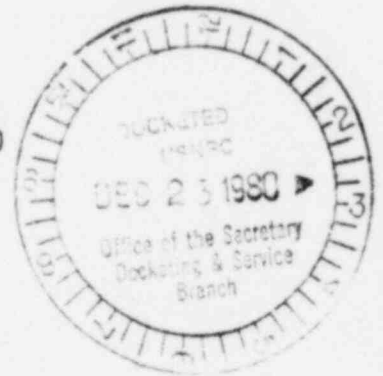


LIC 12/22/80



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

LICENSEE'S TESTIMONY OF
 HENRY D. HUKILL, RONALD J. TOOLE,
 MICHAEL J. ROSS, AND JOSEPH J. COLITZ
 REGARDING CLI-80-5, ISSUES (2) AND (5),
 ANGRY CONTENTION NO. IV, AND
 SHOLLY CONTENTION NO. 14(a), (b), AND (e)
 (TMI-1 UNIT ORGANIZATION
 AND TECHNICAL RESOURCES)

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OUTLINE

The purposes and objectives of this testimony are to respond to Issues (2) and (5) of Commission Order CLI-80-5, ANGRY Contention IV, and Sholly Contention 14(a), (b), and (e) insofar as they challenge the sufficiency of management commitment and technical resources devoted to the daily operation and maintenance of TMI-1. The testimony shows that the TMI-1 unit organization has been significantly modified since the accident at TMI-2. The TMI-1 unit organization is now separate from TMI-2. Emphasis has been placed upon availability of full-time technical and management staff to operate, maintain and manage TMI-1 activities under normal and abnormal operating conditions. The TMI-1 staff has been markedly increased in number, as well as depth of technical expertise. New personnel with extensive nuclear reactor experience have been brought into the unit organization. Concomitantly, Licensee has reduced the scope of responsibility previously assigned to TMI-1 management and plant staff. As a result, station staff and supervisory personnel are able to focus fully on the facility's operation and maintenance; TMI-2 cleanup and other Licensee activities do not detract from this focus.

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BY WITNESSES HUKILL, TOOLE, ROSS AND COLITZ

This testimony, by Henry D. Hukill, Vice-President of TMI-1, Ronald J. Toole, Manager of TMI-1, Michael J. Ross, Supervisor of Operations, TMI-1, and Joseph J. Colitz, Manager of Plant Engineering, TMI-1, is addressed to the following questions and contentions:

CLI-80-5, ISSUE (2)

Whether the operations and technical staff of Unit 1 is qualified to operate Unit 1 safely (the adequacy of the facility's maintenance program should be among the matters considered by the Board).

CLI-80-5, ISSUE (5)

Whether the Unit 1 Radiation Waste System is appropriately staffed with qualified individuals to ensure the safe operation of the facility.

ANGRY CONTENTION NO. IV

The Licensee lacks the management capability to operate a Nuclear Generating Station without endangering the public health and safety.

SHOLLY CONTENTION NO. 14(a) (b) AND (e)

The Licensee's management capability, in terms of organizational, staffing, and technical capabilities, is not sufficient. Specifically, the following deficiencies in Licensee's management capability are contended:

- (a) Licensee's administrative structure, both at the plant and corporate levels, is not appropriately organized so as to assure safe operation of TMI-1 while conducting cleanup operations at TMI-2.
- (b) Licensee's operations and technical staffs are not sufficiently qualified to safely operate TMI-1.
- . . .
- (e) Licensee's maintenance program is insufficiently staffed and inappropriately organized for the purpose of safely operating TMI-1.

BY WITNESSES HUKILL AND TOOLE

The TMI-1 unit organization includes a full-time staff of approximately 322. Since the TMI-2 accident, Licensee has devoted substantial time and effort to its reorganization and strengthening of Unit 1 staff, including: isolating the management and technical support of TMI-1 from TMI-2 activities; significantly reducing the responsibilities of lead TMI-1 management in order to allow these individuals to devote their full attention to Unit 1's safe and efficient operation and maintenance; and restructuring the TMI-1 organization so that effective control over important unit activities and decisions is maintained by TMI-1 management. The TMI-1 organization is described in detail in Section 5 of the TMI-1 Restart Report.

The job of reorganizing and strengthening the Unit 1 staff has involved a number of separate efforts. New

personnel, particularly in the top levels of management both at TMI-1 and in the support divisions, have been recruited by Licensee from outside of the GPU organizations. In addition, personnel previously assigned to other GPU activities have been brought to TMI-1 and permanently assigned to the unit. Licensee has also restructured the TMI-1 organization, with emphasis upon on-site technical support and management control. At the same time, direct channels of communication have been developed between on-site technical and management personnel and off-site support organizations, such as Radiological and Environmental Controls, Technical Functions and Nuclear Assurance. In this manner, the unit staff can rapidly and effectively make use of the extensive technical support staff available to it from other elements of the GPU Nuclear Corporation.

With respect to personnel qualifications and training, whenever applicable, Licensee's TMI-1 employees meet the qualifications and requirements set forth in NRC's Regulatory Guide 1.8 (May 1977), entitled, "Personnel Selection and Training," and ANSI/ANS 3.1 (1978), "The American National Standard for Selection and Training of Nuclear Power Plant Personnel." At the same time, in its pursuit of top notch staff for the unit, and in anticipation of forthcoming changes in these industry criteria, Licensee has sought personnel with credentials significantly in excess of these requirements.

Licensee has also reconstituted and expanded its TMI-1 training program. The training program is described in the testimony of Dr. Robert R. Long et al.

BY WITNESS HUKILL

The Vice-President of TMI-1 is the senior member of management within the TMI-1 unit organization. The Vice-President of TMI-1 is located full-time on site. He reports to the Office of the President of GPU Nuclear Corporation, located in Parsippany, New Jersey. The primary job of the Vice-President of TMI-1 is to ensure that in all respects the facility is being operated and maintained safely, in accordance with the plant's Technical Specifications, as well as other applicable criteria. The Vice-President of TMI-1 has been delegated absolutely minimum responsibilities not directly associated with the operation and maintenance of Unit 1 so that he may devote his full time and attention to management of TMI-1 operations. His responsibilities include assuring the adequacy of his staff's procedures and practices, and of performance and training of all unit personnel. On a daily basis, the Vice-President of TMI-1 oversees the plant's operation, and evaluates, institutes, and modifies policies affecting activities at Unit 1. In addition, he implements those policies and procedures of GPU Nuclear Corporation applicable to TMI-1.

The Vice-President of TMI-1 is the senior TMI-1 liason with the engineering, design and analysis, nuclear assurance (which includes training and emergency preparedness), maintenance and construction, radiological and environmental controls and administrative services available to the facility from the GPU Nuclear Corporation. In this capacity, it is the responsibility of the Vice-President of TMI-1 to ensure coordination of the services provided by the other GPU Nuclear Corporation divisions whenever such services are in the interest of the health and safety of either the public or personnel at TMI, or to improve plant reliability and efficiency.

The Vice-President of TMI-1 has the authority to shut and cool down TMI-1 whenever it is appropriate to do so, whether in the interest of health and safety, or because in his judgment such action is otherwise warranted. In connection with his responsibility for ensuring that the unit organization functions effectively during an emergency, the Vice-President of TMI-1 coordinates with the Vice President-Nuclear Assurance in scheduling, instituting and evaluating the unit's response to emergency drills and training.

The Vice-President of TMI-1 is Henry D. Hukill. Mr. Hukill joined GPU as the Prospective Director, TMI-1 in June 1980, and formally began serving as Director on September 8, 1980. Mr. Hukill received a Bachelor of Science degree from

the U.S. Naval Academy in 1953, and served on active duty in the U.S. Navy for more than 22 years. His naval assignments primarily involved the construction, maintenance and operation of nuclear submarines, including completion of one year of naval nuclear power training resulting in qualification as a Chief Operator of the S-3-G landbased prototype reactor plant; tours as Division Officer for the Reactor Control, Mechanical, and Electrical divisions aboard a nuclear submarine; a tour as Chief Engineer; and five years in command of a nuclear submarine which encompassed a reactor refueling and major overhaul. During his last four years on active duty Mr. Hukill was assigned as a Special Assistant and Senior Line Officer on the Staff, Director, Division of Naval Reactors, Department of Energy. In this capacity he was directly responsible for the selection and engineering training of all nuclear ship Commanding Officers. He was also directly involved in the establishment and enforcement of standards and procedures for the safe and proper operation of all naval nuclear propulsion plants. During his four years with the Director, Division of Naval Reactors, Mr. Hukill gained extensive insight into the procedures, methods and requirements developed by the Director for insuring the safe and reliable design, operation, and maintenance of the Navy's nuclear propulsion plants. Based on firsthand observation and participation, Mr. Hukill is implementing at TMI-1 a very vigorous and disciplined approach to

nuclear power plant operation, including strong and direct leadership from the top for all matters related to the design, engineering, maintenance and operation of nuclear power plants. In Mr. Hukill's judgment, such leadership is absolutely essential if one is to achieve the high standards of performance required. The insight and experience Mr. Hukill acquired while working for the Director, Division of Naval Reactors, will be invaluable in carrying out his present responsibility for restarting and operating TMI-1 in a safe, reliable and professional manner. Mr. Hukill has also gained valuable experience from his tenures as the Project Operations Manager, Clinch River Breeder Reactor Plant Project for Burns and Roe, Inc. (January, 1976 to February, 1977) and as a Senior Civilian Special Assistant to the Commander, Naval Sea Systems Command (February, 1977 to May, 1980). In the latter capacity, Mr. Hukill was responsible for all matters related to the selection, education, qualification, training and professional performance of the Navy's more than 1200 Engineering Duty Officers.

Reporting directly to the Vice-President of TMI-1 are the following Managers, who have primary responsibility for Unit 1's daily operational, maintenance, engineering and in-house administrative activities: (1) R. J. Toole, Manager, TMI-1; (2) J. J. Colitz, Manager, Plant Engineering; and (3) P. G. Christman, Manager, Administration.

BY WITNESSES HUKILL AND TOOLE

The Manager of TMI-1 is responsible for the day-to-day operation and maintenance of the facility. The Manager directs the activities associated with on-going operation of TMI-1. Essentially, it is the Manager's job to see to it that any and all operational problems which arise while the plant is operating or during an outage are properly diagnosed, so that appropriate action can be taken. It is also the responsibility of the TMI-1 Manager to effectively coordinate the activities of the Operations and Maintenance Departments and, in particular, to ensure that Maintenance personnel are responsive to the needs of Operations. The TMI-1 Manager has the authority to order the unit shut and cooled down whenever it is in the interest of the public health and safety to do so, or whenever in his judgment such action is otherwise warranted.

While the Manager relies first upon the staff of approximately 260 under his supervision to operate and maintain the unit, he also utilizes, as appropriate, the technical resources from other Unit 1 and GPU Nuclear organizations. For example, the Unit 1 Manager may ask the Manager of Plant Engineering to evaluate equipment performance and when required recommend appropriate preventive or corrective maintenance actions. If an unresolved issue arises between Managers within

Unit 1, the matter is referred for resolution to the Vice-President of TMI-1. In the event that it becomes evident that the problem requires a good deal of technical analysis, or involves an extended number of manhours of maintenance work, the Manager of Unit 1 can request the assistance of the Technical Functions and/or Maintenance and Construction branches of the GPU Nuclear Corporation.

As a result of the organizational changes instituted by Licensee since the TMI-2 accident on March 28, 1979, the responsibilities of the Manager of TMI-1 have significantly decreased in scope. The Manager is no longer responsible for the unit's engineering, radiation protection, water chemistry, and administrative activities. Instead, the Manager can focus his attention on plant operations, and on the facility's preventive and corrective maintenance programs.

The current Manager of TMI-1, Mr. Ronald J. Toole, assumed his responsibilities as Manager in February of this year. Mr. Toole has diversified power plant experience, having worked in both nuclear and coal facilities. Moreover, Mr. Toole has previously served in management and engineering staff positions.

Immediately prior to joining TMI-1, Mr. Toole was the Unit Superintendent in charge of two 650 MWe coal fire plants located at Pennsylvania Electric Company's Homer City Station. In this capacity, he was responsible for all engineering,

maintenance and operational activities at the facility. Before going to Homer City Station, Mr. Toole was employed at TMI Unit 2 for over four years (September, 1974 until December, 1978) as the Test Superintendent responsible for construction, pre-operational and power escalation testing. From January, 1971 until September, 1974, Mr. Toole was the Assistant Test Superintendent for GPU at TMI Unit 1. As the Assistant Test Superintendent, he developed the schedule that was used in the testing and start-up program, beginning with energizing the auxiliary transformers through the initiation of commercial operation. During this period of time, Mr. Toole also worked for six weeks at the GPU Oyster Creek nuclear facility as the Refueling Supervisor, directing the operations and maintenance personnel in the performance of the first Oyster Creek refueling. In addition, Mr. Toole served as the Shift Test Director during the TMI-1 low power physics and power escalation programs. From February, 1968 until December, 1970, Mr. Toole worked for GPU as a shift test engineer at the Oyster Creek nuclear facility. During this period of time, he obtained a reactor operator's license (1969), and a senior reactor operator's license (1970). Mr. Toole began his career in 1966 working as a construction engineer for Pacific Gas and Electric Company, after receiving a Bachelor of Science degree in electrical engineering from the Newark College of Engineering. As a construction engineer, Mr. Toole supervised

the installation of the electrical switchgear and power train system in the Moss Landing Generating Station.

BY WITNESSES HUKILL, TOOLE AND ROSS

Reporting to the Manager of TMI-1 is the Supervisor of Operations. The responsibilities of the Supervisor of Operations encompass all aspects of facility operation, including maintaining TMI-1 in compliance with its operating license. On a daily basis, the Supervisor of Operations reviews and schedules all routine and nonroutine operations; is in charge of requesting operations-related maintenance work from the Maintenance Department; reviews and writes operating procedures; and is available to consult with his staff of approximately one hundred with respect to plant operations.

The Supervisor of Operations has no responsibilities that do not directly affect the daily operation of TMI-1. In the event of a reactor-related emergency, the Supervisor of Operations is in charge of all control room activities; however, he is not responsible for any other on or off-site activities, such as radiation control or monitoring. The Supervisor of Operations has the authority to order the unit shut and cooled down whenever it is in the interest of the public health and safety to do so, or whenever in his judgment such action is otherwise warranted.

The current Supervisor of Operations is Michael J. Ross, who has served in this capacity since April of 1978. Prior to becoming Supervisor of Operations, Mr. Ross worked as a TMI-1 shift supervisor (July, 1972 to April, 1978). He was also a Unit 1 shift foreman for two years, beginning in August of 1970. Mr. Ross also was employed as a member of the Operations staff and an operator instructor at the Saxton Nuclear Experimental Corporation. From 1960 when he graduated from high school until 1968, Mr. Ross served in the Navy, during which time he attended the U.S. Navy Nuclear Power school (26 weeks in 1961) and the Nuclear Power Prototype School (26 weeks in 1961); served as a reactor operator aboard the USS HADDO for three years (1962-1965); taught reactor controls and instrumentation at a Navy's Nuclear Power Training Unit (NPTU) from 1965 to 1966, qualifying at that time as an Engineering Officer; and served as an AEC Field Representative at the NPTU from 1966 to 1968, during which time he passed the Navy's nuclear engineering examination. Mr. Ross holds a senior reactor operator license on TMI-1.

The Operations staff, under the direction of the Unit 1 Supervisor of Operations, is divided into three categories: the shift operating staff, the radwaste group, and several operations engineers. In addition, working in conjunction with the control room operating personnel are the Shift Technical Advisors (STAs) who represent Technical Functions and provide on the spot and around the clock technical advice and guidance to the plant operating staff.

The shift operating staff of Unit 1 is directly responsible for placing and maintaining the plant in a safe condition on a 24-hour basis. Operating personnel control the reactor primary and secondary systems as well as associated plant systems and equipment during normal operations and plant shut downs; in response to reactor transients; and when emergencies unrelated to the operation of the facility are experienced on site, such as fires and personnel injuries.

The shift operating staff is on a six shift rotation (one of every six weeks being totally devoted to training). The shift will be composed of six shift supervisors, six shift foremen, 18 control room operators, (at least 12 of which shall be licensed), and 36 auxiliary operators. When the reactor coolant water temperature is greater than 200°F, Licensee normally has on shift one shift supervisor who is SRO licensed, a second SRO-licensed operator who is the shift foreman, one shift technical advisor, three control room operators, at least two of which are licensed, and six auxiliary operators. About six CRO positions and six AO positions have been established as training positions to fill vacancies due to attrition. These individuals may be in the classroom receiving formal instruction or on shift receiving actual on-the-job training depending on their status in the formal training and qualification program. Shift turnover procedures have been adopted and shift recordkeeping required by Licensee to ensure that each shift is

kept fully informed of the current status of all systems important for reactor operation and safety. Prior to assuming his duties, the control room operator (CRO), for example, must review the Control Room Log and several other specified operating logs. The CRO acknowledges this review and his cognizance of current plant status by signing the Control Room Log prior to assuming the shift duty. While on shift, the CRO must maintain certain records, including the CRO Turnover Checklist and the ES Checklist, designed to summarize important, current plant conditions. He must also discuss with his oncoming relief plant status, operations in progress, and shift turnover checklists, prior to signing out. Similar shift turnover checklist procedures exist for other shift staff with responsibility for operation or maintenance of the primary or secondary plant systems, e.g., shift supervisors, shift foremen, auxiliary operators, senior radiation protection and chemistry personnel, shift maintenance foremen. Additionally, the shift supervisor at the beginning of each shift briefs his operating crew on the current plant status and scheduled events during the shift.

The shift supervisor directs activities in the control room, as necessary. This includes supervision of all plant operators and trainees. He is also in charge of other operational activities, such as requesting, approving and monitoring the progress of needed maintenance work. In

addition, it is the job of the shift supervisor to ensure that all safety-related activities are conducted in accordance with the appropriate procedures. The shift supervisor reports directly to the Supervisor of Operations. It is the responsibility of the shift supervisor to concern himself at all times with the safety of the unit. Administrative functions that detract from or are subordinate to this primary responsibility are delegated to other personnel. Prior to the TMI-2 accident, the shift supervisor split his time between the two TMI units. This is no longer true. The presence of a shift supervisor on duty at all times at TMI-1 significantly bolsters the shift operating staff by providing additional depth in available dedicated personnel.

The shift supervisor has the authority to shut and cool down the reactor if it is necessary to do so in the interest of health and safety or if, in his judgment, such action is otherwise warranted. He is also vested with the authority to change operations and maintenance work priorities, as needed. Finally, any activity on any plant system can be halted by the shift supervisor if in his judgment such action is required for the safe operation of the plant.

All six of the incumbent TMI-1 shift supervisors worked their way up the ladder of responsibility within TMI-1's shift operations department. As a result, they all have had significant "hands-on" experience, not only with a nuclear

power plant, but with the TMI-1 facility. In addition, all of the shift supervisors have received their senior reactor operator licensee.

Incumbent A served as a shift foreman at Unit 1 from October, 1976 to July, 1979, prior to becoming a shift supervisor. Incumbent A was also a control room operator at TMI-1 from October, 1969 to October, 1976. He obtained his reactor operator license in 1974, and his senior reactor operator license in 1976. Incumbent A served in the U.S. Army from 1958 to 1959. He graduated from high school in 1954.

Incumbent B also became a Unit 1 shift supervisor in July, 1979 after working as a shift foreman at Unit 1 for four years (July, 1975 to July, 1979), a control room operator at Unit 1 for two and a half years (December, 1972 to July, 1975), and an auxiliary operator at Unit 1 for over three years (October, 1969 to December, 1972). Incumbent B obtained his reactor operator license in 1974, and his senior reactor operator license in 1976. He is a high school graduate (1961).

Incumbent C has been a shift supervisor at Unit 1 since April, 1978. Prior to that time, Incumbent C was a TMI-1 shift foreman (August, 1976 to April, 1978), and a TMI-1 control room operator (October, 1968 to August, 1976). Incumbent C received his reactor operator license in 1974 and his senior reactor operator license in 1977. Upon graduation from high school in 1959, Incumbent C served in the U.S. Air Force for four years.

Before becoming a shift supervisor in May, 1976, Incumbent D worked as a Unit 1 shift foreman for two and a half years (October, 1973 to May, 1976), and as a Unit 1 auxiliary operator for one and a half years (February, 1972 to October, 1973). He received a reactor operator license in 1974, and a senior reactor operator license in 1975. Incumbent D was also a reactor operator aboard the USS BAINBRIDGE from 1969 to 1971, after attending the U.S. Navy's Basic Nuclear Power School for 26 weeks (1966 to 1967), and Naval Nuclear Power Prototype Training for 26 weeks (1967). Incumbent D graduated from high school in 1964.

Incumbent E has been a Unit 1 shift supervisor since October, 1977. He has also been a Unit 1 shift foreman (October, 1975 to October, 1977), a Unit 1 control room operator (July, 1973 to October, 1975), and a Unit 1 auxiliary operator (March, 1969 to July, 1970). Incumbent E obtained a reactor operator license in 1974, and a senior reactor operator license in 1976. He served in the U.S. Air Force from 1964 to 1969. Incumbent E is a high school graduate (1964).

Incumbent F became a shift supervisor at TMI-1 in May, 1980. Prior to this assignment, Incumbent F worked as a Unit 1 shift foreman for over two and a half years (September, 1977 to May, 1980), a Unit 1 control room operator for seven years (July, 1970 to June, 1977), and an auxiliary operator at Unit 1 for nine months (October, 1969 to July, 1970).

Incumbent F obtained his reactor operator license in 1974, and obtained his senior reactor operator license in 1977. He is a high school graduate (1957).

In contrast to the shift supervisor, the shift foreman's job is strictly limited to reactor operations. The shift foreman, who reports to the shift supervisor, oversees the activities of the control room operators and the auxiliary operators. The job of the shift foreman consists primarily of directing and assisting the operators, control room and auxiliary, whenever necessary; ensuring that all control room activities are executed in accordance with prescribed requirements, guidelines, and operating procedures; and ensuring that operators devote their full time and attention to their job which includes control panel monitoring, processing of radiation work permits (RWPs) and tagging applications, and operational log and recording functions.

The shift foreman has the authority to shut and cool down the reactor if it is necessary to do so in the interest of health and safety or if, in his judgment, such action is otherwise warranted.

Like the incumbent shift supervisors, the current shift foremen for Unit 1 have worked extensively in TMI-1 shift operations prior to assuming their present responsibilities. Each of these individuals has been both a control room operator and an auxiliary operator at Unit 1. This experience has not

only served to extend their nuclear power plant experience, but has made them familiar with the operating characteristics of TMI-1.

Incumbent A became a shift foreman in July, 1978. From June, 1975 to July, 1978, Incumbent A was a Unit 1 control room operator. From July, 1968 to June, 1975, he served as a Unit 1 auxiliary operator. Incumbent A obtained his reactor operator license in 1976, and his senior reactor operator license in 1978. Incumbent A served in the U.S. Air Force from 1963 to 1968. He is a high school graduate (1963).

Incumbent B, who was promoted to shift foreman in May, 1978, worked as a Unit 1 control room operator for three years (April, 1975 to May, 1978), and as a TMI-1 auxiliary operator for over four years (February, 1971 to April, 1975). In addition, Incumbent B was an Engine Room Supervisor aboard the submarine USS THEODORE ROOSEVELT from 1968 to 1971 and a mechanical operator aboard the submarine USS WHALE in 1968. He was trained at the U.S. Navy Nuclear Power School for twenty-six weeks (1964-1965), and Nuclear Power Prototype Training for twenty-six weeks (1965). Incumbent B began his service in the U.S. Navy in 1963, upon graduation from high school. Incumbent B received his reactor operator license in 1976; his senior reactor operator license in 1978.

Incumbent C has been a Unit 1 shift foreman since July, 1978. From October, 1976 to July, 1978, he was a TMI-1 control room operator. From February, 1974 to October, 1976,

he worked as a Unit 1 auxiliary operator. Incumbent C served in the U.S. Navy from 1968 to 1974, during which time he received significant nuclear experience. After attending the U.S. Navy Nuclear Power School in 1968, and Nuclear Power Prototype Training from 1968 to 1969, he worked as an electrical system operator aboard the submarine USS SEA DEVIL from 1969 to 1972, and as a sound and vibration analyst worker aboard the submarine USS BATES from 1972 to 1974. Incumbent C obtained a reactor operator license in 1977 and a senior reactor operator license in 1978. He graduated from high school in 1966.

Incumbent D became a Unit 1 shift foreman in August of 1979 after working as a TMI-1 control room operator for approximately two years (October, 1977 to August, 1979), and as an auxiliary operator for two years (September, 1975 to October, 1977). Incumbent D obtained his reactor operator license in 1978. He is a high school graduate (1967).

Incumbent E worked on the TMI-1 shift operations staff as an auxiliary operator for two years (May, 1976 to March, 1978) and as a control room operator for over one and a half years (April, 1978 to December, 1979) prior to becoming a shift foreman at the station. He received his reactor operator license in 1979, and his senior reactor operator license in 1980. Incumbent E served in the U.S. Navy from 1970 to 1976 and, in this capacity, received additional nuclear power plant

training and experience. He attended the U.S. Navy Nuclear Power School in 1971 and Nuclear Power Prototype Training in 1972, and submarine school in 1972. From 1972 to 1976, Incumbent E served aboard the submarines USS NATHANIEL GREEN and USS PARGO. Incumbent E graduated from high school in 1969.

Incumbent F became a Unit 1 shift foreman in March, 1978. Incumbent F's experience at TMI-1 includes four years as a control room operator (February, 1974 to February, 1978), and over three and a half years as an auxiliary operator (June, 1970 to February, 1974). Incumbent F served in the U.S. Navy for seven years, from 1963 to 1970. During that time, he attended the U.S. Navy Electronics School (1963-1964), the U.S. Navy Nuclear Power School (1965), and Nuclear Power Prototype Training (1965-1966). He worked as a reactor operator aboard the submarine USS GEORGE C. MARSHALL from October, 1968 to March, 1970. He received his reactor operator license in 1974 and his senior reactor operator license in 1978.

Incumbent G became a Unit 1 Shift Foreman in October 1980. Incumbent G's experience at TMI-1 includes over three years as a Control Room Operator (May 1977 to October 1980), and over three years as an Auxiliary Operator (February 1974 to May 1977). Incumbent G served in the U.S. Navy for six years from 1968 to 1974. During that time, he attended the U.S. Navy Nuclear Power School (1968 to 1969), the U.S. Navy Nuclear Power Prototype Training (1969). He served as a Mechanical Operator on the cruiser TRUXTON from 1970 to 1972 and was an

Engineer Room Supervisor on the same ship from 1972 to 1974. He received his reactor operator license in 1978. Incumbent G graduated from high school in 1964 and graduated from Pennsylvania State University in 1966 with an Associate Degree in Drafting & Design Technology.

At Unit 1 currently there are 22 control room operators. The control room operators report to the shift foreman. It is the job of the control room operator to operate and monitor the status of the reactor, the turbine, the generator, and all of the other equipment pertinent to TMI-1 operation. A control room operator's responsibilities extend solely and entirely to ensuring the safe operation of all equipment assigned to him. If the responsibility is delegated to him by the shift foreman, his responsibilities may include directing the activities of the auxiliary operators on duty, and ensuring that the auxiliary operators perform their assigned jobs in accordance with the appropriate procedures. The control room operator immediately reports to the shift foreman any and all unusual performance of the equipment he is monitoring. The control room operator has the authority to shut and cool down the reactor whenever, in his judgment, it is necessary to do so.

In order to fully qualify as a control room operator, an individual must have received a reactor operator license from the NRC. He must also have had two years of experience in

a power plant, at least one year of which must have been in a nuclear power plant. Licensee also evaluates the character and maturity of applicants for the position of control room operator in light of the significant responsibility imposed upon these individuals on a daily basis. A control room operator must have received a high school degree or its equivalent.

The 42 auxiliary operators, 6 per shift, operate and inspect equipment located throughout the nuclear power plant station as required to support day-to-day reactor operations. From his position outside of the control room, the auxiliary operator has a very close-up view of the plant's equipment, in contrast to the centralized perspective of the control room operating staff. The activities of the roving auxiliary operators are directed by the shift foreman or by a designated control room operator. This coordination enables the control room to maintain a "hands-on" view of the facility at the same time as information is available to them from the instrumentation located in the control room. The auxiliary operator's duties include notification of appropriate personnel if established radiological control limits are exceeded; assisting in the receipt, storage, loading, and unloading of fuel; and assisting Radwaste Operation's personnel in the shipment and disposal of irradiated materials and waste, as directed.

Licensee seeks to obtain auxiliary operators who exhibit mature judgment. Applicants are evaluated for this

capability when they interview for the position of auxiliary operator. In addition, prospective auxiliary operators are evaluated to determine whether they have the ability to progress to higher levels of responsibility and to train for and obtain an NRC reactor operator license.

In addition to managing the shift operating staff, the Supervisor of Operations is in charge of the TMI-1 Radwaste group.

The TMI-1 Radwaste organization, directed by the Supervisor of Radwaste, carries out the daily radioactive waste activities at the facility. It is the job of this group of individuals to collect, decontaminate, package, prepare to ship or otherwise properly dispose of materials, liquid and solid, which exceed a specified level of radioactive material. Pursuant to Company policy, NRC's regulations, applicable NRC Regulatory Guides, and other industry criteria, the Radwaste organization keeps the facility as clean as possible, with the goal of minimizing the radioactive exposure of on-site personnel.

The Radwaste organization has changed significantly since March of 1979. Prior to the TMI-2 accident, radwaste activities were a part of the Three Mile Island health physics program; consequently, there was no staff specifically allocated with the responsibility of decontamination, packaging, preparation for shipping and minimizing the quantity of radwaste at Unit 1. This is no longer the case. Not only are

the individuals who work for the Supervisor of Radwaste dedicated solely and on a full-time basis to Unit 1 activities, but they are also designated TMI-1 Radwaste staff.

The Supervisor of Radwaste directs the activities of the 24 individuals reporting to him. One of the goals of the Supervisor of Radwaste is to develop, through experience, a rotating decontamination system which will ensure that the protected and vital areas at TMI-1 are maintained in as clean and radioactively-free an environment as possible. The Supervisor of Radwaste meets several times a week with the Manager of Operations, coordinating the activities of radwaste personnel with the needs of the operating and maintenance staff. Much of the time of the Supervisor of Radwaste is spent doing radwaste engineering support work such as drafting procedures and working on plant modifications related to his area of responsibility, e.g., evaluating the need for new valves and additional piping to improve the efficiency of the Unit's radwaste evaporators.

It is the job of the Supervisor of Radwaste to coordinate his work and the work of his staff with the activities and responsibilities of the Radiological and Environmental Controls Division (R&EC) of GPU Nuclear Corporation. Given the nature of radwaste activities, in most instances it is necessary for Radwaste personnel to obtain Radiation Work Permits (RWPs) for work performed. These permits must be obtained from R&EC. In addition, radwaste work

must be closely monitored by R&EC in order to ensure that required radiation limits on personnel exposure, and limits on shipments, packaging, disposal and other radwaste activities, are not exceeded.

The present Supervisor of Radwaste, Mr. Edward Fuhrer, took over his current responsibilities in November of 1979. For three and a half years prior to assuming the position of Supervisor of Radwaste, Mr. Fuhrer worked at TMI as a radwaste engineer. In that capacity, he provided technical support, such as "trouble-shooting" malfunctioning radwaste systems and drafting radwaste procedures, for both TMI-1 and TMI-2. Prior to working at Three Mile Island, Mr. Fuhrer was employed by Metropolitan Edison Company for over two and a half years as an environmental engineer. Mr. Fuhrer graduated from Drexel University in 1973 with a Bachelor of Science degree in chemical engineering.

Working for the Supervisor of Radwaste is a radwaste engineer, who assists the Supervisor by writing procedures and by trouble-shooting the system when problems arise which need immediate evaluation. (This position has just recently been vacated and strenuous efforts are underway to obtain a qualified replacement.) Decontamination, storage, and preparation for shipping activities at TMI-1 are directed by the Supervisor through three radwaste foremen and twenty radwaste workers.

The Unit 1 Supervisor of Operations is also in charge of the activities of several operating engineers from whom he

can obtain immediate and short-term engineering work. These personnel assist the Supervisor of Operations in writing operating procedures, reviewing these procedures for their effectiveness, and otherwise providing additional support for operations-related engineering problems. For example, one of the jobs delegated to the senior operating engineer is the review of operators' log sheets to discern and evaluate operating trends. The availability of operating engineers within the Operations staff provides added depth to the station organization in that three levels of technical support are now available to plant operations: first, from within the Operations department; next, from TMI-1 Plant Engineering on site; and additionally, from the Technical Functions staff of the GPU Nuclear Corporation.

A major addition to the shift staff responsible for the safe operation of TMI-1 is the presence of a Shift Technical Advisor on a twenty-four hour basis immediately available on site when the plant is in operation. The role of the Shift Technical Advisor (STA) is a new one within the commercial nuclear industry in the aftermath of the TMI-2 accident. It is also a unique role, in that the STA works directly and intimately with the shift operating staff, yet reports to the Technical Functions Division of the GPU Nuclear Corporation, and thus provides technical support independent of the shift operating personnel.

The position of STA was instituted at TMI-1 in response to the accident at TMI-2, and was subsequently adopted as one of the recommendations of the NRC Lessons Learned Task Force, NUREG-0578 (1979). One degreed engineer is assigned to each of the six unit operations' shifts. In addition, two individuals are assigned as "STA Trainees," thereby bringing the total number of individuals currently participating in the STA program to eight.

It is the STA's primary duty to assess the impact which various plant operations may have on nuclear and environmental safety. During accident or off-normal conditions, the STA's specific duties include recognizing and diagnosing unusual reactor and instrument responses. During normal operating conditions, the STA's duties include the review and evaluation of plant performance, and of the adequacy of procedures used to assess that performance.

Thus, the STA monitors and provides direct technical input to the on-going activities in the TMI-1 plant. Because an STA must have a Bachelor of Science or Engineering degree, he provides additional analytical and technical capability to support the operator on an around-the-clock basis. The STA can, for example, analyze conditions in the core in the event of a transient. This analytical capability heretofore has not necessarily been present. On an ongoing basis, the STA evaluates the need for and recommends corrective action on safety components and systems; advises the shift foreman or

shift supervisor, as needed; and provides a technical liason with the Corporation's engineering staff in Technical Functions.

In order to qualify for the position of Shift Technical Advisor, an individual must have a Bachelor of Science or a Bachelor of Engineering degree; a minimum of two years of related experience in power generation; a thorough knowledge of nuclear plant systems and components; and the training necessary to be licensed as a senior reactor operator.

The credentials of each of the six individuals serving as TMI Unit 1 STAs meet or exceed the qualifications which are prerequisite to assuming an STA's responsibilities. For example, several of the incumbent STAs have Masters degrees, as well as Bachelor of Science or Engineering degrees. In addition, Licensee is requiring its STAs to undergo a rigorous training program in which they receive college-level training in particular areas, such as nuclear theory and transient analysis; gain simulator experience; become intimately familiar with the function, physical layout and operation of the various TMI-1 systems; are briefed extensively on emergency procedures; and individually receive additional education in specific areas, e.g., a nuclear engineer may need additional work in the field of electrical engineering. This training is currently scheduled to be completed prior to restart of Unit 1.

BY WITNESSES HUKILL AND TOOLE

The Maintenance Department is the other major station organization which reports directly to the Unit 1 Manager. At the top of the Maintenance organization is the Superintendent of Maintenance. In contrast to the organization utilized by Licensee prior to the accident at TMI-2, the maintenance activities for Unit 1 are conducted entirely separately from any such activities which may be on-going at Unit 2. The responsibilities of the Superintendent of Maintenance at Unit 1 are limited to the maintenance activities at that unit; he is no longer responsible for any Unit 2 activities. The activities of the TMI-1 Maintenance Department are monitored by the Maintenance and Construction Division of GPU Nuclear Corporation. The Maintenance and Construction Division establishes uniform policies, practices and procedures for all GPU nuclear maintenance, repair and construction activities. Using these corporate policies and procedures, the TMI-1 Superintendent of Maintenance then establishes plant level procedures specifically designed for the control and coordination of maintenance at Unit 1.

The Superintendent of Maintenance, in coordination with the Supervisor of Operations, is in charge of planning, organizing, integrating and directing the daily maintenance effort that takes place at Unit 1. It is the responsibility of the Superintendent of Maintenance not only to coordinate

preventive maintenance, but also to direct the diagnosis and repair of all equipment that Operations has identified as in disrepair, requiring component replacement or in need of other corrective maintenance work. The Superintendent of Maintenance obtains technical support from the plant engineering staff in carrying out his responsibility for preventive and corrective maintenance. In the event that the necessary work appears to require a great deal of manhours or technical analysis, the Superintendent of Maintenance through plant engineering calls upon the technical resources available from the Technical Functions Division of the GPU Nuclear Corporation. Major plant maintenance and construction activities are assigned to the Maintenance and Construction Division of GPU Nuclear Corporation.

It is the responsibility of the Superintendent of Maintenance to oversee all maintenance activity at TMI-1. He directs outside contractors to support the department's workload and schedule requirements. For example, if contractor maintenance personnel are present at the facility, their activities are reviewed and coordinated with the Operations Department by the Superintendent of Maintenance. Similarly, if engineers employed within the Technical Functions group of GPU Nuclear Corporation have been brought to the site by Plant Engineering for the purpose of engaging in maintenance work, their activities will be in support of work scheduled by the Superintendent of Maintenance. It is through this centralized

organization that TMI-1 management effectively coordinates and scrutinizes all on-site maintenance activities. In carrying out his responsibilities, the Superintendent of Maintenance frequently meets with the Supervisor of Quality Control in order to ensure that maintenance work is performed in accordance with the Operational Quality Assurance Plan. There are currently about 150 full-time employees assigned to the Superintendent of Maintenance to plan, direct, supervise and execute the corrective and preventive maintenance programs at TMI-1.

The current Superintendent of Maintenance, Mr. Daniel M. Shovlin, is a Navy veteran of twenty-seven years. During his Navy career, Mr. Shovlin spent six years as Chief Engineer and Repair Officer on several large combatant surface ships. In this capacity, he was responsible for the operation and maintenance of the ship's main propulsion plant, auxiliary machinery, and piping systems, and for the operation and maintenance of electric power generation and distribution systems. From 1972 to 1973, Mr. Shovlin served as a member of the Naval Board of Inspection and Survey as an Engineering Inspector. Mr. Shovlin began working at TMI in 1973 as the Unit 1 Supervisor of Maintenance in charge of instrumentation and control, mechanical, electrical, and utility maintenance functions. He remained in this position until January, 1977, at which time he assumed the responsibilities of Supervisor of Maintenance at TMI Unit 2. In December of 1977, Mr. Shovlin

became the Superintendent of Maintenance responsible for all maintenance activities on Three Mile Island. In November of 1979, when the TMI-1 and 2 organizations and units were formally separated, Mr. Shovlin was designated as the Superintendent of Maintenance at TMI-1.

Maintenance is divided into two, entirely separate organizations: the preventive and the corrective maintenance groups. The preventive maintenance group conducts the Preventive Maintenance Program. This Program is designed to promote safety and optimize equipment availability and reliability. The Supervisor of Preventive Maintenance is in charge of this effort. It is his job to identify resources that are necessary to accomplish particular preventive maintenance work, and to assign workers to the job.

The current Supervisor of Preventive Maintenance, Mr. M. G. Snyder, worked in the United States Navy from 1958 to 1962 as an Electronics Technician. While in the Navy, Mr. Snyder attended Electronics Technician Class A School (1958-1959). During his last year and a half in the Navy, Mr. Snyder was the leading petty officer of the Electronics Division aboard the USS GALVESTON. In 1966, Mr. Snyder joined the Saxton Nuclear Experimental Corporation as an instrument technician. He stayed with Saxton until 1972, at which time he joined Licensee as an instrumentation maintenance foreman. While at TMI, Mr. Snyder became the instrument and control

maintenance department supervisor (December, 1978), and the TMI Unit 1 preventive maintenance supervisor (November, 1979).

Through its preventive maintenance program and staff of 24 employees it is the goal of Licensee to assure reliable performance of equipment and to reduce to an absolute minimum the amount of necessary corrective maintenance work at TMI-1. By regularly inspecting and performing other preventive maintenance work on TMI-1 systems, particularly those related to the facility's safety and reliability, equipment is less likely to fall into disrepair and consequently, the unit is more likely to operate on a full-time basis.

In addition to the maintenance staff working full-time on preventive maintenance activities, Licensee's TMI-1 Maintenance Department has a group of about 94 workers under the direction of the Supervisor of Corrective Maintenance who perform necessary instrument and control (I&C), mechanical, electrical and utility maintenance work.

The Supervisor of Corrective Maintenance, in contrast to his Preventive Maintenance counterpart, is in charge of all TMI-1 maintenance work that is corrective, rather than preventive, in nature. It is his responsibility to ensure that necessary corrective maintenance meets the needs of TMI-1 Operations. On a daily basis, the Supervisor of Corrective Maintenance plans, organizes, and directs corrective maintenance work at Unit 1. It is also his job to identify,

request and utilize resources necessary to accomplish particular kinds of maintenance work, including seeking assistance from the Maintenance and Construction Division of the GPU Nuclear Corporation or from outside sources if it becomes necessary or preferable to do so.

Reporting to the Supervisor of Corrective Maintenance are the Lead Foremen in the areas of I&C, mechanical and electrical, and the Supervisor of Shift Maintenance. Each of these Lead Foremen is responsible for the activities of the foremen and the 24-hour shifts of maintenance workers reporting to the foremen. This responsibility encompasses all activities related to the planning, organizing, and directing of day-to-day maintenance in their respective disciplines taking place at TMI-1. All work performed in the unit must be cleared with the Operations staff in order to ensure that it does not interfere with ongoing operational activities.

The current Supervisor of Corrective Maintenance, Mr. R. R. Harper, served in the United States Navy from 1962 to 1968 as an Electronic Technician and Nuclear Reactor Operator. While in the Navy, Mr. Harper attended Electronics Technician Class "A" School (1962-1963), the U.S. Navy Nuclear Power School and U.S. Navy Nuclear Power Prototype Training (1964-1965), and served as a Reactor Operator on the submarine USS ANDREW JACKSON. In 1968, Mr. Harper joined the Saxton Nuclear Experimental Corporation as an Instrument Technician. He stayed at Saxton until 1969, at which time he joined

Licensee at TMI as an Instrument Maintenance Foreman. While at TMI, Mr. Harper became the Instrument and Control Maintenance Department Supervisor (1974). Mr. Harper was transferred to Licensee's Portland Generating Station (Sept. 1978) as the Supervisor of Station Maintenance. In November 1980, Mr. Harper rejoined the Three Mile Island staff as Supervisor of Corrective Maintenance.

It is the responsibility of each Lead Foreman to coordinate his activities with the Operations Shift Supervisor and Shift Foreman, and to interface with Radiological and Environmental Controls, which issues RWPs to maintenance personnel. Finally, of course, all corrective maintenance work must be performed in accordance with the Operational Quality Assurance Plan. It is the responsibility of the Lead Foreman in each of the disciplines contained within the Corrective Maintenance group to see to it that this requirement is met.

The shift maintenance work force is composed of six rotating sections. Each section is normally comprised of a minimum of 2 men from each discipline: Electrical, I&C, Mechanical and Utility (approximately 10 men per section). Shift maintenance normally works on corrective maintenance items that can be completed during an 8-hour shift. Each section is headed by a maintenance foreman. These shift maintenance foremen report to the Supervisor of Shift Maintenance.

It is the responsibility of the Supervisor of Shift Maintenance to organize, coordinate and direct corrective maintenance on shifts.

The current Supervisor of Shift Maintenance, Mr. D. V. Dyckman, received a Bachelor of Science degree in Mechanical Engineering in 1968 from the University of Missouri. He served in the U.S. Navy from 1968 to 1979. During this time he attended the U.S. Navy Nuclear Power School and Prototype Training. Upon receiving this training he was qualified for the Supervision, Operation and Maintenance of a Naval Nuclear propulsion plant. He qualified as a Nuclear Engineer Officer in 1973. He served on two different nuclear submarines as Electrical Officer, Main Propulsion Assistant, Engineer Officer and Executive Officer (2nd in command). He also supervised equipment overhauls, reactor defueling and refueling and reactor startup and testing on two nuclear submarine overhauls in 1972 and 1976 as Senior Supervisory Watch. Upon leaving the Navy in 1979, Mr. Dyckman joined GPUSC, working as a maintenance engineer. His initial assignment was Supervisor of the TMI Unit 2 Auxiliary Building charcoal filter changeout and the design, implementation and maintenance of an emergency air breathing system for Unit 2. Mr. Dyckman was assigned as temporary Supervisor of Corrective Maintenance in October 1979 and served in that capacity until the present assignment in November 1980.

In addition to the two major maintenance staffs, corrective and preventive, reporting to the Superintendent of Maintenance, there are a number of additional maintenance employees whose activities are important in the planning and conducting of maintenance work at TMI-1. A staff of approximately 35 workers, under the direction of the Supervisor of Utility Maintenance, primarily perform housekeeping activities on site. The Welding Foreman assigns and directs the specialized work of crews working on necessary welding activity at TMI-1. He also certifies welders. The Senior Technical Analyst, who also reports to the Superintendent of Maintenance, is primarily responsible for maintenance work associated with the TMI-1 security and communication systems, e.g., metal detectors, key card system, paging system. The Senior and Junior Maintenance Planners at TMI-1 plan, schedule and coordinate normal and outage maintenance work so that this work can be accomplished in the safest, most effective, timely and economical manner.

The Manager of Administration reports to the Vice President of TMI-1. It is the responsibility of the Manager of Administration to see to it that on-going programs at TMI-1 are properly and effectively administered. The Manager of Administration is therefore involved in whatever administrative areas require review, evaluation and implementation (e.g., review of personnel recruiting, personnel retention, employee benefits, and labor relations), as well as assisting the TMI-1

Vice President whenever he needs support on particular projects, e.g., budget/expenditure analyses. The Manager of Administration also functions as a staff assistant to the Vice-President of TMI-1. In this capacity, it is the job of the Manager of Administration to screen incoming mail, prepare outgoing correspondence, assist in the preparation of testimony and other preparatory licensing work, schedule meetings, and assist the Vice-President with audits, staff plans, and any other administrative work delegated to him by the Vice-President of TMI-1. Finally, the Manager of Administration coordinates the administrative work and needs of TMI-1 with the activities of the GPU Nuclear Corporation's Division of Administration to ensure that all necessary administrative work on site is being properly monitored and conducted.

The present Manager of Administration, Mr. Paul Christman, received a Bachelor of Science degree in Civil Engineering in 1957 from the Pennsylvania State University. From 1957 to 1959, he served as a Navy Officer on an amphibious ship. He began working for Licensee in 1959, and held positions in transmission engineering (fourteen years), distribution operations (one year), and operations analysis (four years). Mr. Christman was named to the position of Manager of Generation Administration for the corporate technical support staff on April 1, 1978. He has been serving as the Manager of Administration at TMI-1 since November of 1979. Mr. Christman

has attended the Public Utility Executive Program at the Graduate School of Business Administration, University of Michigan.

BY WITNESSES HUKILL AND COLITZ

Also reporting to the Vice President of TMI-1 is the Manager of Plant Engineering, who is responsible for direct engineering and technical support for operations and maintenance of TMI-1. The TMI-1 Plant Engineering Group provides the on-site technical capability to support the day-to-day safe operation and maintenance of the generating facility. This support covers the electrical, mechanical, nuclear and instrument and control engineering disciplines, plant chemistry and fire protection. The Manager of the Plant Engineering Group oversees these activities. He works closely with the Manager of Unit 1 in order to ensure that appropriate priorities are maintained in those areas where plant Operations or Maintenance require technical support from the Plant Engineering staff. In addition, the Manager of Plant Engineering works with the Unit 1 Manager and his staff in preparing operating and emergency procedures; ensuring that the Technical Specification requirements are met; providing engineering and other technical support to on-going preventive and corrective maintenance work; reviewing and evaluating changes in plant design or procedures; and supporting refueling outage activities.

The Manager of Plant Engineering is the major TMI-1 liason to the Technical Functions division of the GPU Nuclear Corporation. In this capacity, the Manager of Plant Engineering refers to Technical Functions engineering matters for which they are responsible and requests assistance whenever, in his opinion, the nature of the project requires extensive design or other analytical work, or is beyond the level of expertise or the manpower capabilities of his staff. For example, the Manager of Plant Engineering refers to Technical Functions questions requiring plant design changes and requests assistance in nuclear analyses, fuel analyses, or safety analyses.

The Manager of Plant Engineering is also authorized to approve purchase requisitions for material, equipment, supplies and services for engineering and chemistry work performed at TMI-1.

The present Manager of Plant Engineering is Mr. Joseph J. Colitz. Mr. Colitz received a B.S. in mechanical engineering from Villanova University in 1963. He then joined Licensee as a cadet engineer. In that capacity, Mr. Colitz worked on a variety of projects, including technical problems which arose in the generation department with respect to several fossil fuel power plants; plant engineer at a coal-fired power plant; and mechanical maintenance foreman at a coal plant in charge of scheduling all mechanical plant maintenance work and supervising the plant maintenance staff.

Colitz began working at the Saxton Nuclear
re he received an NRC operator license and other
the overall operation and maintenance of a nuclear
n 1968, he was assigned to Three Mile Island as the
f Operations. In that capacity, Mr. Colitz was
the initial selection and training of operating
TMI. In 1973, he became the Plant Engineer
or all mechanical, electrical, nuclear and I&C
at TMI-1. In August, 1974, Mr. Colitz became the
ntendent responsible for the operation and
of Unit 1. While holding this position, he
enior reactor operator license on TMI-1. In May of
litz was transferred by Licensee to the Reading
partment as the Director of Projects. His major
while working as Director of Projects were respon-
industrial waste plants at several fossil units;
ting of a fossil unit with a cooling tower; and the
of the TMI security system. In April of 1979, Mr.
ent to TMI to assist in TMI-2 post-accident
He was initially involved in acquiring necessary
engage in clean-up and other activities. He also
pproximately five months as the senior on-site
ve on the back shift at Unit 2. Mr. Colitz assumed
ibilities of the Manager of Plant Engineering at
e latter part of 1979.

The Plant Engineering staff is subdivided into the areas of engineering work, fire protection, chemistry, the generation maintenance system, and project engineering. A total of about 45 people are assigned to Plant Engineering.

The Engineering staff is composed of Lead Engineers and supporting engineers in each of the following disciplines: mechanical engineering, nuclear engineering, electrical engineering, and instrument and control engineering.

The Lead Nuclear Engineer, with the assistance of a support engineer, is responsible for nuclear physics testing, evaluation and procedures. The Lead Nuclear Engineer and the engineer reporting to him, in coordination with his counterpart in the Technical Functions organization, directs nuclear physics tests to verify core design parameters; analyze periodic surveillance reports with respect to core parameters; review and comment upon operating, test and maintenance procedures and procedural changes that affect core parameters; evaluate nuclear parameters in order to ensure that they are within the limits prescribed in the TMI-1 Technical Specifications; and assist in areas of plant operations and maintenance which require expertise in the nuclear physics area, such as maintaining special nuclear material inventory records in accordance with the requirements of 10 C.F.R. Part 70, and coordinating nuclear fuel movement during outages.

The current Lead Nuclear Engineer, Mr. W. Scott Wilkerson, received a B.S. degree in nuclear engineering from

Rensselaer Polytechnic Institute in 1976. Upon graduation, Mr. Wilkerson began working for Licensee as a nuclear engineer, developing a program for plant performance testing on TMI Unit 1. In 1977, he transferred to Metropolitan Edison Company's Nuclear Fuel Group and, in that capacity, worked on nuclear physics-related projects, including TMI-1 physics testing, cycle reload evaluations and licensing, reviewing the TMI-1 nuclear steam supply system safety analyses, and completed accident analyses for fuel handling accidents. Since January of 1979, Mr. Wilkerson has worked as the TMI-1 Lead Nuclear Engineer.

The Lead Electrical Engineer, along with several electrical engineers assigned to TMI-1, provides technical assistance to plant operations and maintenance when the needed work relates to electrical systems and components. For example, the Lead Electrical Engineer will provide technical assistance when Operations or Maintenance is concerned with the operation of the control rod drive system, the pressurizer heater control, the engineering safeguards actuation system, the diesel generators, the main and auxiliary transformers, the inverters and vital busses and any other electrically-related equipment or equipment problem. Like his counterpart in the field of nuclear engineering, the Lead Electrical Engineer performs initial nuclear safety evaluations on design and procedural changes involving electrical equipment or electrically-related problems.

The present Lead Electrical Engineer is Mr. C. E. Hartman. Mr. Hartman received an Associate Degree in electrical engineering in 1965, and a Bachelor of Engineering Technology in electrical engineering in 1970. In 1970, he began working for Licensee at TMI as a Unit 1 project engineer. In this capacity, Mr. Hartman reviewed procurement specifications and vendor proposals on electrical equipment, and reviewed vendor proposals and witnessed factory tests for the various systems, including the control rod drive system, the underwater television system for in-service inspection, the solid radioactive waste packaging system and the boroscope. He also prepared and reviewed operating, maintenance and start-up test procedures for TMI-1. In 1973, Mr. Hartman was designated as the Lead Electrical Engineer at Unit 1. In addition to his daily responsibilities in this position, Mr. Hartman has served for approximately six years as a member of the Plant Operations Review Committee (PORC), and while on PORC, has served as Vice-Chairman for approximately two years and as the Chairman for approximately six months. Mr. Hartman was previously licensed as an SRO on Unit 1.

The Lead Instrument and Control Engineer provides technical support to plant operational and maintenance activities related to I&C components and systems, such as the reactor protection system, the integrated control system, non-nuclear instrumentation, the incore monitoring system, the loose parts monitoring system, the pneumatic control valves and

components, and the turbine electro-hydraulic control system. He also performs necessary nuclear safety evaluations on design or procedural changes involving I&C equipment. The Lead I&C Engineer is assisted by several full-time engineers.

The current I&C Lead Engineer, Mr. Victor P. Orlandi, has received both a Bachelor and a Master of Electrical Engineering degree. After receiving this education, Mr. Orlandi served in the United States Navy. He attended the Bettis Reactor Engineering School in 1969, receiving 586 classroom hours of graduate level courses in pressurized water reactor theory and design. He worked on the staff of Vice Admiral H. G. Rickover until 1973, serving as a nuclear propulsion engineer. In this capacity, Mr. Orlandi was responsible for reactor instrumentation and control systems for five classes of nuclear powered submarines, a total of eight ships. Upon leaving the Navy, Mr. Orlandi worked for Virginia Research, Inc., a consulting firm doing contract work for the U.S. Navy. He began working for Licensee in June of 1974 as the Lead I&C Engineer for TMI Unit 1.

The fourth lead engineer reporting to the Manager of Planting Engineering is the Lead Mechanical Engineer. His technical assistance is available to plant Operations and Maintenance for problems relating to mechanical systems or components. This would include work on steam generators, reactor coolant pumps, pipe hangers, supports and snubbers, heat exchangers and coolers, emergency diesels, the ventilation

system, and piping, pump, valve and filter systems. In supporting TMI-1 operations and maintenance activities, the Lead Mechanical Engineer performs the initial nuclear safety analysis on design and procedural changes involving this equipment.

The current Lead Mechanical Engineer, Mr. R. O. Barley, received a B. S. in Chemistry from Pennsylvania State University in 1969. He served in the Navy for five years, from 1969 to 1974, during which time he attended the U.S. Navy Nuclear Power School and Prototype Training. This training program included a six-month graduate level course of instruction in reactor plant engineering, as well as six months of systems and practical operations training at an operating naval nuclear reactor prototype plant. Upon receiving this training, Mr. Barley was qualified for supervision of operations and maintenance of a Navy nuclear propulsion plant. He was assigned to serve as an officer aboard an operating nuclear fleet ballistic missile submarine for approximately four years, during which time he was the Main Propulsion Assistant (Mechanical Machinery Division Officer); the Damage Control Assistant (Auxiliary Mechanical Division Officer); and the Reactor Controls Division Officer. This duty included service during shipyard overhaul, demonstration and shakedown, and fleet operations. Upon leaving the Navy in 1974, Mr. Barley joined Licensee, working for two years as a TMI Unit 1 Operations engineer during the first years of commercial

operation, and during the first refueling outage. In this capacity, Mr. Barley provided technical support and engineering assistance to the Supervisor of Operations. In 1977, Mr. Barley became the TMI Unit 1 Lead Mechanical Engineer.

In summary, reporting to the Manager of Plant Engineering are eleven engineers, under the direction of four Lead Engineers in the fields of nuclear, electrical, I&C, and mechanical engineering. This group of individuals provides technical assistance on a 24-hour basis to the facility's Operations and Maintenance departments. In the event that a problem requires a significant amount of time, or involves major design or analytical work, the Manager of Plant Engineering will request the assistance of the Technical Functions Division of the GPU Nuclear Corporation. If it becomes necessary to do so, Technical Functions can seek additional assistance from outside consultants. In this manner, Licensee effectively utilizes the layers of resources available to it to ensure the safe, reliable, and efficient operation of TMI-1.

The Manager of Plant Engineering also oversees the activities of the TMI fire protection engineers. The fire protection engineers are responsible for the overall readiness of all fire service and fire protection systems at Three Mile Island. This responsibility includes inspecting the facility on a weekly basis, and notifying the appropriate personnel in the event that any potential fire hazards exist on site;

drafting, revising and reviewing procedures relating to fire protection procedures and equipment; conducting surveillance on fire protection equipment located throughout TMI; and providing technical assistance to the Training Department of the GPU Nuclear Corporation with respect to training programs for the TMI-1 and 2 fire brigades and local fire companies. The fire protection engineers also interface on a regular basis with GPU Nuclear Corporation's Licensing Department with respect to regulatory changes in the area of fire protection in order to ensure that the fire protection system at Three Mile Island complies with current regulatory standards.

The senior TMI fire protection engineer, Mr. T. A. O'Connor, is currently pursuing his Associates degree in fire technology, having completed 47 out of 60 college credits in the fire science program. After graduating from high school in 1966, he served in the nuclear Navy program for nine years. While in the Navy, he attended the Navy Nuclear Power School; qualified as a U.S. Navy S3G prototype mechanical operator and engineering laboratory technician; went to the U.S. Navy Engineering Laboratory Technician School; and became a U.S. Navy S3G Prototype instructor. Upon leaving the Navy, Mr. O'Connor began working for Licensee as a Quality Control assistant. He has worked in the fire protection field for three years, and has held his current position since October 1978.

The Chemistry Department of TMI-1, under the direction of the Supervisor of Chemistry, also reports to the Manager of Plant Engineering. The Chemistry department conducts all TMI-1 water chemistry-related work, including sampling and laboratory analysis on the primary and secondary systems of the TMI-1 reactor, in order to ensure that the water chemistry at TMI meets plant Technical Specifications, manufacturer specifications, and discharge limits. It is also the responsibility of this group to provide technical supervision and assistance in the operation of the water treatment, chemical addition, and waste treatment systems at TMI-1. The Supervisor of Chemistry, with the aid of a Technical Assistant and a Chemical Foreman, directs the activities of the twelve chemistry technicians, who operate on a six shift basis. In addition to managing these personnel, the Supervisor of Chemistry reviews operating plant chemistry procedures and requirements and evaluates the effectiveness of these limits. He is also responsible for the proper operation, calibration, and use of all chemical and radio-chemical analytical and counting instruments, including all laboratory equipment available to plant chemists.

The Chemistry Supervisor recommends water chemistry modifications to the Manager of Plant Engineering, based on analysis and required chemistry parameter limits. He also proposes changes in chemistry-related procedures, as necessary.

The present Supervisor of Chemistry, Mr. J. G. Reed, received a Bachelor of Science degree in 1967 from Pennsylvania

State University. He then worked at the Saxton Nuclear Experimental Corporation for four years (July, 1968 to August, 1972) as a radio-chemist. During his tenure at Saxton, Mr. Reed had full responsibility for plant chemistry and radio-chemistry analyses, including responsibility for complying with the facility's water chemistry Technical Specifications, vendor specifications, and Industrial Waste Permit specifications. He also trained plant operators in chemistry and radio-chemistry. Mr. Reed became a chemist at TMI-1 in August of 1972. In April of 1974, he was promoted to TMI-1 Chemistry Foreman. In January, 1980, Mr. Reed assumed the responsibilities of the TMI-1 Supervisor of Chemistry.

Finally, TMI's Generation Maintenance System (GMS) coordinators report to the Manager of Plant Engineering. The service provided by these individuals augments the capabilities within the Maintenance Department, and provides a useful check on maintenance activities. The GMS analysts coordinate the scheduling of and provide the data to computer operators regarding preventive maintenance work at TMI-1. They also review maintenance work that has been completed in order to verify that necessary jobs are performed on a timely basis. Similarly, the GMS coordinators go through machinery history files in order to discover any previously unidentified generic equipment problems. Such problems might not be evident to plant personnel working on a daily basis with particular pieces of equipment; however, the job of the GMS coordinator is to

look for such trends by examining the system as a whole. The GMS coordinator also schedules and keeps records of all Technical Specification Surveillance Tests performed and assesses the surveillance program to ensure timeliness and accuracy. In general, the GMS department provides the interface between the computer and its on-site users. The department focuses on the integrity and validity of the computer system rather than the accomplishment of specific maintenance items.

To summarize, it is the function of the Manager of Plant Engineering to provide to Operations and Maintenance necessary on-site technical and engineering services not available within the Operations and Maintenance departments. Through the integration of the capabilities of these separate departments at TMI-1, Plant Engineering can effectively assist Operations and Maintenance in meeting Licensee's goal of operating the facility in a safe, reliable, and efficient manner. On-site engineers in the fields of nuclear, electrical, I&C, and mechanical engineering report to the Manager of Plant Engineering through their respective Lead Engineers. In addition, the Manager of Plant Engineering oversees the work of the fire protection engineers, the chemistry group, and the GMS coordinators.

BY WITNESSES HUKILL, TOOLE, ROSS AND COLITZ

In conclusion, the TMI-1 unit organization has been significantly modified over the past year and a half. The

organizational changes reflect Licensee's commitment to providing to the unit sufficient depth in technical capability, as well as the necessary management oversight to ensure the safe and efficient operation of TMI-1 under both normal and abnormal operating conditions. Highly competent individuals, with extensive nuclear reactor experience, have been incorporated into the unit management organization. In addition, the on-site technical support staff is extensive. Emphasis has been placed on limiting the scope of responsibility vested in high-level personnel so as to free these individuals from non-TMI-1-related duties and purely administrative work. While the facility functions as a separate entity in its daily operation and maintenance, outside assistance is readily available from the other GPU support divisions. This organizational structure enables TMI-1 technical and management staff to effectively utilize the services available from other GPU Nuclear organizations, such as the engineering capability within Technical Functions, as well as from outside consultants, as necessary.