INITIAL SALP REPORT

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

REPORT NO. 50-289/90-99

GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION

THREE MILE ISLAND, UNIT 1

ASSESSMENT PERIOD: MAY 16, 1990 - NOVEMBER 16, 1991

BOARD MEETING DATE: JANUARY 6, 1992

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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated Nuclear Regulatory Commission (NRC) staff effort to collect observations and data and to periodically evaluate licensee performance on the basis of this information. The SALP process is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. SALP is to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to the licensee's management to promote quality and safety of plant operations.

An NRC SALP board, composed of the staff members listed below, met on January 6, 1992, to review the collection of performance observations and data and to assess the licensee's performance at the Three Mile Island Plant. This assessment was conducted in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." A summary of the guidance and evaluation criteria is provided in Attachment 1.

This report is the NRC's assessment of licensee performance at Three Mile Island Unit 1 for the period of May 16, 1990, through January 6, 1991. Any Unit 2 activities that reflect on overall licensee operational performance are included in this assessment.

The SALP Board was composed of the following:

Chairman:

M. W. Hodges, Director Division of Reactor Safety (DRS)

Members:

J. Wiggins, Deputy Director, Division of Reactor Projects (DRP)
R. Cooper, Deputy Division Director, Director of Radiation Safety and Safeguards (DRSS)
J. Joyner, Chief, Facilities Radiological Safety and Safeguards Branch, DRSS
J. Durr, Chief, Engineering Branch, DRS
J. Stolz, Director, Project Directorate, Office of Nuclear Reactor Regulation (NRR)
R. Hernan, Project Manager, NRR
F. Young, Senior Resident Inspector

Others in Attendance:

E. Wenzinger, Chief, Reactor Projects Branch 4, DRP
W. Ruland, Chief, Reactor Projects Section No. 4B, DRP
T. Frye, Reactor Engineer, Reactor Projects Section No. 4B, DRP
D. Beaulieu, Resident Inspector, TMI
J. Ramsey, Region 1 Coordinator, Office of the Executive Director of Operations

II. SUMMARY OF RESULTS

II.A Overview

The licensee continued to safely operate the plant and exhibited strong performance during power operations. However, weaknesses were noted in the performance of infrequently performed activities during the recently completed 9R refueling outage. These weaknesses have resulted in a decline in performance in the maintenance/surveillance area and indications of weakening performance in plant operations. These weaknesses appeared to be primarily attributable to problems with procedural implementation and a lack of specificity in certain procedures.

Operator performance during power operations continued to be a strength. However, personnel errors during the 9R refueling outage indicate a decline in performance. Operator conduct during normal and off-normal events continued to be excellent and professional. Management involvement in plant operations continued to be effective. While housekeeping conditions were adequate during power operations, a decline was noted during the refueling outage.

A decline in performance in the maintenance/surveillance area was noted. Plant maintenance activities were effective in supporting safe and reliable operation and the surveillance program continued to be effective in verifying the operability of safety-related systems. However, weakness was noted in the area of maintenance and surveillance procedure implementation which resulted in problems with procedure quality and recurring instances of plant staff not properly using procedures. Management was closely involved in the operation of the plant. The quality assurance department continued to effectively function to aid the plant staff in maintaining the material conditions and plant operations at a high level.

Continued strong performance was noted in radiological controls, emergency preparedness, security, and engineering/technical support. Radiological controls program strengths included staff technical ability, training, and implementation of the field operations program. Strong management involvement was evident in on-site and off-site activities which resulted in the implementation of an effective emergency preparedness program. A high quality and effective security program was supported by a well trained, professional staff and the continuation of system and equipment upgrades. Site and corporate engineering continued to provide excellent support for plant operations.

II.B **Facility Performance Analysis Summary**

	Functional Area	Rating, Trend Last Period	Rating, Trend This Period
1.	Plant Operations	1	1, Declining
2.	Radiological Controls	1	1
3.	Maintenance/ Surveillance	1	2
4.	Emergency Preparedness	1	1
5.	Security	1	1
6.	Engineering/ Technical Support	1	1
7.	Safety Assessment and Quality Verification	1	1

Previous Assessment Period: January 16, 1989, through May 15, 1990
Present Assessment Period: May 16, 1990, through November 16, 1991

III. PERFORMANCE ANALYSIS

III.A Plant Operations

III.A.1 Analysis

Plant operations were rated as Category 1 in the previous assessment period. Significant strengths identified in this area included experienced, highly professional operators and a strong effective operator training program. A strong station management involvement in plant activities was noted.

During this period, the licensee continued to emphasize a strong commitment to high quality operations. Corporate and site management was involved in plant activities and provided timely and comprehensive safety assessment of events. Strong and effective oversight, even with significant changes in site management, continued during this assessment period. All site departmental middle managers continued to conduct back shift tours of the facility including the control room, areas containing key safety equipment, and balance of plant equipment. These tours were effective in site management emphasis to plant personnel on the need to recognize safety concerns. Noted concerns were addressed in a timely manner.

Improved identification of minor plant problems and events has been noted during this period. The licensee is now producing a monthly report entitled "Significant Plant Events." This report identifies minor problems that do not reach the threshold for plant incident reports. This report provides for additional engineering and operations review of events to determine if any trends exist or if additional corrective actions were necessary. This program has increased the licensee's effectiveness in early identification of plant problems.

Operations staffing was maintained at a full complement of six operating crews throughout the assessment period. The majority of operators on shift have more than ten years plant experience and provided a large knowledge base for dealing with normal plant evolutions and problems. There has been very low turnover of the licensed operator personnel. To enhance supervision of major evolutions performed outside the control room, operations management has initiated a program to add an additional senior licensed operator (SRO) to each crew. The program has been effective with the two operating crews presently with the additional SRO.

Operator professionalism, routine conduct of control room operations during power operations, and response to off-normal plant conditions and transients continued to be very good. A good understanding by operators of plant status identified several deficient conditions. For example, on a shift foreman's walkthrough of the plant, he noted that the B Radwaste tank was being released vice the A tank. This led to the identification of improper valve line up by an operator in a very timely manner.

Two automatic reactor trips occurred during the SALP period. One of the two automatic reactor trips was partially attributed to operator error. The operator did not properly identify an abnormal condition on the rod control panel. Operators did avert the need for reactor trips on several occasions through decisive action. Immediate operator actions following the two reactor trips and other plant transients were, in general, excellent. For each event, the emergency procedures were followed. However, in several instances, procedures were not reviewed until well into the event and operators tended to rely initially on their memory for the follow-up steps.

Adequate housekeeping conditions were maintained while the plant was operating. A decline was noted during the outage. After completion of work in a specific area of the plant, loose material was still present. The licensee has recognized the need to enhance their effort in this area during outages. In addition, the licensee implemented a vigorous painting program to upgrade the plant appearance.

One initial and one requalification examination were administered during this SALP period. For the initial examination, all seven reactor operators (ROs) passed. For the requalification examination, six ROs and six senior reactor operators (SROs) were administered exams, of which five ROs and five SROs passed. There were no crew failures. Examination materials developed by the training department, i.e., lesson plans, examination bank questions, scenarios, job performance measures, etc., were excellent.

The operations and training departments worked together in assuring that they have trained, qualified, competent licensed operators. This was demonstrated by participation of operations supervisory personnel in licensed operator training and requalification evaluations. Overall, the operator training program continues to be strong and effective.

Planning meetings during outages and plant operation were effective in identifying potential plant problems that required interdepartmental effort. These meetings fostered good interdepartmental communications and cooperation. Significant efforts were made by the licensee in planning and scheduling for the 9R refueling outage. A shutdown risk assessment of the outage was performed that identified potential problems. The outage schedule was adjusted to minimize risk based on this assessment.

However, during the most recent outage, several events occurred that reflected poorly on operator performance. A licensed operator in the control room and other licensed individuals, while performing a refueling surveillance, allowed irradiated fuel to be moved prior to establishing proper containment systems alignment (see Section III.c, "Surveillance"). In addition, an inadvertent Engineered Safeguards Actuation System and Emergency Feedwater activation occurred due to operator error. These events were infrequent evolutions performed only during outages. Licensed operator response to the events was timely and proper. These problems suggest a weakness in accomplishing correctly infrequent critical plant evolutions particularly in areas involving procedural adequacy and attention to detail in procedural adherence.

Summary

Management directives and guidance to plant staff continued to be effective in providing timely and comprehensive safety assessments of plant events. Operator professionalism, responses to off-normal plant conditions, and control room conduct were, in general, excellent. The operator training program continues to be effective. Operator performance during power operations was strong. Outage planning, particularly the efforts to minimize shutdown risk, was noteworthy. Housekeeping was normally adequate with some improvement needed during outages. However, the significant personnel errors that occurred during the outage suggests a problem with personnel performance in conducting some infrequent plant evolutions.

III.A.2 Performance Rating: Category 1

Trend: Declining

III.A.3 Recommendation: None

III.B Radiological Controls

III.B.1 Analysis

The previous SALP Report rated Radiological Controls as Category 1. All areas of the radiological controls program, including radioactive waste, transportation, and the Radiological Environmental Monitoring Program (REMP), were strong during the last SALP period. No significant weaknesses were noted during that period.

Radiological Controls

The Unit 1 and Unit 2 Radiological Controls organizations were consolidated into one organization during the period. The reorganization was well planned and well implemented and all programs remained strong through the transition. Management personnel were frequently involved in the assurance of quality for radiological control work and remained well informed on details regarding such activities. Senior Radiological Control management personnel maintained a good working knowledge of issues described in internal audits, NRC inspections, and GPU's Radiological Occurrence Reports.

Technical issues that arose during the period were handled well by station personnel. Hot particle dose calculations were technically accurate and in close agreement with NRC calculations. Good radiological engineering controls were implemented for handling the Unit 2 accident-generated-water evaporator bottoms processing. Engineering controls included the use of glove bags and other containments which eliminated the need for respiratory protection and dramatically reduced the potential for personnel contamination. Traversing in-core probe work was well analyzed and included good radiological safety precautions. GPU's internal dosimetry procedures were well written and the staff was well versed in the use of those procedures. Overall, GPU continued to maintain a technically strong Radiological Controls staff.

Steam generator tube leakage during the current period caused extensive low level contamination of the secondary system during the operation of Unit 1. The leak was evaluated by the Radiological Engineering section. Although the evaluation was well performed, the Operations Department made the decision to vent the contaminated steam to a clean area prior to Radiological Controls concurrence. During another incident, the Chemistry Department did not communicate with the Radiological Controls Department and sent slightly contaminated samples from the secondary system to a non-radiological laboratory for analysis. Neither event resulted in any significant contamination of personnel or facilities. However, both events were indicative of weakness within the operations and chemistry groups in their communication with the radiological controls group.

Radiological controls were very good during the Unit 1 refueling outage. A few posting discrepancies were noted during outage work. However, these postings problems were adequately and expeditiously addressed and no significant radiological safety concerns were identified during observation of field work. Post-outage recovery of contaminated areas was well performed and allowed auxiliary operators to perform their routine surveillances without protective clothing. ALARA performance remained strong relative to both individual and collective dose goals. Personnel radiation exposure goals were aggressive and estimates were generally accurate.

Staffing levels were adequately maintained during the period. The radiation protection staff remained relatively stable. Qualified candidates readily filled vacated positions. Adequate numbers of qualified Radiation Protection technicians were obtained for outage support despite shortages of contractors nationwide. Overall, the licensee continued to exhibit technical depth and diversity of skills.

Plant systems training for Radiological Controls personnel was provided during the period. Much of the systems training focused on contaminated secondary systems. Areas of particular radiological concern such as filters, traps, and sampling stations were emphasized. The effectiveness of this training was evident during the extensive radiological work performed on secondary systems. No specific training weaknesses were identified during the period for Radiological Controls personnel.

Radioactive Waste and Transportation

The licensee's programs for the collection, processing, and shipment of radioactive wastes continued to be strong. Quality assurance controls included vendor audits, plant audits, and monitoring reports. Operational controls to minimize and control the generation of radioactive waste continued to be effective.

Although one event during the SALP period was identified where the licensee failed to properly control maintenance on a shipping cask, this event was not reflective of the program as a whole. Training of personnel involved in the processing and shipment of radioactive wastes continued to be a licensee strength.

Radiological Effluents and Radiological Environmental Monitoring

During the previous assessment period, excellence in the implementation of the radioactive effluent controls program and the REMP was noted. This excellent performance continued during this assessment period.

The scope and technical depth of the licensee's QA audits were excellent. Additionally, the Radiological Environmental Monitoring Program (REMP) and chemistry laboratory QA/QC programs were utilized by the licensee to enhance program performance in these areas. Licensee performance on radioactivity and chemistry measurements during the chemistry inspection were excellent, with all licensee sample results agreeing with NRC results. The licensee's establishment of a task force to evaluate the radiation monitoring system and effluent sampling was noteworthy. The task force effectively handled a number of issues related to tritium and iodine sampling, offgas monitoring, and Radiation Monitoring System (RMS) system modifications.

Summary

Radiological Controls were maintained at the high level of performance observed during the previous SALP period. Program strengths included the technical ability of the staff, implementation of the field operations program, training, and quality assurance for radioactive waste, transportation, and the REMP. A weakness involved two examples of inadequate communication between site departments. The overall quality of the Radiological Controls program was excellent during the period.

III.B.2 Performance Rating: Category 1

Trend: None

III.B.3 Recommendations: None

III.C **Maintenance/Surveillance**

III.C.1 Analysis:

The previous rating for this functional area was Category 1. The previous assessment determined that maintenance activities were performed well and had a high degree of management involvement. In the area of surveillance, no programmatic deficiencies were identified. Generally, good control of maintenance and surveillance activities was noted with a relatively low number of unnecessary challenges to safety equipment.

Maintenance

In general, maintenance activities have been effective in supporting the safe and reliable operation of the unit. Strong management support was evident in programs affecting maintenance and reliability of safety-related systems. A reliability-centered maintenance program is under development to optimize preventive maintenance procedure effectiveness. A plant preservation program was implemented to improve the exterior material condition and overall appearance of the unit. Historical information in the plant component database was good. The backlog of outstanding maintenance items was well managed and appropriately prioritized. The planning of day-to-day preventive and corrective maintenance of safety-related components was good. During the refueling outage, sufficient management involvement existed to properly control vendor activities.

A major strength of the maintenance organization was the highly trained and competent staff. The licensee maintains an extensive training program for maintenance activities. The training program was enhanced by using several mockups including one for reactor coolant pump seals and a full scale once-through-steam-generator secondary side lower shell. The licensee has shifted from classroom descriptions of task performance to a more hands-on approach. The skill of the technicians was evidenced by the low rate of rework. This training combined with a low maintenance employee turnover and appropriate staff size has yielded a stable and experienced maintenance work force.

There has also been a significant improvement in the control of measuring and test equipment. A continually manned tool room maintains accountability of mechanical and electrical test equipment. However, aside from test equipment, several examples were noted where the licensee failed to control access to in-plant areas used for storage of safety-related materials and equipment. This concern was promptly corrected.

During this period, there has been a noted improvement in the quality of maintenance procedures. The licensee recognized a weakness in the quality of maintenance procedures and in 1989 began a maintenance procedure upgrade program, which is nearly completed. A review of a number of the upgraded procedures indicates that the procedure upgrade process has been

effective in improving procedure quality. Past poor procedure quality has necessitated the heavy reliance on technician training. The practice of using technician ability to compensate for insufficiently detailed procedures was not uncommon.

Several instances were noted where the adherence and implementation of maintenance procedures was poor. Several examples of this are as follows: (1) The failure to adhere to a maintenance procedure for the "A" emergency diesel generator room fire sprinkler system led to a condition in which a proper fire watch was not established; (2) A maintenance procedure step was not performed which required a specific check list to be completed to verify the lineup of the redundant string of safety-related equipment; (3) Unapproved, handwritten step-by-step instructions for a battery charger were used to supplement approved procedures; and, (4) The failure to implement a routine preventive maintenance procedure resulted in the failure of a high pressure injection discharge valve.

Surveillance

The overall surveillance program continued to be effective in verifying the operability of safety-related equipment and satisfying Technical Specifications. Surveillances were performed on schedule, were adequately documented, and testing deficiencies were properly dispositioned. Testing activities observed were performed by qualified personnel.

The licensee has a good inservice inspection program which is staffed with well-qualified examiners. The steam generator eddy current inspection program exceeded the requirements of the Technical Specifications by examining more tubes than were specified. The qualification of examiners ensures highly qualified technicians are used by requiring a performance demonstration test prior to any examination in the plant. In the area of ultrasonic testing, a minor problem concerning the evaluation process used by the ultrasonic test personnel was quickly resolved prior to any analysis.

A weakness in the controls used in surveillance testing resulted in the degradation of and unnecessary challenges to plant safety systems. Five examples of these inadequate controls are as follows: (1) An inadvertent emergency feedwater pump autostart occurred due to not performing a surveillance procedure under the plant conditions intended; (2) The "C" high pressure injection pump was disabled after performing surveillance procedure steps out of order; (3) An inadvertent lift of the power operated relief valve occurred due to the inadequate performance of the reactor protection surveillance procedure; (4) A fuel assembly was lifted from the core without containment isolation being properly established; and, (5) A reactor trip occurred due to the inadequate implementation of the reactor protection system surveillance procedure.

As suggested above, there was a heavy reliance on operator training to compensate for insufficiently detailed procedures. Also, station operators did not always have a clear understanding of procedure contents prior to test performance. Finally, the procedures were not always performed in a step-by-step, controlled manner. Negative ramifications of the above

weaknesses were especially prevalent when the procedure was performed on an infrequent basis or was performed by a less experienced operator.

Summary

In general, maintenance activities have been effective in supporting the safe and reliable operation of the plant. A major strength was the maintenance staff. Maintenance procedures were improved. However, a weakness in the area of maintenance procedure implementation was demonstrated. The overall surveillance program continued to be effective in verifying the operability of safety related equipment and satisfying Technical Specifications. However, a weakness was noted in the lack of preparation for a test and the controls used during test performance. There was also a heavy reliance on personnel training to compensate for procedures with insufficient detail.

III.C.2 Performance Rating: Category 2

Trend: None

III.C.3 Recommendations:

Greater licensee attention is required to ensure procedures are implemented as written, proper procedures are used to perform the desired activity, and that procedures are changed when instructions are insufficient in detail. Evaluate the identified concerns associated with the maintenance/surveillance program and brief the NRC on your plans and results to date.

III.D **Emergency Preparedness**

III.D.1 Analysis

The last Emergency Preparedness (EP) SALP rating was Category 1. There was close management involvement, a demonstrated commitment to quality, prompt resolution of technical issues, a well-developed training program, effective event response, and effective performance in the annual emergency exercise.

The 1991 full-participation emergency exercise occurred during the current SALP period. During that exercise, performance by GPUN emergency response organization (ERO) personnel and site EP staff was very effective. Direction and control were strong in each emergency response facility (ERF). ERO personnel worked closely together and achieved timely problem resolutions. Exercise strengths were identified in communications, engineering analysis, and accident assessment. No weaknesses were identified. The most significant area for improvement was in the evaluation of radiological dose, particularly with regard to worker contamination calculations and off-site dose projections to simulated releases. The GPUN post-

exercise critique was constructive and thorough. Overall, the exercise demonstrated the licensee's ability to properly implement the Emergency Plan.

GPUN provided strong management support to the EP program and its implementation including a high level of effort for training the ERO staff, supplying appropriate dedicated emergency equipment and supplies, and maintaining administrative functions. Training was effectively demonstrated by the strong performance during the annual exercise. Enhancements to the Emergency Operations Facility (EOF) improved communications capability and data displays. Other ERFs were maintained ready with good facilities and equipment.

Frequent interface meetings were held by the EP staff with State and County officials. Corporate managers maintained an active involvement in EP activities through meetings with the site EP staff, report reviews, and tracking of outstanding items. Management knowledge of and participation in EP activities was assessed as strong.

Management conducted appropriate reviews of the Emergency Plan, and Emergency Plan Implementing Procedures (EPIP) changes made specifically to reflect Unit 2 defueling and upgraded the Emergency Action Level (EAL) classification scheme. Later GPUN review identified potential improvements in quantification of existing EAL initiating conditions. After peer and management review, a revised EAL package was submitted to (and is now being reviewed by) the NRC. Overall, GPUN's efforts to maintain the Emergency Plan and EPIPs current were aggressive.

The EP staff was comprised of seven full-time personnel supplemented by assistance from other GPUN site and corporate staff personnel. This has provided sufficient depth, experience, and a discipline mix that contributed positively to program implementation. EP staffing has been stable. Upkeep of the Emergency Plan and EPIPs, scenario development, assuring readiness of ERFs and communications systems, and interfaces with on-site and off-site support groups were all effective. Overall, there was proper EP program administration. A performance-based emphasis was evident in walk-through training evolutions. A sufficient and fully qualified ERO staff was in place: four technical and management staff were assigned and qualified in each key functional area and were required to maintain qualification. A matrix for shift, initial, and support training incorporated well-described course modules that included appropriate training requirements. Overall, ERO training was thoroughly defined and implemented to exceed established training program goals.

The licensee conducts a major emergency preparedness drill once per quarter, including their annual exercise. The quarterly drills include participation by an operating crew, the initial response organization, and the emergency support organization. Each of the six operating crews is drilled at least once per year. Integration of other plant departments, including radiological

controls and security, occurs during each quarterly drill. A critique of each drill is conducted to identify weaknesses and improve performance. There are three separate emergency response crews. Each response crew is scheduled for at least one quarterly drill per year.

There were no events causing activation of the emergency plan. Only minor plant incidents occurred. During these, the site staff responded well, resolved technical issues properly, and made required notifications in a timely manner.

Summary

In summary, GPUN implemented an effective emergency preparedness program. Management involvement was evident in on-site and off-site EP activities. Site EP staff maintained program readiness for implementing emergency response. The relationship with State and local government officials was actively maintained. Licensee training was performance-based and clearly defined. Sufficient and well-qualified personnel were assigned to the ERO. Response during the annual exercise provided timely resolution of scenario problems and was strong in communications and accident assessment. Responses to actual events were timely and appropriate. Overall, EP performance was strong and effective.

III.D.2 Performance Rating: Category 1

Trend: None

III.D.3 Recommendations: None

III.E **Security**

III.E.1 Analysis

During the previous assessment period, the licensee's performance was rated as Category 1, based on a very effectively implemented and performance oriented security program as evidenced by: appropriate management attention to and support for the program; the allocation of resources for necessary program upgrades and staffing; an aggressive audit program; an excellent enforcement history; and an effective training program.

During this period, the licensee sustained this level of performance. Upgrades and enhancements of the security systems and equipment were continued and included the completion of an upgrade to access control hardware with state-of-the-art equipment, the complete replacement of the back-up perimeter intrusion system with a state-of-the-art system, and an upgrade of the assessment system, including the installation of additional assessment equipment. The licensee also completed renovation of the access control facility that included redesigning and relocating the badge issuance and supervisors' areas for more efficient traffic flow and better oversight of the access control functions. The transition to new equipment was made with no

adverse impact on security. The significant commitment of resources for capital improvements was indicative of management's continued support for and commitment to maintain an effective security program.

Security management also maintained effective communication and good rapport with other plant groups during this assessment period by having a member of security management actively involved in outage planning, and by participating in the daily plant maintenance and outage meetings. Security management also remained active in industry organizations engaged in nuclear power plant security matters.

Security management met weekly with maintenance supervision to review security maintenance work. The licensee also assigned a full-time I&C technician to maintain security equipment. The weekly meetings and dedicated I&C support resulted in excellent on-line availability for security equipment and the minimal use of compensatory measures. This reflected management's commitment to an effective program.

The classroom security training was administered by the licensee's Training Department. All practical security training was conducted by qualified security department instructors. The security department instructors were also qualified to conduct the classroom training in the event the need arises. The training program was well-structured, current, and effective as evidenced by minimal personnel errors.

Staffing of the security force was consistent with program needs, as evidenced by the minimal use of overtime. Members of the security force exhibited a professional demeanor, high morale and were very knowledgeable of their duties. The turnover rate remained very low. The security force and other plant employees had a good working relationship.

Audits of the security program conducted by the licensee's Quality Assurance Group and the self assessments were found to be comprehensive and thorough. Findings from audits and surveillances tended to be directed toward improving the program as opposed to being compliance-oriented. Corrective actions were prompt and effective with aggressive follow-up to ensure implementation.

The licensee's event reporting procedures were clear, consistent with the NRC's reporting requirements and well understood by security supervisors. Two one-hour events were reported during the period. Corrective actions were prompt and appropriate for each event and no adverse trend was identified. The licensee also properly tracked and analyzed loggable security event reports and took corrective actions as necessary.

The licensee's Fitness-for-Duty (FFD) program and its implementation were responsive to both the spirit and intent of the NRC's rule and were aggressive, comprehensive, and directed toward assuring the public health and safety.

Four security program plan changes were submitted during the period. The revisions were technically sound and demonstrated a thorough knowledge and understanding of NRC requirements and security objectives.

Summary

In summary, the licensee continued to maintain a very effective and performance-oriented program. Management attention and support were clearly evident in all aspects of the program implementation, system and equipment upgrades continued in order to reduce reliance on human resources, good communications, and rapport were maintained with other plant departments, and resources were allocated to security-related maintenance. In addition, a well trained, professional staff was retained and performance-based audits and self-assessments were conducted. These efforts were reflective of the licensee's commitment to a high quality, effective security program.

III.E.2 Performance Rating: Category 1

Trend: None

III.E.3 Recommendations: None

III.F Engineering/Technical Support

III.F.1 Analysis

During the previous assessment period, the licensee's performance in this functional area was rated Category 1. Numerous accomplishments were described in the prior SALP and engineering support for the TMI-1 site was effective. However, a high backlog of engineering evaluation requests, a large number of field change requests and field change notices for modification packages, and infrequent site attendance at the corporate engineering meetings were identified as problem areas. These problem areas were assessed as minor in safety significance. Follow-up of these previously identified problems was being adequately addressed by the licensee.

During the current assessment period, the licensee continued to exhibit effective engineering support for the site and safety perspective was evident in design modifications and other engineering activities. Several of the major modifications that were successfully completed during the recent 9R outage included the chemical cleaning of the steam generators (SG) that was exceptionally well planned and effectively monitored; the station blackout modification that required extensive electrical, mechanical, and instrument and control work and successful resolution of the diesel generator startup problem; the reactor coolant pump lube oil modifications that should improve reliability of these important pumps and reduce radiation exposure to maintenance personnel; completion of the instrument air upgrade to improve capacity and performance; and the control room alarm enhancements that provide a more logical

and improved annunciator layout organized by system and subsystem with enhanced labeling and a hierarchy arrangement. In each of the modification and outage efforts there was continuous and effective engineering direction and a team oriented approach that resulted in good overall performance. A review of six randomly selected modifications indicated that the modification packages were complete, logical, and technically accurate.

Additional outage activities where the licensee displayed notable performance and a safety conscious approach were the eddy current testing of much larger than required tube sample size, and the precautionary sleeving of 125 tubes that are subject to high cycle fatigue from high steam velocities in each SG steam exit lane wedge. The ten year inservice inspection of the reactor vessel welds was another well coordinated activity performed by the licensee which required thorough engineering analysis and resolution of several nondestructive test indications.

The licensee has a strong probabilistic risk assessment (PRA) staff and was starting to make more effective use of PRA as an evaluation tool for prioritizing modification efforts. The PRA was performed in-house by the engineering staff and was being upgraded to reflect actual equipment availability.

The recently instituted site engineering requirement for an engineering manager to attend the 6:30 a.m. shift turnover briefing was an excellent engineering initiative that enables early engineering participation in support of plant problems. Site engineering supervision effectively reduced, by over 50 percent, a large engineering work request backlog that was a prior NRC concern. This was accomplished thorough aggressive management review of the requested work, setting realistic completion dates, and holding individuals accountable. During this assessment period, plant engineering effectively responded to daily plant problems and work was prioritized and completed in a timely manner.

Evidence of an effective erosion/corrosion program at the plant was demonstrated by the early identification of potential problem areas for repair and replacement. Engineering has used the Electric Power Research Institute "Checkmate" computer program for the first time to effectively detect erosion/corrosion in the piping systems. Input from engineering for control of primary and secondary water chemistry was also evident. Plant engineering preparation and oversight of injection sealant repair of a steam valve bonnet flange leak was very effective and the communications interface between corporate and site engineering and operations on a leakage through two core flood tank check valves was well coordinated. Plant engineering also took the lead in resolving the problems associated with the excessive reactor coolant pump leak off-during the last operational cycle. Additionally, the engineering staff oversaw the chemical cleaning process to the secondary side of the steam generators. The chemical cleaning program was technically sound and well planned. The vendor chosen to apply the process was well qualified and the staff well trained and knowledgeable, especially in the area of corrosion monitoring.

Several minor problems were noted in documenting the operability determination of a valve with a failed key and, in the plant review group, documenting that the failed key was not reportable under 10 CFR 21. In the case of the failed key, the engineering resolution of the decay heat removal cooler adequacy with the valve as positioned, did not fully support operability and additional documentation was required. Several other documentation inadequacies and an inconsistency in a 10 CFR 50.59 review were identified during the assessment period; however, the overall quality of engineering support was excellent.

Both corporate and site engineering personnel showed technical competence. There was good cooperation and a team atmosphere throughout the organization and there was a very limited use of contract engineering personnel. In-house training for the engineering staff and management was effective as demonstrated by the engineering activities reviewed. There is a comprehensive personnel development program that is reviewed quarterly. The licensee also supports industry training, participation in the B&W owners group, and in ASME and IEEE activities.

In the area of engineering self-assessment, the licensee has performed safety system functional inspections for three systems including the emergency electrical power distribution system. The reports were comprehensive and appropriately identified programmatic problems in the particular area. Quality assurance was also involved in the evaluation of engineering. Quality assurance audits were performed in the areas of design control, engineering administration, operating experience, contractor design controls, engineering technical reviews and the TMI-1 mini-modification program. The findings and observations were incisive and resolved in a timely manner.

Summary

In summary, plant and corporate engineering have provided excellent support for TMI-1 operations. Major modifications performed enhanced plant safety, improved equipment reliability and performance, and benefitted personnel safety. Good engineering was evident in the modification planning and direction for the SG chemical cleaning, station blackout work, reactor coolant pump lube improvements, instrument air upgrade, and control room alarm enhancements. The site engineering involvement in plant operating activities was noteworthy. Cooperation between corporate and site engineering was a strength and engineering personnel are technically competent.

III.F.2 Performance Rating: Category 1

Trend: None

III.F.3 Recommendations: None

III.G Safety Assessment/Quality Verification

III.G Analysis

This area received a Category 1 rating in the last assessment period. The last SALP report identified strengths as the TMI-1 Quality Assurance (QA) program, the quality of Licensee E nt Reports (LERs), an aggressive program for plant improvements, and aggressive senior management involvement in daily plant operations. A minor weakness was identified in the quality of 10 CFR 50.59 evaluations for procedure changes.

At the end of the SALP assessment period, there were 13 active licensing actions, about half the average for the two previous SALP periods. The licensee was aggressive in providing information necessary to close out 36 licensing and safety issues. The licensee met with the NRC approximately once per month to enhance communications regarding licensing issues, generic safety issues, and inspection open items. The licensee, on its own initiative, made presentations to the NRC Headquarters staff on issues of particular complexity such as (1) installation of four Westinghouse lead test assemblies in the core during the 9R refueling outage, (2) corrective action for the steam generator fouling problem, and (3) a special license amendment to raise the Technical Specification limits for allowable primary-to-secondary leakage. Thus, the licensee exercised foresight in avoiding potential delays in resolution of safety issues. Licensee responses to NRC requests for information, such as generic letters and bulletins, were consistently on time and responsive to the issues. The quality and completeness of licensee submittals has remained excellent for the most part. In one instance, however, regarding a relief request to delete certain valves from the inservice testing program, it was necessary for the NRC to request information from the licensee that should have been in the submittal. Two major submittals during this SALP period were the inservice inspection program for the second 10-year interval and a license amendment request to support a spent fuel pool reracking project. Although both of these submittals were still under staff review at the end of the period, preliminary assessment was that the submittals were complete and reflected the professionalism of the licensee's engineering staff.

During this SALP period, the licensee submitted and the staff reviewed and approved three revisions to the GPUN Operational Quality Assurance Plan (OQAP). These revisions represented upgrades to the quality and clarity of the OQAP, provided for better training of Level III inspectors, and committed to the requirements of ANSI 3.1-1981.

As during past SALP periods, execution of the QA program has been very effective in identifying deficient conditions. The audit reports issued by the QA department were thorough and probing and resulted in actions that improved the quality and safety of TMI-1 operation. An event of interest was discovery by a Quality Control (QC) inspector and the Engineering department that 54 stainless steel valves and approximately 155 carbon steel valves, all manufactured by the Yarway Company, were stamped with incorrect valve application data. Some of the carbon steel valves had been installed in the plant and were evaluated after-the-fact as being suitable for their application. The problem was reported to Yarway, who subsequently

corrected the valve data on the valves that had not been installed. Discovery of the deficiency demonstrated that the QA program is capable of discovering potential quality problems. However, there was a delay in affixing hold tags on the carbon steel valves that had not been installed.

In general, the licensee's QA effort associated with its program to upgrade maintenance procedures made some improvements to procedures for operation and maintenance of the emergency diesel generators as an outcome of a licensee identified common cause failure mode for the diesel generators. However, maintenance procedures for lubricating safety related valves were not implemented and led to valve failure and degradation of other like valves. Further, as indicated by events during the recent outage, surveillance procedures failed to give sufficient and appropriate guidance for infrequently performed tasks. Further, implementation of the existing surveillance procedures was not always accomplished with the necessary rigor. Collectively, these procedure problems suggest that the licensee's staff placed undue emphasis on operator or technician knowledge over specific procedural instructions.

The licensee initiated a special shutdown (outage) risk assessment program in preparation for the 9R refueling outage. As part of this effort, a set of fuel protection criteria were developed to provide an adequate safety margin for each of the identified plant conditions and critical safety functions. The integrated outage schedule was then reviewed against these criteria. To reduce shutdown risk during the 9R outage, the time spent in mid-loop operation was minimized by installation of cold leg dams during the outage. These measures demonstrate a safety concern by the licensee for reducing risk during outage periods.

The licensee's safety assessment program also included two initiatives concerning steam generator integrity and performance. These were chemical cleaning of the steam generator secondary sides and sleeving of 125 of the tubes most susceptible to fatigue failure in each steam generator. These initiatives have been more fully discussed in Section III.F of this report.

The quality of 10 CFR 50.59 safety reviews performed by the licensee continued to improve during this assessment period. Minor problems were noted in documenting operability determinations. The licensee has taken the initiative of utilizing guidance developed by industry into the training program for safety reviewers. The administrative procedure governing these reviews was also strengthened during this period. One particularly significant special test was performed under 10 CFR 50.59 in June 1990 to determine how high steam generator downcomer level could be raised without affecting the feedwater heating feature of the steam generator. The safety evaluation supporting this test was particularly well done. Safety reviews for plant modifications have continued to be a strength as noted in previous SALP reports.

The quality and timeliness of Licensee Event Reports (LERs) has continued to be excellent during this assessment period. The reports have been well-written and normally provide objective assessments of the root causes of events, their safety significance, and corrective action. The number of LERs and number of plant events remained low. A significant event

occurred when irradiated fuel w. moved within the reactor building without establishing containment closur. as required by Technical Specifications. The LER very clearly described the event and described its root causes. The licensee also performed a detailed human factors review of this event.

The licensee completed a number of plant modifications intended to enhance safe operations of the plant during this period. The most significant modification was conversion of a TMI-2 emergency diesel generator to a TMI-1 Station Blackout (SBO) diesel generator, becoming the first licensee to achieve compliance with the Station Blackout rule (10 CFR 50.63). The licensee suspended critical path outage completion activities (i.e., plant heatup) to complete diesel testing.

The licensee has various oversight and safety review committees in place. The Independent Onsite Review Group (IOSRG) exists as required by the TMI-1 Technical Specifications. Most of the routine onsite safety review activities are conducted by the Plant Review Group (PRG). The Nuclear Safety and Compliance Committee (NSCC), formed as a result of the TMI-1 restart hearings, reports directly to the Chairman of the Board and has a number of onsite members. The General Office Review Board (GORB) also advises the licensee's President/CEO. The PRG makes appropriate decisions and recommendations in response to safety issues that arise. The NSCC semiannual reports are particularly objective and raise many of the same types of issues raised by the NRC, both at TMI-1 and Oyster Creek. The program to upgrade maintenance procedures, for example, was partly the result of an NSCC observation. The licensee has also initiated a program of monthly review, by the Plant Review Group, of the Operations Monthly Significant Events Report that includes a number of information sources including the control room personnel log entries, QA, Safety Manager and plant management notes and comments. This report has a section that designates some events as low threshold events. The results of these monthly reviews are being trended for significant conditions adverse to safety or quality. An appropriate number and diversity of safety committees have been established to identify and resolve safety issues at TMI-1. These groups have been effective in advising senior management of issues the possible solutions and management generally responds to their recommendations.

Summary

In summary, there were numerous licensee programs in place to assess safety and verify quality. These programs looked at normal operations and utilized lessons learned from past outage periods. Management, at all levels, was closely involved in operation and maintenance of the plant and decisions were made on the basis of safety implications, not schedule. The TMI-1 QA Department continued to function efficiently to maintain the quality of plant operations and material condition. The few LERs were of high quality. The various safety committees to continue to be effective. Recent procedure quality/implementation problems have led to personnel errors and events.

III.G.2 Performance Rating: Category 1

Trend: None.

III.G.3 Recommendations: None

IV. SITE ACTIVITIES AND EVALUATION CRITERIA

IV.A Licensee Activities

The licensee began this SALP period operating Unit 1 at 94 percent power. Reactor power was limited to 94 percent power due to once-through-steam-generator (OTSG) operation near the integrated control system high level limit due to secondary side fouling. On June 22, 1990, the licensee performed a special test that raised reactor power to determine the maximum OTSG level that could be attained without affecting feedwater preheating. After a safety evaluation was written concluding the plant could be safely operated at higher OTSG operating levels, on July 20, 1990, reactor power was increased to 97 percent. Reactor power gradually decreased due to the gradual fouling of the secondary side of the steam generators.

During the SALP period, the licensee had several required power reductions. Beginning September 28, 1990, reactor power was reduced for five days to 47 percent to repair main condenser tube leaks. On November 28, 1990, the licensee reduced power to 75 percent to repair a leak in the tenth stage feedwater heater. On February 23, 1991, an electro-hydraulic control (EHC) spurious closure signal caused the plant to run back to 75 percent power. On June 7, 1991, power was reduced to 75 percent for two days to repair leaks in the 10A feedwater heater.

On July 24, 1991, a reactor trip occurred from 92 percent power due to a combination of personnel error and equipment malfunction. A resulting redistribution of OTSG secondary side deposits allowed reactor power to be increased to 95 percent upon restart on July 26, 1991.

On September 27, 1991, the plant was shut down for the ninth (9R) refueling outage. During the shutdown, a reactor trip occurred at 13 percent power due to an incomplete turbine test procedure. Major outage work activities included replacing seals in all four reactor coolant pumps, main turbine overhaul, in-core detector replacement, complete core off-load for reactor vessel in service inspection, OTSG tube plugging and sleeving, OTSG chemical cleaning, and electrical connection of the station blackout diesel from Unit-2 to Unit-1 busses. On November 14, 1991, the licensee restarted the unit following completion of the refueling outage. The unit was expected to be at full power on November 17, 1991. The next scheduled refueling outage is in September, 1993 (21 month fuel cycle).

On January 24, 1991, the Unit-2 accident generated water (AGW) evaporator began the vaporization of AGW to atmosphere. At the close of the SALP period, the licensee had vaporized 843,842 gallons.

IV.B NRC Inspection and Review Activities

During the assessment period the NRC resident staff decreased from four to two inspectors. An NRC intern and a Department of Energy intern were assigned to the site for six months and two months, respectively. NRC team inspections were conducted in the following areas:

-- Emergency Preparedness Inspection conducted on September 12, 1990, to observe the partial-participation exercise.

-- Electrical Distribution System Functional Inspection conducted from November 19, 1990, to December 21, 1990, to determine if the electrical distribution system is capable of performing it's intended function.

-- Emergency Preparedness Inspection conducted on June 26, 1991, to observe the full-participation exercise.

IV.C Significant Enforcement Actions

There was a significant event which involved moving fuel without first having established containment. The event itself occurred during testing of the Main Bridge refueling interlocks in which the procedure called for the lifting of one fuel bundle out of and back into the core. The operators performing the test misinterpreted the intent of the procedure, and consequently removed and replaced one fuel bundle without having first established containment integrity. A briefing had been conducted prior to the commencement of the bridge interlock test; however, the briefing was inadequate. A severity level three violation was issued but the civil penalty was fully mitigated because of prompt NRC notification and past good performance in operations and outage planning.

ATTACHMENT 1

SALP EVALUATION CRITERIA

Licensee performance is assessed in selected functional areas, depending on whether the facility is in a construction or operational phase. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations. Special areas may be added to highlight significant observations.

The following evaluation criteria were used, as applicable, to assess each functional area:

1. Assurance of quality, including management involvement and control;

2. Approach to the resolution of technical issues from a safety standpoint;

3. Enforcement history;

4. Operational and construction events, including response to, analyses of, reporting of, and corrective action for;

5. Staffing, including management;

6. Effectiveness of training and qualification program;

On the basis of the SALP Board assessment, each functional area evaluated is rated according to three performance categories. The definitions of these performance categories are given below.

Category 1: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a superior level of performance. NRC will consider reduced levels of inspection effort.

Category 2: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a good level of performance. NRC will consider maintaining normal levels of inspection effort.

Category 3: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in an acceptable level of performance; however, because of the NRC's concern that a decrease in performance may approach or reach an unacceptable level, NRC will consider increased levels of inspection effort.

Category N: Insufficient information exists to support an assessment of licensee performance. These cases would include instances in which a rating could not be developed because of insufficient licensee activity or insufficient NRC inspection.

The SALP Board may assess a functional area and compare the licensee's performance during a portion of the assessment period to that during an entire period to determine a performance trend. Generally, performance in the later part of a SALP period is compared to the performance of the entire period. Trends in performance from one period to the next may also be noted. The trend categories used by the SALP Board are as follows:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period and the licensee had not taken meaningful steps to address this pattern.

A trend is assigned only when, in the opinion of the SALP Board, the trend is significant enough to be considered indicative of a likely change in the category in the near future. For example, a classification of "Category 2, Improving" indicates the clear potential for "Category 1" performance in the next SALP period.

It should be noted that Category 3 performance, the lowest category, represents acceptable safety performance. If at any time the NRC concluded that a licensee was not achieving an adequate level of safety performance, it would then be incumbent upon NRC to take prompt appropriate action in the interest of public health and safety. Such matters would be dealt with independently from, and on a more urgent schedule than, the SALP process.