply encourage memorization for test-taking purposes.

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[57]"A related problem--indeed a "catch 22"--is that because of lack of use, the operators skills have declined during the period of plant shutdown. This is evident from a recent inspection report where the staff concludes that overall licensed personnel at TMI-1 are well trained but identified several areas of weakness that are to be addressed in a special restart training program. Ltr. from R. W. Starastechi to H. D. Hukill, (April 13, 1984) (Inspection report No. 50-289/84-05 at 4-5)"

Footnote 57 p. 72 ALAB Decision,
May 24, 1984

The above citation refers to an Operational Readiness Evaluation conducted by the NRC in April 1984. It indicated a need for additional training to improve familiarity and skills with operational conditions for some operators whose operational skills appear to have declined during the prolonged shutdown. GPU Nuclear took immediate action to address the specific items noted in the report. In fact, GPU Nuclear had already made provisions to address the general area of skill deterioration for prolonged shutdown. A restart requalification card to be utilized during hot functional testing, zero power testing, and the power escalation test program was issued in April 1983. Furthermore, the power escalation test program was designed with hold time periods at 40% and 75% power levels to allow all crews an opportunity to participate in hands-on performance of items identified on the restart qualification card. Additionally, based on its own management's observation of the crews during the ATOG simulator training at the B&W simulator in January and February of 1984, GPU Nuclear recognized the need for the crews to spend time practicing some routine evolutions associated with operation at power and had already scheduled additional training for each crew at the B&W simulator in May and June of 1984. Finally, the hot functional test program has been completed since the issuance of the inspection report, thereby providing additional training for the operators.

The cover letter which transmitted the inspection report states:

> "Based on the results of these efforts, licensed personnel at TMI-1 were found to be knowledgeable and well trained. The results also indicate an effective requalification program. The nature of GPU Nuclear's approach to this evaluation did not permit advance preparation on the part of the licensed personnel. Consequently, we believe that the favorable results are indicative of a sound and effective training approach."

The inspection report also states:

> "Based on this assessment, the inspectors determined that there were no generic areas of weakness that were attributable to training;...."

The Committee also believes that the inspection report speaks directly to the concerns raised by the ALAB regarding the efficacy of the training programs in the light of the cheating incident.

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> "We are troubled by the numerous substantive problems in the examination ....In short, the question and answer keys often reflect training information, (some of which might be obsolete or overly specific), rather than actual plant design. This, in turn, means that training may not be oriented to actually operating the plant. Again this shows undue emphasis on passing the examination, as opposed to learning how to operate the particular plant in question."
>
> p. 75 ALAB Decision, May 24, 1984

This question raised about the current training program has been addressed by the staff of the training program at GPUN. The Training and Education Department subscribes to the job task analysis approach to training development. RO and SRO licensed candidates are required to spend at least three months on shift as an extra person as part of their training program. There are 28 specified evolutions that are conducted at the plant or on a simulator as part of the requalification program. Additional emphasis is placed on heat transfer, fluid flow, and thermodynamics in licensing examinations. In addition to its regular simulator training, GPU Nuclear, over the past year, committed to extra training at the B&W Simulator in

Abnormal Transient Operating Guidelines (ATOG) and tube rupture scenarios. The ATOG philosophy is a "symptom-oriented" rather than "event-oriented" approach to responding to unanticipated plant transients. In anticipation of restart, each TMI-1 operating crew also recently completed three additional days of refresher training on the Lynchburg simulator. GPU Nuclear has taken delivery of the Basic Principles Training Simulator and is scheduled to receive its replica simulator in the fourth quarter of 1985.

For operator training, GPU Nuclear has produced and published an Operations Plant Manual, a nine volume set consisting of 121 sections intended to cover all systems and major components in TMI-1, as well as fundamentals and theory necessary to understand the operation of power plant systems and equipment. The manual was designed to be the basis for training lessons plans and to serve as a sole source reference for operators. Each section contains behavioral learning objectives for auxiliary operators, RO's, SRO's and STA's, and is written from an operator's viewpoint. Much of the detailed engineering information typically found in system descriptions, but unnecessary for operator training has been omitted. To date, 101 of the 121 sections have been issued with the remainder in various stages of preparation, review and printing. Every section has been reviewed by the appropriate technical organization for completeness, accuracy, and for appropriateness of the learning objectives.

Mr. P. R. Clark, President of GPU Nuclear, addressing the Subcommittee on Energy Research and Production Committee on Science and Technology, U.S. House of Representatives, on May 22, 1984 said:

> "Both the replica simulator and the BPTS have computer-assisted exercise capabilities which permit accurate assessment of operator performance. All of the simulator training activities emphasize the importance of the team

concept and effective communications among personnel when controlling and responding to normal plant operations to accidents.

The Institute of Nuclear Power Operations (INPO), created in response to the TMI-2 accident, has had a significant effect on operator training. INPO guidelines have been used to evaluate, revise, and strengthen GPUN Operator Training Programs. GPUN has applied to INPO for accreditation of its Operator, Shift Technical Advisor, and Radiological Controls Technician Training programs and the accreditation process is underway.

Classroom training for GPUN operators has approximately doubled in both the auxiliary/equipment operator and reactor operator replacement programs. Furthermore, the training is now tailored to specific background and experience of the individuals."

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"Are the licensee and NRC examinations an effective way to measure an operator's ability to run the plant? Do the format and content of the examinations encourage cheating?"

P. 63, ALAB Decision, May 24, 1984

The Committee believes a relationship between training and operator competence does exist, and that the industry's examination process is an effective way to measure each operator's knowledge and his ability to run the plant.

The format and content of the examinations are designed to test specific skills and knowledges. The examinations, based upon behavioral objectives related to task and job analyses, are an important element in the performance based training program. Both informal job and task analyses done by the GPU Nuclear staff and a set constructed by INPO have been used. The written examinations are part of GPUN's overall appraisal of a potential operator's competence to function safely in the Control Room of TMI-1. The entire evaluation process involves:

1. classroom activities with lectures, quizzes, and examinations,
2. simulator exercises involving the solution of problems related to the malfunctioning of the system, and
3. on-the-job performance and evaluation.

These three components are integrated so that the required skills and knowledges can be tested appropriately, and the extent of each examinee's understanding can be reliably ascertained.

The examination format has been reworked and revised in an effort to improve both the effectiveness of the administration of questions and the efficiency of the grading process. Following the cheating incidents at TMI, much discussion among experts in the industry ensued regarding cheating on examinations. Those NRC and industry examiners with experience in this field feel that cheating rarely occurs. In particular, during their many years as NRC examiners, neither Mr. Kelly nor, to the best of his knowledge, any of his colleagues in both NRC and industry, could remember a single incident where an operator was caught cheating on an NRC-administered written examination.

Following the cheating incidents with the TMI operators, the industry evaluated ways to protect against such incidents. For example, it was realized that the potential for cheating could be reduced by better monitoring. Therefore, the NRC and the industry, including the TMI Training staff, established very stringent rules to govern the administration of examinations. The changes that were incorporated included physical separation between the personnel taking the examination, provision of more than one person to proctor an examination, and the signing of an affidavit to the effect that all work was their own and that they had neither given nor received aid. These and many other items (See Section II D) were incorporated into industry and NRC examinations to improve the security of the examination process. While the Committee members can only speculate as to why the individuals in question cheated, they believe that the format, content, and

conduct of the industry and NRC examinations do nothing to encourage this cheating. To the contrary, they believe that the present format, content, and especially the security procedures discourage cheating.

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> "...we believe the Board (ASLB) could have elaborated more on the areas the (OARP Review) Committee identified as needing improvement.....See also OARP Report, at 140,...."
>
> P. 21, ALAB Decision, May 24, 1984

Note p. 140 in OARP Report deals with the man-machine interface.

GPU Nuclear has taken several actions to improve the human engineering of the control room and its operator training program. A competent contractor, MPR, and two consultants with expertise in human factors design were retained to redesign the TMI-1 control room. They interviewed expert operators and conducted walk-throughs and talk-throughs based on carefully selected scenarios. The redesigned control room was based on an analysis of the informational requirements of the operators. Two human factors specialists worked continuously with the design engineers of MPR to ensure that the revised control room was designed in accordance with sound human engineering principles. To ensure safe effective plant operations, the control room was completely redesigned including changes in the basic design of instruments and controls, functional arrangement of displays and controls, re-working of the entire alarm system, the addition of CRT's, and improvement of the working environment. The alarm system was made more compatible with the perceptual and information-handling capabilities of the operators. All of these changes have been made in the TMI-1 Control Room.

Training objectives were established that reflected the changes in the control room. The walk-through/talk-through data plus input from educational experts within GPU and from outside experts served as the basic behavioral data on which these training objectives were based. A further validation of these objectives, along with specification of competency levels, is being conducted employing task analytic data supplied by INPO.

In summary, GPU Nuclear personnel clearly recognize that maximally effective systems performance is achieved only by optimizing the man-machine relationship. This optimization requires that attention be given both to design for human use (human engineering) and the establishment of training objectives with provision of adequate facilities and personnel to meet those objectives. Specific GPUN responses to the OARP Review Committee recommendations are presented in Chapter III of this report.

## B. SIMULATOR TRAINING OF LICENSED OPERATORS

> "Because of the demonstrated weaknesses in past testing procedures, would the Committee require even greater usage of simulators in training and testing." "... we have been unable to locate any regulatory requirement for a specific amount of simulator training. The OARP Committee, however, should reconsider its generalized view on this topic with respect to the particular amount of simulator time per operator at TMI-1. See Lic. Exh. 27, OARP Report, at 99.
>
> PP. 69-70, ALAB Decision, May 24, 1984

The Committee interprets "greater usage" to refer not only to the quantity of simulator usage but also to the quality of simulator usage. A second aspect of this issue is concerned with whether or not "...all TMI-1 operators, previously licensed or not, should be tested on a simulator."

Amount and Nature of Simulator Training - GPU Nuclear purchases an extensive amount of time on the Babcock and Wilcox (B&W) simulator at Lynchburg. The hours of training at Lynchburg for the last three years for both initial training and requalification training are listed in Table 4-1.

Clearly, a very significant increase in the amount of simulator training for requalification occurred in 1983. In addition, the content of the program changed significantly.

The three-week initial program for the RO's addresses such topics as normal operations, emergency procedures, start-up procedures, integrated plant operations, and so on. The two-week initial program for the SRO's includes practice on normal operations, emergency procedures, etc. with significant emphasis on the role of shift supervisors.

TABLE 4-1

Hours for Individual Operators of Initial and Requalification Training at B&W for the Past Three Years

| | INITIAL* | | REQUALIFICATION* | | TOPICS |
|---|---|---|---|---|---|
| | RO | SRO | RO | SRO | |
| 1981 | 120 | 80 | 40 | 40 | Refresher |
| | | | 16 | 16 | Transient Assessment |
| 1982 | 120 | 80 | 40 | 40 | Refresher |
| 1983 | 120 | 80 | +80 | +80 | Refresher |
| | | | 24 | 24 | Tube Rupture |
| | | | 40 | 40 | **ATOG |
| 1984 | 120*** | 80*** | 24 | 24 | ATOG II & Low Power Operations |
| | | | 40*** | 40*** | Refresher |

* 50% classroom time at the simulator and 50% hands-on simulator time
** The ATOG Training was actually conducted in 1984, even though it was part of the 1983 requalification cycle.
*** Projected
(Refresher for 1984 scheduled for January, 1985.)
\+ Hours encompass requirements for 2 requal cycles.
Note: Requalification Training year runs from March to March.

The requalification program for RO's and SRO's was increased from the 40 hours in 1982 to 144 hours for the members of each group to meet a specific need. Each crew practiced not only those scenarios required by NRR (the so-called "Denton Requirements") but also major procedural changes, plant status changes, tube rupture procedures, and other scenarios.

A separate program involved practice on the new abnormal transient operating guidelines (ATOG), including the use of symptom-based procedures rather than event-based procedures. Another ATOG program also practiced as part of the training for the 1984 requalification cycle included normal plant operations, plant start-up and more ATOG exercises.

Many other qualitative changes have been made since 1980 that significantly strengthen the simulator program, per se, and thus increase the effectiveness of the overall training program. Certain of these will now be described.

Basic Principles Training Simulator - GPU Nuclear is the one of only three U.S. utilities of which we are aware that gives its operators training on both a Basic Principle Training Simulator (BPTS), the requirements for which were developed by GPU Nuclear personnel, and a full-scale (B&W) simulator. The BPT simulator is intended to teach operators basic principles of neutronic behavior, reactor kinetics, thermodynamics, heat transfer, fluid flow, and PWR operational characteristics. Systems diagnosis and operating procedures are taught on the B&W full-scale simulator (which will be replaced by a replica simulator at TMI). Thus, GPU Nuclear operators receive excellent training in both theory and practice.

It is important to note that the BPT simulator requirements were established by GPU Nuclear engineers and instructors and the simulator was designed to their specifications. GPU Nuclear personnel performed the analyses for the BPT simulator that led to the specification of learning objectives, panel layout, layout of control rod section, etc. Advanced simulator characteristics such as freeze (stop-action), reverse (e.g., go back and repeat operations again, if desired), slow-action (action can be slowed to one-tenth of real-time), and performance measurement capabilities are included. (The replica simulator will also have these desirable features.) The important point is that in the development of the BPT simulator, GPU Nuclear demonstrated, not only impressive design engineering capability, but also instructional plans on how to integrate the BPT simulator into the training program.

Objectives of B&W Simulator Training - GPU Nuclear employs the B&W simulator to support a three-fold program: initial training, maintenance of skills, and special training requirements (e.g., when new procedures were developed for handling leaks and/or ruptures in steam generator tubes, all of the procedures were run on the simulator before being applied in the actual plant).

Initial Training, Maintenance of Skills and Special Training Requirements - Each crew was given 12 hours on the simulator plus 12 hours of classroom before the tube rupture procedures were instituted in the plant. As another example, the approved ATOG procedures were handled by running them on the simulator before incorporating them in the training curriculum. Following simulator training, the ATOG Procedures were revised to reflect lessons learned during the training sessions. The Committee feels that this is an excellent way to employ a full-scale simulator as a significant element in a well-integrated training program.

Individual and Crew Assessment - The B&W simulator is used also by senior members of TMI Operations staff to assess individual and crew capabilities. These exercises provide a basis for evaluating not only the proficiency of individual crew members but also crew integration, crew communications, and duty assignments. Operators can be interchanged among crews to maximize overall crew capabilities.

Quality Assurance and Quality Control of Simulator Training - The Director of Training and Education and members of his staff personally visit Lynchburg and

evaluate the programs being administered to GPU Nuclear operators for suitability as training materials and assurance that the simulator training is fulfilling its objectives as an integral part of the overall training program.

Quality control is exercised by having training personnel travel to Lynchburg a week ahead of the first crew's arrival to finalize program content and methods of presentation. Excellent working relationships have been established between GPU Nuclear training staff and B&W simulator instructional staff. This interaction ensures timely and appropriate responsiveness to any changes in simulator training requirements.

Decisions regarding what should be taught on the B&W simulator are based on training department lesson plans developed from identified training needs that result from a continuous review of operator skills and an analysis of specific job requirements for operation of the TMI-1 plant. The simulator program is an integral part of the overall training program because the simulator program's objectives are: (1) an on-going review of operator skill requirements, (2) accommodation of new modifications and procedures, and (3) specific operational requirements of the TMI-1 plant.

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"At the same time, the Committee should consider whether all TMI-1 operators, previously licensed or not, should be tested on a simulator. ...We believe it is important that the OARP Review Committee now consider whether, in view of the compromised written examinations, previously licensed operators should be tested on the simulator as well."

P. 70, ASLAB Decision, May 24, 1984

This issue has been addressed above. To recapitulate, GPU Nuclear requires requalification annually by (1) classroom examination, (2) in-plant walk-throughs and talk-throughs, and (3) 40 hours of crew training on the B&W simulator (supplemented last year by special ATOG training). In a word, all previously licensed operators have been tested and will continue to be tested annually on the simulator, but not necessarily by the NRC.

## C. IMPACT OF CHEATING UPON COMMITTEE'S RECOMMENDATIONS

> "In reading the OARP Report, one question is inescapable: would the Committee reach the same favorable conclusions in light of the cheating incidents and subsequently acknowledged deficiencies in licensee's training program?"
>
> p. 67, ALAB Decision, May 24, 1984

> "For instance, the OARP Report referred to 'pre-accident neglect' of the TMI Training Department and identified more specific shortcomings (bitterness) and anxiety among some employees, inadequate training facilities, the need for special teacher training for instructors, etc. Notwithstanding these and other criticisms of the program, the Committee gave the OARP high marks. How would the committee members now strike the balance between the positive and negative aspects of the program?"
>
> p. 67, ALAB Decision, May 24, 1984

Perhaps the most perplexing issue with which the Committee had to deal was the cheating incident on the NRC-administered reactor operator examination and other allegations of cheating on NRC and/or GPU Nuclear administered examinations. Other than the direct admission by the two principals involved in the NRC reactor operator examination cheating, the Committee is as confused as others appear to be about these allegations. (Note the disagreements between the ASLB and the Special Master.) The Committee possesses no clairvoyance in this regard, and it makes no attempt to resolve this issue. Suffice to say that cheating occurred on the reactor operator exam, and additional cheating may or may not have occurred. For purposes of this report, the Committee accepts this as given and will respond to the issues addressed to the Committee by the ALAB accordingly.

The fact that anyone cheated on examinations is, of course, inexcusable. The real motivation for these few instances may never be known. When what appear to be desirable and worthwhile ends are involved (e.g., devotion to a friend,

a highly desirable job or career, security for one's family, etc.) some individuals apparently are willing to resort to illicit means to achieve those ends, especially if they think that they will not be detected.

Whether cheating is the product of a lifetime of experiences, the result of the immediate environment, or a product of both, probably cannot be determined. Attempts to identify this process and persons who may cheat under a given set of circumstances have not been very successful. Cheating along with dishonesty has been shown in psychological studies to be highly situational. Hence, management must take the utmost precautions to prevent it. It is essential that when the stakes are high, those in authority (supervisors, proctors, etc.), develop, institute, and administer controls that not only make cheating virtually impossible but also provide for exposure of the occasional person who attempts to cheat.

As regrettable as the cheating incidents are, the Committee feels that they must not be allowed to overshadow the extraordinary progress made by the GPU Nuclear Training and Education Department since the TMI-2 accident. Indeed, the cheating seems to have served as a stimulant to the training personnel to redouble their efforts. In discussions with the management of the Training and Education Department, there was a keen sense of their responsibilities in the cheating incident and a firm dedication to see that cheating never happens again. The Committee believes that the procedures presently in place will prevent cheating in the future.

The Committee fully supports appropriate disciplinary action against individuals who have engaged in, condoned, or encouraged cheating in any form. On the other hand the "punishment should fit the crime". The Committee

does not believe that individuals who "cooperated" during training, either through misunderstanding of the ground rules or through past laxness on the part of the instructor, should be treated the same as those who cheated during NRC exams or Company administered certification examinations. While dismissal is clearly appropriate in the latter case, indiscretions during training should not necessarily bar a person permanently from involvement with nuclear plants when he has demonstrated his awareness of the seriousness of the ethical issues involved or from promotion at a later date when the individual's performance warrants it .

In virtually every case where the Nuclear Regulatory Commission, the ASLB, or the ALAB have raised objections to an individual's continued participation in the TMI-1 restart activities for any reason, GPU Nuclear has removed the individual from the prescribed activity. Individual careers have been disrupted, and some individuals have left. Indeed, the Committee feels that GPU Nuclear may be "overreacting" to demonstrate its willingness to "go the extra mile" to establish its credibility with its employees, the NRC, the ASLB, the ALAB, and the general public. GPU Nuclear may have been denied the services of some very talented people on the basis of little more than rumor, hearsay, or "demeanor judgments." Perhaps this is inevitable, given the special circumstances that surround the TMI-1 restart.

The Committee feels that an entire training program and the reputations of the overwhelming majority of the conscientious students and operators at TMI should not be tarnished by the actions of a very small minority. Performance on examinations of the TMI operators, subsequent to the cheating episode, is essentially the same as it was prior to the episode -- and this under conditions so tightly controlled that cheating simply would not have been

possible. The Committee accepts this as one additional piece of evidence that only a very, very few were involved in cheating. Further, it is satisfied that GPU Nuclear training personnel have done everything that can be done to ensure that efforts to cheat are reduced to an absolute minimum.

The Committee's evaluation of the training program can only be meaningful if it reflects the situation that exists today. Since the OARP Review Report was issued in 1980, most of the recommendations contained have been carried out, and the strongest aspects of the OARP have been developed further and incorporated in the current training program. The present program is significantly superior to the OARP training program. Management has actually devoted considerable additional resources (both personnel and new buildings) to training as well as systematically developing procedures that promote an effective program. Many of the current procedures are described in the TMI Self-Evaluation Reports dated May 24, 1984, sent to the INPO accreditation team as preparation for their review of the GPUN training program.

The Committee's view of the present training program is well documented throughout this report. Suffice to say that the Committee believes the present training program strongly supports the restart of TMI-1.

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> "For example, it is essential to know if Dr. Gardner's favorable opinion of the Operator Accelerated Retraining Program--offered in late 1980 and based on what he believed was the satisfactory implementation of the program--would be altered by the subsequent knowledge of cheating on licensee and NRC examinations."
>
> p. 66, ALAB Decision, May 24, 1984

Note: As requested by the ALAB, this issue has been addressed by Dr. Eric F. Gardner.

This issue can be addressed by answering three separate but related questions:

1. Is cheating an important issue in educational programs and/or testing programs?

The answer is an unequivocal yes. It is especially important to prevent cheating in testing programs designed solely to evaluate the skills and knowledges of individuals being tested, such as in the NRC examinations. However other testing is done as special parts of the learning process rather than to provide an evaluative function. For example, to achieve some objectives, test examinees may be told to work together or to use certain materials such as books, notes, etc., in answering questions. On group practical examinations and take home tests, if the ground rules are poorly stated, assisting each other or seeking help from others may be perceived as acceptable behavior. It is not that such behavior is acceptable, but rather what constitutes cheating may be difficult to define. In a specific situation, it is important that the purposes and the procedures be carefully spelled out and be understood by both the examinees and the examiners. The fact that each shift must learn to operate as a team for optimally safe operation of the plant must be emphasized. Accordingly, the training does properly contain exercises and indeed testing, that involves team effort.

If there had been any cheating incidents prior to my evaluation of the OARP training program, I would certainly have taken it into account as well as any additional information that might be relevant to the evaluation of the program itself. It might or might not have influenced my judgment about the quality of the instructional program, depending upon the facts and whether or not the situation had been corrected.

2. Would my evaluation have been less favorable about the program had I known about the cheating on the NRC examinations?

I would still have given the same weight to the evidence I collected about the organization and procedures of the training program, from observing classroom activities, interviewing instructors and students, and studying the evaluations given to the instructors by other observers. I would not view the cheating on the NRC examination as changing my evaluation of any of those activities nor my conclusions about the quality of the OARP Training Program. However, I would recommend that all NRC examinations be given under much more secure, well-defined conditions.

3. Would my evaluation have been less favorable about the program had I known about the alleged cheating that took place on the examinations and quizzes administered by GPU Nuclear training staff?

I would have had to determine the purpose (educational or evaluative) of specific quizzes. Even if collaboration were authorized, I would have been concerned about possible erroneous evaluations of the skills and knowledges of the examinees. As background, I would have wished to know what the previous practice had been, what the understandings about the nature and purpose of the quizzes had been, and what was understood by students and instructors as to their responsibilities at the time the alleged cheating took place. Since the information I had acquired previously during the OARP study about the planning, instruction and operation of the OARP Program has not been altered, I would be concerned primarily as to whether any collaboration (cheating or otherwise) had prevented adequate data from being obtained about the skills or knowledges acquired by the individual candidates and whether adequate procedures had been established and implemented for administering examinations used primarily for evaluation purposes.

During OARP, evaluated information about students was obtained from a combination of quizzes, examinations, oral questioning in class, and observations of the examinees' performance, both in the class room, on the simulator, and on the job. From the accumulated evidence available (both positive and negative) including that in the Special Master's report, I believe that the evaluation of the OARP enrollees' knowledge and performance as part of the retraining program was valid. Stringent procedures to protect against cheating have been adopted and are being applied currently by GPU Nuclear.

Hence in answer to the question, "Would I have changed my favorable evaluation of the OARP if I had had the knowledge that is currently available about the cheating incidents?" I would respond that from the records available to me, my opinion would be unchanged.

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> "One or more of the instructors evaluated by the OARP were involved in the cheating episode. Would that alter the Committee's generally favorable perceptions of the instructors?"
>
> p. 68, ALAB Decision, May 24, 1984

Dr. Gardner reviewed Table 6.3 of the 1980 OARP Review Report and with assistance from GPU Nuclear, identified three instructors who were involved in some way in the cheating episode. Two, who gave a total of only three OARP lectures, are no longer employed by GPU Nuclear. The third, Mr. Husted, who gave six lectures, was the only one of the three instructors whose class was observed by Dr. Gardner. (It should be noted that Mr. Husted was associated with the cheating incident by the NRC investigators, although not convicted of participating in cheating himself.) Dr. Gardner, upon visiting his class in

1980 during the OARP evaluation and conferring with him and with his students independently afterwards, came to the conclusion that he was a superior instructor. His behavior at the time was highly cooperative; he was interested in his students and concerned that important learning took place. The students in turn felt that he was able to instruct them in a way that facilitated their learning.

The major complaint after the cheating incident was his lack of cooperation with the NRC investigators and the Special Master during their investigations of it. If a record had been available of his failure to cooperate in any investigation by the NRC, especially with respect to cheating, Dr. Gardner would have considered this an important factor in evaluating him. His skills and performance as a teacher in the classroom would still have been evaluated favorably, but consideration of his attitude towards proper authorities would definitely have lowered his overall value as an instructor. However, there was no evidence at the time of the OARP Report that would have suggested any lack of cooperation. (It is noted that Mr. Husted has been removed from all responsibilities associated with licensed and non-licensed operator training as directed by the ALAB.)

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"Mr. Kelly testified about the pride and enthusiasm found among employees in the training program as well as the professionalism of the instructors...Dr. Christensen observed similar attitudes...Subsequent post-cheating testimony, however, reflected a lack of these qualities. Kelly and Christensen should have been asked how the latter might bear on their previous assessment of the effectiveness of the training program."

P. 66 ALAB Decision, May 24, 1984

Because of the limited time available, there was little opportunity to visit with operators or to monitor classes being taught as some Committee members were able to do in 1980. Hence, the primary bases the Committee members have for re-assessing the effectiveness of the training program is the material provided to the Committee by GPU Nuclear (See Table A-2 in the Appendix), its discussions with management personnel, mostly from the Training and Education Department, and the performance of operators on NRC administered and NRC-sanctioned, GPU Nuclear administered examinations. The performance of the operators and trainees on these examinations is documented throughout this report. The development of the Training and Education Department, since the 1980 OARP Department, as reflected by the training facilities, the large number of well-qualified training personnel, the comprehensive procedures now in effect, and especially the commitment of resources by GPU Nuclear management give further evidence of the high quality of the training program today.

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> "There is no real dispute that the administration of the April 1981 NRC examination and earlier licensee tests were lax. --- In fact, the Commission has issued a Notice of Violation imposing a $40,000 civil penalty for licensee's failure to implement its Operator Accelerated Retraining Program properly. --- What is relevant here however, is whether there can be confidence that future training and testing procedures will not be compromised."
>
> Footnote 15, P. 22, ALAB Decision,
> May 24, 1984

Although the Notice of Violation cites the licensee's failure to implement its Operator Accelerated Retraining Program properly, the specific dates cited on which cheating is alleged to have occurred (November 2 and 26, 1980, December 19, 1980 and March 27, 1981 and the mock exam on April 2-3, 1981)

are, in fact, after the OARP was completed and after the OARP Review Committee issued its report. In view of the fact that this fine has not as yet been fully resolved between GPU Nuclear and the NRC, it is not appropriate for the Committee to comment further on this matter. However the Committee is confident on the basis of the information presented in this report that future training and test procedures will not be compromised.

## D. MANAGEMENT AND COMMUNICATIONS

"Top Management needs to keep aware of the real and perceived problems of its employees. Id. at 149. The committee suggested that there was a lack of communication between top management and the operating crews.[55] Do the post-cheating changes in the training program adequately ameliorate this situation?[56]

[55]The Special Master similarly concluded with regard to the poor administration of licensee's examinations, that if licensee was not aware of these conditions, its management was out of touch with the training program."

p. 71, ALAB Decision, May 24, 1984

Note: Footnote 56 cited above is addressed in Section B of Chapter II.

In order to evaluate the issue of communication between top management and the training program, the Committee interviewed a broad spectrum of persons (listed in Table A-1 in the Appendix of this report).

From the discussions with these individuals, the Committee found extensive evidence of communications between top management and the training program.

Examples of procedures currently in use at GPU Nuclear TMI-1 include:

1. Vice President/Director of TMI-1, H. D. Hukill, conducts formal interviews normally one hour or more in duration annually with each license holder. Also, he personally interviews each license candidate as a part of the certification process prior to examination.

2. License examination certification and requalification certification processes have been formalized into an administrative procedure

detailing requirements for certification. Written certification by the Operations and Training management, including an evaluation of each trainee's performance and attitude while in training is required.

3. During each week of requalification training, a one-hour "Management Interface" meeting is held for operations, maintenance and technician training crews. One of the following three people attend each of these meetings: Vice President Hukill, Operations and Maintenance Director R. J. Toole, or Plant Engineering Director J.J. Colitz (three of the four individuals designated as Emergency Directors). A second manager typically from a support organization, (e.g. Training, QA, Rad Con, etc.), also attends. Between them, they address the status of situations in their respective areas and respond to questions from the trainees in give-and-take discussions.

4. Vice President of TMI-1 Hukill has committed and is almost without exception (in response to the Rickover audit) attending four hours of training classes per month.

5. Bi-weekly reports of activities including training are submitted up the management chain to the respective Vice-Presidents who in turn submit a report to the Office of the President, indicating those items which might be of interest to the Board of Directors. Included in these items are reports of off-shift tours by management.

6. Vice President of TMI-1 Hukill holds periodic meetings with operators as a group several times a year. Vice President of Nuclear Assurance Robert Long holds employee meetings at each site every six months.

7. Management and Supervisory Development training programs include seminars with panels of Vice-Presidents to discuss management/supervisory type problems.

Other examples of steps taken to keep management in touch with crews are relevant, viz.:

1. Off-shift tours by management. Each week three managers are assigned to conduct a tour on the 3-11 and 11-7 shifts and on the weekend. They are charged with pointing out problems that they observe and discussing their functional areas to determine whether or not crews are having problems in those areas.

2. Senior managers from Nuclear Assurance, Operations and Training attend simulator training sessions at Lynchburg to evaluate training being conducted by B&W. Also during requalification training at the simulator one of the four emergency directors administers an operational evaluation of each crew.

3. Most training programs, schedules, and content, including learning objectives are approved by the appropriate line function (i.e., operations, maintenance, radcon, chemistry) prior to the conduct of training. Meetings, ranging from bi-weekly to monthly are held between training and the line functions to discuss training problems and to approve these training programs.

4. During requalification training, at the end of each week the shift foreman or supervisor from the crew that is just completing training

meets with the Supervisor, Licensed Operator Training; the Supervisor, Non-licensed Operator Training; the Operator Training Manager, and either the shift foreman or the supervisor from the crew entering training the next week. The purpose of the meeting is to discuss the week's training and what needs to be improved or emphasized for the following week.

5. Manager of Plant Training TMI, S. Newton, attends Vice President TMI-1 Hukill's managers' meetings to stay abreast of on-going events and to discuss training problems.

If a training need is identified in any of the above steps, it is brought to the attention of the Training Department.

The Committee also reviewed internal letters and memoranda that strengthen its belief in the basic integrity of management and strong communication channels that exist within the utility. For example, we note a memorandum dated December 8, 1983, from Mr. P. R. Clark, President GPU Nuclear, to Samuel L. Newton (a copy of which was sent to all employees) from which the following excerpts were taken:

> "GPU Nuclear Corporation must continue to be fully committed to meeting all of our responsibilities. Primary among those is conducting all of our activities so as to protect the health and safety of the public and of our employees. Under our license, and our agreement with the owners of GPU's nuclear plants, GPU Nuclear Corporation and the Metropolitan Edison and Jersey Central employees assigned to our nuclear sites have that very sobering responsibility. Each of us must fully accept and devote himself or herself to meeting that responsibility. It comes directly from the fact that we have chosen to engage in nuclear power generation with its inherent potential for serious consequences to public health and safety. Our job is to assure that risk is kept acceptably low."
>
> "The owners and our Board of Directors have made clear the overiding importance they place on fulfilling that responsibility. Our Mission states:"

"'Manage and direct the nuclear activities of the GPU System to provide the required high level of protection for the health and safety of the public and the employees.

Consistent with the above, generate electricity from the GPU nuclear stations in a reliable and efficient manner in conformance with all applicable laws, regulations, licenses and other requirements and the directions and interests of the owners.'"

"Many things are involved in carrying out this Mission. However, I want to draw your attention today to three which are vital. They have all been the subject of prior guidance but they deserve reemphasis."

"The first is that we must set our own standards--demanding ones in keeping with the responsibility we bear. They must encompass and exceed the regulatory requirements. We must actively seek excellence."

"The second is the need to have full and open communications--both within the company and between us and our regulators. In particular, problems, concerns, and uncertainties need to be identified and addressed openly. I stand ready to discuss with any of you any safety concern you believe is not being adequately addressed."

"The third is rigorous and faithful adherence to all of our requirements and standards as a minimum."

"Our success depends on everyone faithfully fulfilling their responsibilities. In accepting election to the position of president, GPU Nuclear Corporation, I have committed myself to the Board of Directors to do so. I ask each of you to do likewise."

"The members of the GPU and GPU Nuclear Board of Dir :tors have promised their full support. Mr. Kintner, Executive Vice President, joins me in pledging to you our very best efforts."

This communication restated top management's commitment to integrity which had been stated earlier in a letter to employees dated October 9, 1981 from Mr. R. C. Arnold, former Chief Operating Executive who wrote, (the underlining was used by Mr. Arnold for emphasis)

"Again, the interest of the Company, its employees, and the public are best served by an open and cooperative attitude and honesty in our interactions with the governmental agencies responsible for regulating our various activities. We expect your active support in fulfilling these aspects of our public and corporate responsibilities."

Evidence of communications between management and GPU Nuclear employees is also readily available. Beginning in the spring of 1983, Dr. Robert L. Long, Vice President/Director of the Nuclear Assurance Division, has held Nuclear Assurance Division employee meetings at about six month intervals. Separate meetings are held at each of the three locations, Parsippany Headquarters, TMI, and Oyster Creek. The format of these meetings includes one hour devoted to four 15 minute presentations by Division employees on their current activities, and one hour to a give-and-take discussion among employees, the Nuclear Assurance Division Vice President, and a Division Vice President from another Division. These discussions are used to emphasize the importance of compliance with corporate procedures and government regulations, doing the job right, and being problem solvers - not problem creators. The employee meetings have provided an effective way to encourage esprit de corps and develop a commitment to excellence and to quality performance.

GPU Nuclear has taken positive steps to insure that each trainee taking written examinations understands completely the conduct expected of him as evidenced by GPU Nuclear Training and Education Department Procedure "Control of Examinations". This Procedure also provides guidance to examiners concerning proper conduct of the examination as discussed in Section A of this chapter.

Other evidence of the solid and laudatory accomplishments and actions supported by excellent management practices and clear communications (both internal and external) are included in the following recent publications:

1. "How GPU Has Responded to TMI-2", Jan.-Feb., 1984 issue of GPU Nuclear Today
2. "Looking Beyond the Lessons: A Utility Manager's Perspective", Philip R. Clark, Pres. & CEO, GPUN, Nuclear News, April, 1984.

3. "Nuclear Personnel Training after TMI-2: The GPUN Response", R. L. Long, R. P. Coe, D. P. Gaines, and R. A. Knief, Progr. Nuclear Energy, 10, 349 (1982). Revision proposed by GPUN May, 1983.
4. "Behavioral Training Objectives for Plant Simulation at TMI", R. A. Knief, C. A. Irizarry and D. J. Boltz, Trans. American Nuclear Society., 139, 283 (1981).
5. "Training Requirements at TMI: Harbinger for the Nuclear Industry?", R. A. Knief, R. L. Long, S. L. Newton, Vol. 45, 1983 Winter Mtg. Trans. American Nuclear Society, 45, 195 (1983).

After examination of the evidence, the Committee has confidence in GPU Nuclear management's current awareness of the real and perceived problems of its employees. It has in place working and demonstrating effective communication practices between top management and the operating crews. In further response to the ALAB's questions, the Committee believes that the post-cheating changes in the GPU Nuclear training program adequately ameliorate the situation of concern. Indeed, the Committee believes that GPU Nuclear has one of the strongest procedures extant and operating in any utility in the United States today to "ameliorate" the concerns expressed by ALAB.

## Chapter V CONCLUSIONS

The Reconstituted OARP Review Committee has reached the following conclusions in its "quick response" study of the issues raised by the ALAB in its May 24, 1984 decision regarding the TMI-1 restart hearings:

1. The Committee is pleased at the response of GPU Nuclear Training and Education Department to the recommendations contained in the 1980 OARP Review Report. It feels that progress has been outstanding and that the GPU Nuclear Training and Education Department now ranks among the top utility training programs in the United States.

2. The commitment of resources and dedication of the training personnel is indicative of the interest and commitment of top management in the development of the training program. The confidence in the GPU Nuclear management expressed by the Committee in 1980 has been justified.

3. The management of the training program is well qualified and the specific management hierarchy is appropriate. The diversity of background and the extensive practical operational experience of the training personnel are commendable.

4. The instructor development program is appropriate and should prove to be effective.

5. The examination development, control, and security procedures are more extensive than any that the Committee has seen in industry or academia.

6. The commitment to the use of task analysis as a basis for the establishment of learning objectives in the development of course and examination content is an example of the extra effort being committed to relate training to on the job performance and to increase the safety of plant operations.

7. The management of the training program recognizes its responsibility associated with the cheating incident. They have taken specific steps to correct this situation and are dedicated to assuring that it never happens again.

8. The redesign of the Control Room shows that GPU Nuclear management is determined to provide a well-human engineered control room to complement the training program.

9. The development and procurement of the Basic Principles Trainer Simulator and the securing of a replica simulator are further evidence of GPU Nuclear management's commitment to excellence in the training program.

10. The "bottom line" as far as the Committee is concerned is that the GPU Nuclear training program produces qualified operators and is adequate to support the restart of TMI-1.

# APPENDIX

## TABLE A-1

### Individuals Contacted by Committee Members

| | |
|---|---|
| D. J. Boltz | Supervisor, Simulator Instruction - TMI |
| T. G. Broughton | Director, Systems Engineering |
| R. P. Coe | Director, Training and Education |
| E. R. Frederick | Supervisor, Licensed Operator Training - TMI |
| W. L. Gifford | Vice President Communications |
| R. T. Glaviano | Plant Analysis, Manager - TMI |
| H. D. Hukill | Vice Pres. & Director TMI-1 |
| C. A. Irizarry | Simulator Development, Manager - TMI |
| R. A. Knief | Manager - Educational Development |
| B. P. Leonard | Operator Training Manager - TMI |
| R. L. Long | Vice President Nuclear Assurance |
| N. J. Monson | Control Room Operator - TMI |
| S. L. Newton | Manager, Plant Training TMI |
| K. V. Reist | Secretary - TMI Training |
| T. B. Roquemore | Educational Development Coordinator |
| O. J. Shalikashvili | Deputy Manager - Plant Training - TMI |
| R. W. Zechman | Technician Training, Manager - TMI |

TABLE A-2

DOCUMENTS

The documents listed below have been provided by GPU Nuclear to the Committee for their review:

1. INPO Evaluation Three Mile Island Nuclear Power Station - Unit One GPU Nuclear Corporation, May 1983.

2. NRC Inspection Report No. 50-289/83-10 of May 1983

3. GPU Nuclear QA Audit S-TMI-84-05 findings 1 and 2 of 4 dated 4/4/84.

4. 6210-ADM-2610.02 Rev. 1, "Operator Training Instructor Indoctrination/Qualification Training Program dated 4/26/83.

5. Restart Exam Results Administered by the NRC April and October 1981. February Reexam Results 1982.

6. List of Licensed Operators, May 1984.

7. Requalification Cycle 9 Program Statistics (Program, attendance, exam results summary) May 1984.

8. Cycle 10 Requalification Program Statistics (Program, exam results summary) May 1984.

9. Cycle 84 Licensed Requal Lesson Topics (Program, exam results summary) May 1984.

10. ATOG Training Summary, May 1984.

11. Abnormal Transient Operator Guidelines Control Room Walk-Through Program, May 1984.

12. GPU Nuclear letter 3210-84-0209 dated May 10, 1984 H. D. Hukill to R. W. Starastechi (NRC), Operational Readiness Evaluation (Inspection No. 50-289/84-05).

13. ASLB PID (Procedural Background and Management Issues) August 27, 1981.

14. ASLB PID (Reopened Proceeding) July 27, 1982.

15. Report of the TMI-1 Operator Accelerated Retraining Program Review Committee, July 1, 1980.

16. ASLB - Report of the Special Master, April 28, 1982.

17. NRC - Systematic Assessment of Licensee Performance, April 24, 1984.

18. R. A. Knief memorandum of May 24, 1984 INPO Self-Evaluation Reports

19. D. A. Ross memorandum of January 23, 1984, DDL Report Summary

20. An Assessment of the GPU Nuclear Corporation Organization and Senior Management and Its Competence to Operate TMI-1, by Admiral H. G. Rickover, USN, November 19, 1983.

21. Follow-Up Report of An Assessment of the GPU Nuclear Corporation Organization and Service Management and Its Competence to Operate TMI-1 by Admiral H. G. Rickover, USN, April 19, 1984.

22. Nuclear Personnel Training after TMI-2: The GPUN Response, by R. L. Long, R. P. Coe, D. P. Gaines, and R. A. Knief, May 1983.

23. Statement of William G. Kuhns, Chairman and Chief Executive Officer of General Public Utilities Corporation before the Subcommittee on Energy Research and Production, Committee on Science and Technology, U.S. House of Representatives, Tuesday, May 22, 1984.

24. Licensee's Comments on ALAB-772 (Management Phase), June 1984.

25. ALAB Decision, May 24, 1984

26. INPO Letter to R. P. Coe, Re: GPUN TSD Review October 5, 1983.

27. "Control of Examinations for Units 1 and 2", October 23, 1982.

28. Memorandum from B. P. Leonard, Operator Training Manager to Operator Training Section, January 27, 1984.

29. "Operator Training Instructor Indoctrination/Qualification Training Program", Rev. 1, April 26, 1983.

30. "GPUN Instructor Development Program" Draft May 15, 1984.

31. "TMI Training Department Instructor Evaluation Procedure", Rev. 1, August 9, 1983.

32. Letter from H. D. Hukill to R. C. DeYoung, March 30, 1984.

33. How GPU Has Responded to TMI-2", Jan.-Feb., 1984 Issue of GPU Nuclear Today.

34. "Looking Beyond the Lessons: A Utility Manager's Perspective", Philip R. Clark, Pres. & CEO, GPUN, Nuclear News, April, 1984.

35. "Behavioral Training Objectives for Plant Simulation at TMI", R. A. Knief, C. A. Irizarry and D. J. Boltz, Trans. American Nuclear Society, 139, 283 (1981).

36. "Training Requirements at TMI: Harbinger for the Nuclear Industry?", R. A. Knief, R. L. Long, S. L. Newton, Vol. 45, 1983 Winter Mtg. Trans. American Nuclear Society, 45, 195 (1983).

37. GPU Nuclear Training and Education Department Procedure "Control of Examinations," October 1982.