FEB 11 1988

Docket No. 50-289

GPU Nuclear Corporation
ATTN: Mr. H. D. Hukill
Director, TMI-1
P. O. Box 480
Middletown, PA 17057

Gentlemen:

Subject: Systematic Assessment of Licensee Performance (SALP) Report No. 50-289/86-98

The NRC Region I SALP Board conducted a review on December 8, 1987, and evaluated the performance of activities associated with the Three Mile Island (Unit 1) Nuclear Generating Station. The results of this assessment are documented in the enclosed SALP report, which covers the period November 1, 1986, to October 31, 1987. We will contact you shortly to schedule a meeting to discuss the report.

At the meeting, you should be prepared to discuss our assessment and any plans you may have to improve performance further. Any comments you may have regarding our report may be discussed at the meeting. Additionally, you may provide written comments within twenty days after the meeting.

Your cooperation is appreciated.

Sincerely,

Original Signed By
WILLIAM T. RUSSELL
William T. Russell
Regional Administrator

Enclosure: NRC Region I SALP Report 50-298/86-98

cc w/encl:
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C. W. Smyth, Manager, TMI-1 Licensing
R. J. McGoey, Manager, PWR Licensing
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SALP Board Meeting Attendees
R. Brady, RI

RI:DRP	RI:DRP	RI:DRP	RI:DRP	RI:DRA	RI:RA
Conte/meo for 2/3/88	Cowgill* for	Bettenhausen* 2/9/88	Kane*	Allan 2/9/88	Russell 2/10/88

*SEE PREVIOUS CONCURRENCE PAGE.

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02/03/88

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R. Bradley, RI

see comment dtd 2/9/88

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2/3/88	2/5/88			2/6/88		

w/Comment

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02/03/88

ENCLOSURE

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

50-289/86-98

GPU NUCLEAR

THREE MILE ISLAND, UNIT 1

NOVEMBER 1, 1986 - OCTOBER 31, 1987

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TABLES

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance based upon this information. The SALP program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. The SALP program is intended to be sufficiently diagnostic to provide meaningful guidance to the licensee's management to promote quality and safety of plant construction and operation.

An NRC SALP Board, composed of the staff members listed below, met on December 8, 1987, to review the collection of performance observations and data and to assess licensee performance 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 Section II of this report.

This report is the SALP Board's assessment of the licensee's safety performance at Three Mile Island, Unit 1 for the period November 1, 1986, through October 31, 1987.

The SALP Board was comprised of the following:

Chairman

W. Kane, Director, Division of Reactor Projects (DRP), Region I (RI)

Members

T. Martin, Director, Division of Radiation Safety and Safeguards (DRSS), RI
J. Stolz, Director, Project Directorate I-4, Office of Nuclear Reactor Regulation (NRR)
L. Bettenhausen, Chief, Reactor Projects Branch No. 1, RI
P. Eapen, Chief, Engineering Branch, Division of Reactor Safety (DRS), RI
C. Cowgill, Chief, Reactor Projects Section No. 1A, RI
G. Edison, Operating Reactors Project Manager (TMI-1), NRR
R. Conte, Senior Resident Inspector (TMI-1), DRP, RI

Other Attendees (Non Voting)

W. Baunack, Project Engineer, DRP, RI
H. Bicehouse, DRSS, RI
D. Johnson, Resident Inspector (TMI-1), DRP, RI
R. Keller, Chief, Pressurized Water Reactor Section, DRS, RI
A. Krasopoulos, DRS, RI
W. Lazarus, Chief, Emergency Preparedness Section, DRSS, RI
T. Moslak, Resident Inspector (TMI-2), DRP, RI
W. Pasiack, Chief, Effluents Radiation Protection Section, DRSS, RI
S. Peleschak, Reactor Engineer, DRP, RI
M. Shanbaky, Chief, Facilities Radiation Projection Section, DRSS, RI
G. Smith, DRSS, RI
T. Weadock, DRSS, RI

II. CRITERIA

A. General

Licensee performance is assessed in selected functional areas, depending upon whether the facility is in a construction, pre-operational, 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.

One or more of the following evaluation criteria were used to assess each functional area.

1. Management involvement and control in assuring quality.

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

3. Responsiveness to NRC initiatives.

4. Enforcement history.

5. Operational and construction events (including response to, analyses of, and corrective actions for).

6. Staffing (including management).

7. Training and qualification effectiveness.

However, the SALP Board is not limited to these criteria and others may have been used where appropriate.

Based upon the SALP Board assessment, each functional area evaluated is classified into one of three performance categories. The definitions of these performance categories are:

Category 1. Licensee management attention and involvement are aggressive and oriented toward nuclear safety; licensee resources are ample and effectively used so that a high level of performance with respect to operational safety and construction quality is being achieved. Reduced NRC attention may be appropriate.

Category 2. Licensee management attention and involvement are evident and are concerned with nuclear safety; licensee resources are adequate and are reasonably effective so that satisfactory performance with respect to operational safety and construction quality is being achieved. NRC attention should be maintained at normal levels.

Category 3. Licensee management attention or involvement is acceptable and considers nuclear safety, but weaknesses are evident, licensee resources appear to be strained or not effectively used so that minimally satisfactory performance with respect to operational safety and construction quality is being achieved. Both NRC and licensee attention should be increased.

The SALP Board may determine to include an appraisal of the performance trend of a functional area. Normally, this performance trend is only used where both a definite trend of performance is discernible to the Board and the Board believes that continuation of the trend may result in a change of performance level. Improving (declining) trend is defined as: licensee performance was determined to be improving (declining) near the close of the assessment period.

B. Explanation of Functional Areas

Since the SALP process started for TMI-1, the Engineering Support functional area (current title) has evolved as the staff started to focus a number of inspections into this important licensee activity. In the earlier SALP reports, this area was termed "Design, Engineering, and Modifications," and then called "Technical Support." The Institute of Nuclear Power Operation (INPO) has a broad view of the Technical Support area and includes such functional areas as surveillance and maintenance work, along with other NRC termed functional areas. To eliminate confusion and to more clearly define the activities in the subject functional area, Technical Support was changed to Engineering Support.

Engineering Support includes all activities of an engineering nature beyond those provided by the operating organization professional technical personnel in support of operating activities. This includes design control, review, analysis, and audit (non-QA) of nuclear plant operations. Modification control and test is considered implementation of the design product, and it is addressed in the "Outage" functional area.

The various aspects of the "Training and Qualification Effectiveness" functional area are considered and discussed as an integral part of other functional areas and the respective inspection hours have been included in each of the other functional areas. Consequently, the discussion in Section V.K is a synopsis of the assessment related to the training conducted in other functional areas. Training effectiveness has been measured primarily by observed performance of licensee personnel and, to a lesser degree, by a review of the program adequacy. Thus, the discussion addresses the training attributes and weaknesses as noted throughout all functional areas and the effect that these have on the overall safe operation of the plant.

Likewise, management involvement and control in assuring quality continues to be an evaluation criterion for each functional area. The various aspects of the programs to assure quality have been considered and discussed as an integral part of each functional area and the respective inspection hours are included in each one. Consequently, the discussion in Section V.L is a synopsis of the assessments relating to the quality of work conducted in other areas.

III. PRIOR ASSESSMENTS

This was the fourth assessment in the 25-month period since TMI-1 Restart authorization. The first assessment (termed "interim") covered the first three months of operations and it focused on the startup and test program as it interfaced with operations. The second assessment (termed "SALP I") covered the first seven months of operations as directed by the Commission and it included a one-month outage related to steam generator repair. The third assessment (termed "SALP II") covered the subsequent six months a'so as directed by the Commission, and it assessed a period covering full power operations. This fourth assessment was the first twelve-month SALP since restart and it included the first refueling outage (five months) since TMI-1 Restart.

For the SALP I/II period, there were 9,059 inspection hours, compared to 4,966 during this fourth assessment. The reduction in hours reflects the overall positive results of SALP I/II periods in that NRC staff had a high level of confidence in licensee performance in order to reduce the substantial and special attention given to this licensee during the first thirteen months of operations. A relatively high level of attention was maintained, however, with the assignment of four resident inspectors and completion of selected programmatic reviews left over from the SALP II period, as reflected in the relatively high inspection hours for this assessment. The level of attention was maintained due to TMI-1's unique design in Region I and some unexpected weaknesses identified during the SALP I/II period.

Also, comparing the two periods, SALP I/II versus this assessment, the inspector-identified violation rate remains essentially the same and relatively low, approximately two violations per 1,000 hours of inspection. Further, the number of LER's remained relatively low, probably due to the licensee's customized (in distinction to the more restrictive standard) technical specifications.

With respect to performance, the SALP I/II period found that TMI-1 was operated safely with a generally strong orientation toward nuclear safety/safeguards and radiation protection. The notable characteristic was the overall high competence of licensee personnel with respect to their high qualification levels and knowledge of plant design/system status. This reflected positively on the licensee's substantial training programs. The material condition of the plant was quite good and, in general, worker attitudes were noted to be overall positive. There were minor lapses in worker attentiveness early in the startup period while working in safety-related areas. This combination of personnel and good material condition of the plant seemed to be the major contributors toward the relatively good operating record for the plant during that first year of operations. However, weaknesses were identified.

Despite generally well established programs, implementation of these programs, at times, was deficient. Problems seemed to be oriented around control of the human element; namely, personnel error or personnel producing deficient (in part) procedures. Personnel performance notably trended downward, es-

pecially during periods of schedular pressure which seemed to be excessively applied at the middle management level in the interest of production. Also, at times, technical and/or supervisory review lacked thoroughness and inquisitiveness in the area of design or for problems/events not making the reportability threshold. Performance here also trended downward during schedular pressure periods. It was noted that during the SALP II period, these review functions were not excessively challenged because of the good operating record of the plant.

Finally, during SALP I/II, it was noted that many oversight groups had the necessary expertise to aggressively identify problems, but licensee management apparently was less aggressive in prioritizing and effectively resolving the root causes of the issues identified. Escalation of issues to higher management seemed to be weak. A number of licensee initiatives in the area of problem identification were noteworthy, however.

IV. SUMMARY OF RESULTS

A. Overall Summary

The licensee continues to operate TMI-1 in a safe manner. Across all functional areas, programs are well established and generally strong, coupled with substantial personnel resources who are highly knowledgeable and appropriately trained. However, program implementation is sometimes weak. Certain deficiencies, although identified, remain uncorrected as long-term problem resolution continues.

During the period, the operating record at the facility was good. Station personnel are professional and take pride in their performance. The material condition of the plant is good and is a direct result of licensee efforts in the Maintenance and Surveillance areas. Engineering support is also notable in providing new systems or modified systems that did not adversely impact operations significantly during the period. However, a good portion of the operating events were due to personnel error, which are preventable since they are primarily due to failures to follow procedures. Individual procedural step inadequacies continue to be noted, and contributed to certain events. The corporate-based technical and safety review program has weakened because of program changes using a methodology unreviewed and unapproved by NRC staff.

Strong programs exist in the site Emergency Preparedness and Radiological Controls areas. However, the failure to correct long standing problems in these areas indicates a decreasing trend which if uncorrected could result in an overall decrease in performance. Corrective action systems are available and are improving, self-assessments in the Security area remains a strength. However, in the Engineering Support area, performance remains inconsistent indicating more attention is required.

Improvements have occurred in the area of outage planning, coupled with a strong modification control program. The licensee effectively converts regulatory requirements into site implementation either by plant modification or software changes. However, there is a heavy reliance on the test program to identify installation errors. Further, certain designs/installations unnecessarily challenge operators because of weak engineering support. In some cases, this involves an incomplete consideration in the design process for human factors. This apparent deficiency in technical approach appears also in the licensing area. Weak engineering support continues to be noted in the environmental qualifications and fire protection areas. Schedular pressures continue to negatively influence the interfaces between operations and other groups, such as test personnel or engineers.

The various review groups, both required by NRC or by licensee initiative, have the required expertise to identify substantive issues. However, upper management is struggling with developing viable solutions to correct continuing inconsistent performance. A notable asset is the quality

assurance department, but the process for escalation of issues was improved only recently as a result of NRC staff enforcement issues in the environmental qualifications area.

B. Background

1. Licensee Activities

At the beginning of this SALP period, the licensee started their first refueling outage since March 1979, which was scheduled for about five months. The critical path work included final upgrade of the emergency feedwater system to safety grade (installation of the Heat Sink Protection System (HSPS)) and upgrades to the fire protection area to meet 10 CFR 50 Appendix R. Other routine major work completed in that outage were a containment integrated leak rate test, refueling, and emergency diesel generator overhauls. Other significant work completed was the Engineered Safety Features fuel handling building ventilation system (to support refueling) and replacement of both letdown coolers. The outage was completed on schedule.

Upon return to power operation in late March 1987, the plant was limited in power output due to reaching high water level limits in the Once-Through Steam Generators (OTSG's). This is termed "power level limited" and is a generic power generation problem with the Babcock and Wilcox (B&W) designed steam generators. The high level limits are reached because of corrosion product buildup in the secondary side of the OTSG's which interfere with primary-to-secondary heat transfer.

As a short-term measure to increase power output, the licensee conducted a planned turbine-to-reactor trip on May 1, 1987, in order to redistribute the corrosion products interfering with feedwater flow in the OTSG. However, upon return to power, an unplanned trip occurred on May 2, 1987. The planned trip was successful in permitting the plant to return to full power operation.

Excessive letdown cooler leakage into the closed-cycle cooling system was detected on May 14, 1987, and it progressively got worse, affecting both coolers. The licensee decided to conduct an outage to replace both coolers (June 12-24, 1987). During the shutdown of June 11, 1987, an unplanned reactor trip occurred. The outage was planned for four weeks but was completed in two weeks.

Since the return to power operations in late June 1987, there was one additional unplanned trip on September 18, 1987. A minor power reduction for a few days also occurred to correct secondary plant problems.

During current power operations, the licensee continues to make progress on Regulatory Guide (RG) 1.97 instrument work in order to shorten the next refueling outage. This outage is currently scheduled for July 1, 1988, and is to last approximately two to three months.

License amendments to support the above-noted modifications were also issued during this period. An amendment of significance was the NRC staff approval in September 1987 of the licensee's corporate reorganization.

2. Inspection Activities

Resident inspector assignments varied between two and four personnel assigned during the period. In addition numerous specialist inspections were conducted. During this period, the following major team inspections occurred:

-- in November 1986 and October 1987, annual emergency preparedness exercise observations to assess licensee ability to protect public health and safety in case of an emergency;

-- in December 1986, an Appendix R inspection to assess licensee compliance with the fire protection rule 10 CFR 50 Appendix R;

-- in January 1987, an Environmental Qualification (EQ) inspection to assess compliance with rule 10 CFR 50.49.

-- in February 1987, a Readiness Assessment Team (RAT) Inspection to assess licensee preparations for Cycle 6 startup.

Significant NRC staff effort also occurred as followup on the numerous open issues identified during NRC-directed Performance Appraisal Team/Systematic Assessment of Licensee Performance (PAT/SALP) processes of 1986, especially in the areas of Technical Support and Technical and Safety review.

This was a twelve-month SALP period which involved 4966 inspection hours.

C. Facility Performance Analysis Summary*

Functional Area	Last Period	This Period
Plant Operations	2	2
Radiological Controls	1	1
Maintenance	1	1
Surveillance	1	1
Fire Protection	N/A	2
Emergency Preparedness	1	1
Security and Safeguards	2	1
Outages	N/A	2
Licensing Activities	1	2
Engineering Support	2	2
Training and Qualification Effectiveness	1	1
Assurance of Quality	2	2

*No significant trends were discernible to the Board.

D. Unplanned Shutdowns, Plant Trips, and Forced Outages

Date	Power Level	Description	Root Cause	Functional Area
5/1/87	100%	Turbine-to-reactor trip for steam generator fouling problem.	Design - need for an effective system for removal of fouling material.	N/A
5/2/87	90%	Reactor trip on loss of feedwater due to operator error during heat balance calibration (LER 87-02).	Personnel - inattention to verifying action of aligning non-tested power range input to the Integrated Control System (ICS).	Surveillance
6/12/87	11%	Reactor trip on high RCS pressure due to loss of FW in manual mode (LER 87-06).	Personnel - inattention to control parameters in in manual feedwater control.	Operations
6/12/87	N/A	Forced outage for letdown cooler replacement.	Tube failure under investigation.	N/A
6/23/87	N/A	Reactor protection system (RPS) actuation on high pressure in shutdown bypass mode (LER 87-07).	Personnel inattention to control parameters.	Operations
9/16/87	100%	Turbine-to-reactor trip due to high level in plant moisture separator - control valve malfunction (LER 87-08)	Component malfunction.	N/A

NOTE: The root cause in the table is the opinion of the SALP Board based on the inspector(s) description of the event and may, in certain instances, differ from the LER.

V. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

During the previous assessment period, the SALP Board found that operational activities were oriented towards nuclear safety but were not always fully conservative. Adequate resources were available to ensure safe operation. Control room operators exhibited good overall knowledge and command of evolutions. Review groups were utilized to identify problems but were less effective in causing changes to resolve noted problems. Some personnel errors were noted in that operations were conducted from memory or without rigorous use of procedures.

In addition to the routine inspections by the resident inspectors, the inspection effort included a readiness assessment team inspection prior to startup from the Cycle 6 refueling outage (6R). Continuous backshift inspection coverage was provided during transition periods into and out of outages by the resident office.

The control room environment continued to be oriented toward safe operation of the plant. The control room environment is generally quiet, professional, and controlled. Access to the control room proper area was rigorously controlled. Distracting activities, such as radios, were not permitted and this policy was strictly implemented. Control room operations pre-shift briefings of all shift personnel continued to aid in effective shift communication. Routine activities were carried out with few problems.

Overall, operations department organization and planning positively contributed to the successful conduct of both routine evolutions and off-normal situations. Operations department management input into scheduling shutdown and startup activities, along with allocation of resources, has permitted these complex activities to be carried out with relatively few problems. As an example, the planned reactor trip on May 1, 1987, was accomplished without major problems. Preplanning, which included briefings and additional personnel, provided assurance that necessary plant systems were available and the evolution resulted in an expected plant response. Further, recent testing of ventilation systems to justify Appendix R exemption requests was completed without any adverse impact on safe plant operations. Generally, safety evaluations in accordance with 10 CFR 50.59 for these evolutions have been more complete and thorough than in past assessment periods.

However, preplanning becomes a problem at times when schedular pressure heightens. Several operational interface problems occurred during startup from 6R, which resulted from poor communications and

the fast pace of activities. For example, there was an inadvertent injection of feedwater into a steam generator because of simultaneous preoperational testing and feedwater heating/cleanup. Further, a HSPS steam generator level indicator alignment problem confused operators on initial operation of the steam generator for the Cycle 6 startup. These events unnecessarily challenged operators in the performance of their duties during mode transition periods.

Operator response to off-normal events continued to be oriented toward nuclear safety. The operators were generally conservative in these events as identified in their response to the above-noted challenges. Contributing factors appeared to be their substantial experience at TMI-1 specific design and the high quality of training provided by the licensee. For example, training for major modifications (HSPS and Appendix R), which were installed during the refueling outage, was extensive and it aided in operator response to related system off-normal events. The licensee prepared the operators reasonably well for Cycle 6 startup as evidenced by the relatively smooth transition from cold shutdown to power operations. In other cases, there were lapses in operator conservatism. Operator impromptu action to protect against the loss of a vital bus disrupted the conduct of a test for one emergency diesel generator. No adversity to safety resulted because of these lapses in operator performance which usually was of high quality.

Management resolution of problems and anomalous conditions that occur is generally accomplished with an attitude toward safety. The post-trip review process that has been exercised on several occasions during this period has proven to be an effective tool in evaluating the trip and resolving any associated problems. Plant startups after the trips have been accomplished without repetitive problems. The backshift management tours are an initiative to focus attention on routine operations. Overall, management was substantially involved in all facets of plant operations and especially in the process of post-trip recovery. For example, this has resulted in an improved performance in logkeeping practices, especially for recording minor event details.

However, self-evaluation of these less significant problems appears to be weak, as discussed below. These problems are not formally evaluated by the Plant Incident Report (PIR) system. An example of this occurred during post-trip recovery actions when an OTSG level transmitter malfunctioned and operators reduced OTSG level to the point at which there was an emergency HSPS logic initiation. As permitted by technical specifications, the auto start function of the emergency feedwater pump had been defeated, so no plant transient occurred. Earlier evaluation of this anomaly would have resulted in a more timely detection of the malfunctioning detector

prior to plant startup instead of several days after startup. Opportunities for operational program enhancements are lost because of a lack of critical review of minor events.

Although the number of reported events in this area is small, a few problems have occurred with operators due to personnel errors. Review of LER's and internal events indicates that a majority of these events are due to personnel error and/or procedure inadequacies. Procedure nonadherences were a leading contributor to personnel error events. During major plant transitions, the pace of activities also seems to be a contributing cause.

The number and significance of procedure adherence problems appeared to have decreased in this area during this SALP period, but minor problems persisted. The most significant of these events was an inspection finding during the draining of OTSG's for chemistry control and when to use nitrogen overpressure. During this transition period, operators failed to follow procedures rigorously because they were confused on which section of the procedure was to be used. This problem was corrected by shift supervision with no adverse effect on the plant. Counseling or additional training on some complex, non-routine evolutions has been the preferred corrective action, rather than making procedure enhancements or creating new procedures (see also Assurance of Quality).

The licensee completed implementation of the Independent Verification Program (IVP) during this SALP period. The additional emphasis on re-evaluating their IVP activities was accomplished due to additional NRC staff concerns about the program after the IVP issue was initially resolved in 1983. The programs for verifying correct operating activities have been tentatively reviewed by NRC staff as acceptable. A weakness exists in that IVP applies only to a special subset of safety-related equipment.

However, IVP program implementation has, in general, been quite good with no events occurring that involve major safety significance. Operations performance problems with respect to verifying correct activities cannot be correlated to IVP weaknesses. They seem to be due to poor attention to detail; failure to follow administrative controls; poor technical and safety reviews; and, perhaps, poor training in the area of system classification (see Assurance of Quality).

In summary, management involvement has been evident in all areas of operations, especially as evidenced by continuing backshift tours. Some improvement in this area has been noted. Guidance and direction for complex evolutions are substantial. Experienced licensed operators, functioning in a positive control room environment, continue to react well to abnormal situations. This reflects positively on the quality of training provided by the licensee. The post-trip

review process is strong and is a positive aspect of overall plant operations. However, opportunities for operational enhancements are missed because minor events are overlooked. The interface and cooperation between operations and engineering or test personnel weakens under schedular pressures.

2. Conclusion

Category 2.

3. Recommendations

None.

B. Radiological Controls

1. Analysis

During the previous assessment, the licensee's radiological controls program had no significant deficiencies.

In addition to routine resident coverage, three inspections were conducted by region-based radiation specialists during the current period; two covered in-plant radiological safety and one reviewed the licensee's water chemistry control program. One violation related to in-plant radiological safety was identified.

Areas of previously noted strong program performance remained consistent and effective during the current period. A well-qualified supervisory staff provided an appropriate level of oversight for on-going radiological activities. Effective radiation worker and technician training programs continue to be implemented. The licensee's multi-level radiological controls audit program, featuring independent review by Quality Assurance (QA) and Radiological Engineering, provided technically sound and timely assessments.

Adequate facilities and equipment were available to support the program. Routine surveys were effectively performed and aided in the prompt identification of secondary-side contamination and of an inadvertent transfer of RCS water to the borated water storage tank. Appropriate follow-up was taken to insure radiological postings and controls reflected the newly-identified conditions.

Clear procedures and policies are in place and, with isolated exceptions, strong procedural compliance was routine noted.

Radiological activities during the 6R outage were well controlled in which significant planning was noted. In general, the overall pace of activities was unhurried and resulted in minimizing radiological concerns noted during the previous outage. Radiation Work Permits (RWP's) contained appropriate controls and workers appeared well briefed.

Area posting and contamination control were generally effective; however, a concern with high radiation area (HRA) posting was identified. This has been an area of recurring deficiency for the licensee; aggressive corrective actions have been taken but have not been completely effective in sensitizing workers to posting requirements in this area.

Several deficiencies in radiological controls were noted during routine radwaste operations. A failure by the licensee to adequately evaluate the scope of work and the resulting high potential for airborne radioactivity resulted in the unplanned intake of

radioactive material by personnel working in the letdown filter cubicle. The pace of activities was a contributing factor. This cubicle is a known highly contaminated area.

Licensee corrective actions in response to an earlier similar event in the same cubicle were not effective in preventing the above recurrence. The licensee's evaluation and corrective actions generated in response to the second event, however, were noted to be comprehensive and identified both personnel and design deficiencies which are being addressed. Site and corporate management appeared to be somewhat inattentive to the radiological control problems in the letdown filter cubicle.

The licensee's ALARA (as low as reasonably achievable) program exhibited effective performance during the current period. Realistic annual and outage exposure goals were developed. A significant scope of work activities was undertaken in the 6R outage, including refueling, steam generator eddy-current testing, and letdown cooler replacement. Pre-work ALARA planning was initiated early and ALARA reviews were comprehensive and well documented. The licensee implemented various exposure reduction techniques for the outage, including primary system clean-up, flushing of hot spots, extensive use of temporary shielding, and delay of primary system breach, by scheduling integrated leak rate testing (ILRT) at the onset of the outage. The licensee also routinely performs effective pre-work briefings and utilizes engineering and contamination controls. Accruing exposure and work status was closely monitored by the ALARA staff during the outage.

ALARA efforts were effective in bringing outage exposure to 30 percent under the outage goal which was primarily due to reduction of anticipated dose rates. Significant effort was expended debriefing personnel after the outage to ensure all outage "lessons learned" were captured and communicated to the Radiological Controls staff. Licensee exposure for the assessment period totaled approximately 213 person-rem for 1986 and 148 person-rem for the first eleven months of 1987. These exposure values compare favorable with industry pressurized water reactor annual averages (approximately 400 person-rem/year).

Review of the water chemistry control program indicated a strong corporate commitment to and support for this area. The organization was clearly defined and well staffed. Positions were defined and interfaces with the corporate staff were well established. Good communication of chemistry data trends was noted to occur at critical levels within the plant organization. Appropriate action was taken on out-of-specification chemical parameters. In-line instrumentation and sampling was adequate for corrosion and impurity in-

gress monitoring. Special attention is paid to maintenance procedures and the investigation of situations where action levels are exceeded for chemical parameters. The overall evaluation of this area is that the chemistry program effectively supports plant operations.

In summary, the licensee's radiological controls program exhibited generally strong, consistent performance in the radiological safety and water chemistry control areas. Deficiencies in radiological safety were noted; however, they do not appear indicative of programmatic weaknesses and the overall program remains effective. Management inattentiveness to radiological control problems in the letdown filter cubicle appeared to be an isolated case.

2. Conclusion

Category 1.

3. Recommendations

None.

C. Maintenance

1. Analysis

The previous SALP rated the licensee's performance in maintenance activities as being well controlled. The organization, scheduling, and staffing of maintenance activities continued to have a positive effect on plant operations. No major maintenance-related plant problems occurred as maintenance personnel exhibited increased awareness of their effect on an operating plant. Weaknesses were identified in the areas of planning, internal event review, and EQ implementation on prior SALP's.

During this assessment, routine resident inspection activities on maintenance activities were supplemented by a region-based review of the maintenance program. The maintenance area was also examined as part of the Readiness Assessment Team (RAT) inspection prior to startup from the 6R refueling outage.

During this assessment period, major maintenance activities occurred during the 6R outage which involved complex activities requiring good coordination utilizing strict radiological control and good inter-departmental interface communication. The OTSG eddy current testing and tube removal were properly accomplished in accordance with requirements. Good vendor support occurred both in the field and at the laboratory. Overall, performance in the tube plugging/removal evolution was satisfactory and accomplished on schedule.

However, vendor communication problems occurred for the major emergency diesel generator (EDG) maintenance accomplished during the outage. Maintenance activities using poor vendor guidance resulted in damage to the "1A" EDG. The vendor had recommended some minor engine modifications and adjustments and, apparently, this guidance was not subjected to a thorough technical and safety (T&S) review. Some of these critical adjustments/modifications, when combined with the installation of new engine components, resulted in the damage. This required a second engine overhaul with major parts replacement. Licensee communication with the vendor seemed to be the primary cause of this particular problem, along with poor T&S review. The potential existed for common mode failure as similar modifications were to be made to both EDG's. The conditions causing the engine failure were eventually corrected and factored into the "1B" overhaul. Overall, it appears that the outage maintenance was conducive to the good operating record, since only one unplanned trip in September 1987 resulted from maintenance activities. Further, the conduct of maintenance during power operations did not adversely affect plant operations.

The environmental qualification (EQ) review verified that safety-related electrical equipment was being properly maintained in accordance with appropriate EQ requirements.

An administrative problem with the final closeout of job tickets was identified during a review of post-letdown cooler replacement outage work documents. Final closeout of the job ticket documents, reflecting final testing and operations acceptance of the component, had not occurred up to three to four months after the outage. The question of equipment operability certification and restoration to normal was raised, but other management control systems were found to verify component operability. This delay in final job ticket processing did not adversely affect the status of the individual component/system operability processing.

Management involvement in maintenance activities continued to be substantial. The QA/QC coverage was also substantial and the backlog of safety-related maintenance items was relatively small. As an example, both decay heat removal/low pressure injection loops were successfully worked in three day mini-outages to resolve minor leaks/problems and accomplish preventive maintenance. No adverse impact on plant operation resulted from this activity.

The organizational structure of the maintenance department has recently been changed to orient the on-site activities to a higher level of "materiel control" and to be in line with other corporate maintenance organizations. A new area of this organization will trend maintenance activities with the intent of predicting component end of serviceable life so that these components can be replaced prior to failure. This is viewed as a positive step in the overall conduct of maintenance.

One violation occurred due to maintenance activities and one LER resulted from maintenance activities. The violation involved a procedure weakness and a technician being unaware of the safety impact of his actions with lifting leads on a safety system. The LER involved auto start of a diesel due to a construction deficiency with a relay cover. Although these events were isolated incidents in this area, other functional areas address training deficiencies, personnel errors, and procedure step inadequacies. Corrective actions were appropriate (see Training and Assurance of Quality).

In summary, the various groups within the maintenance department are adequately staffed. Maintenance supervisory personnel are knowledgeable of on-going activities and have effectively maintained control of scheduled activities throughout this period. Communication and coordination between maintenance and other groups, such as operations, appeared to be more effective despite isolated lapses in the area of vendor interface. No plant trips or significant

operational problems occurred as the result of maintenance activities. The maintenance department continues to be a positive influence on overall plant performance.

2. Conclusion

Category 1.

3. Recommendations

None.

D. Surveillance Testing

1. Analysis

During the previous SALP period, the licensee's surveillance program was considered a strength. The program was adequate and properly implemented. Failure to provide specific commitments and schedules in the licensing area adversely affected the inservice testing area. Procedures for accomplishing surveillances remained adequate.

During this assessment period, inspection activities in the surveillance area consisted of normal resident review of on-going surveillance activities. Also, programmatic reviews of inservice inspection and testing areas were conducted. The surveillance area was also reviewed in detail during the Readiness Assessment Team (RAT) inspection conducted prior to startup from the 6R outage. Additionally, the containment integrated leak rate test (CILRT) was monitored and evaluated.

Inservice inspection (ISI) activities were satisfactory. The licensee's program for determining pipe wall thinning from the erosion/corrosion process was acceptable and resulted in several components being removed and replaced due to significant degradation well in advance of an NRC bulletin on the matter. The methodology of selection/detection, the equipment used, and the knowledgeable personnel conducting the examination process was viewed as a strength of the ISI program.

The inservice testing (IST) program was adequately implemented. The program implementation was reviewed and it was determined to be in conformance with regulatory requirements. The lack of a trending program for acceptable results represented a weakness in the Engineering Support area for the program in that only unsatisfactory results were reviewed by engineering. With the issuance of the NRR safety evaluation for this program, the licensee initiated actions to assure modifications are installed within schedular commitments.

Outage-related surveillances were conducted properly and were well controlled. For those conducted during the mode transition periods, additional shifts and/or personnel were used to allow the on-shift operators to concentrate on plant status and core heat removal.

Also noteworthy was the containment integrated leak rate test (CILRT) in that it was an "as-found" test in which repairs did not precede the test. Good administrative controls were used for the test and test-related activities. The test procedure was properly implemented or changed appropriately. Duties and responsibilities of test personnel were clearly defined and well understood by personnel. A good interface existed between operations and test personnel and

there was substantial QA and management involvement in the test. These positive attributes were similarly noted for other major plant testing.

Although the "as-found" CILRT failed, adequate corrective actions were taken. The related LER identified that the previous local leak rate test procedure did not identify this leakage because of a test methodology different from the CILRT. Although procedures were upgraded, this procedure deficiency was reflective of a procedure adequacy problem (see Assurance of Quality).

The use of a surveillance matrix on the power escalation test program schedule (start-up pre-requisite document) resulted in a smooth transition from outage activities to power operation. No incomplete actions in the surveillance area was noted. The pre-operational and start-up test programs complement the surveillance test area.

Operability reviews of safety-related systems revealed that surveillance testing was accomplished in an adequate and timely manner. The exception and deficiency (E&D) process for noting unsatisfactory data or procedure problems was properly and effectively implemented. The E&D's were integrated into the refueling outage startup prerequisite list. Problem resolution using this system was effective in resolving issues as they occurred and this additional site management oversight resulted in greater assurance that the large number of surveillances needed prior to 6R startup were completed satisfactorily.

One reactor trip occurred due to surveillance activities and was described in an LER. Another LER dealt with the incorrect performance of a surveillance test resulting in the discharge of a waste evaporator condensate storage tank (WECST) with the automatic termination function being bypassed. Both of these were attributable to a personnel error. However, corrective actions included procedure enhancements (see Assurance of Quality section).

One violation was noted in the surveillance area during the RAT inspection. This was a procedure adherence problem due to the calibration procedure not being upgraded to the actual methodology used for instrument loop calibrations (see Assurance of Quality).

In summary, the surveillance testing area continued to be a strength in the licensee system for ensuring the operability of safety-related equipment. Previous concerns over licensing impact on the IST program have been resolved with the issuance of a final NRC safety evaluation report on the second ten-year IST program. Resolution of technical problems is complete and adequate. Conservative action is taken for surveillance test deficiencies. Procedure use has been generally good with a few exceptions of minor nonadherences or personnel error.

2. Conclusion

Category 1.

3. Recommendations

None.

E. Fire Protection

1. Analysis

The previous SALP period did not specifically evaluate this area. For that period, fire protection activities were included primarily in the maintenance area. The findings of the SALP were, overall, positive with no implementation problems identified.

This assessment is based on the following: (1) region-based Appendix R team inspections; and, (2) resident inspector focus on program implementation in addition to routine monthly reviews.

Management's involvement in the Appendix R compliance effort was evident. Upper level management paid considerable attention to the progress of the Appendix R inspection and they made commitments to satisfy NRC concerns raised during the inspection. The licensee, through the use of an experienced consultant and corporate-based engineering personnel, developed a fire hazard analysis that was thorough and easily understood.

The response to NRC concerns was adequate. Many issues were discussed with the licensee, researched by the licensee, and ultimately resolved to the NRC's satisfaction.

A substantial amount of work was properly completed to assure compliance with 10 CFR 50 Appendix R. Licensee management recognized well before the refueling outage that the fire protection system upgrades were a critical path for Cycle 6 startup. Planning started sufficiently earlier, but poor engineering support (untimely engineering work/incomplete or inadequate initial reviews) appeared to be a contributing factor to poor performance in the Appendix R aspects of fire protection area as noted below.

As an example of poor engineering support, there was an "eleventh hour" change from a maximum of thirty minutes to ten minutes required to restore reactor coolant pump (RCP) seal thermal barrier cooling and seal injection for a design basis fire and this resulted in a last minute exemption request before Cycle 6 startup. Also, engineering review failed to identify the need to install emergency lighting and this resulted in a violation. An LER resulted because of an inadequate fire barrier review. Further, vendor re-review of Appendix R work has identified significant previous oversights for unprotected cables in areas covered and not covered by a fire watch. It is noteworthy that this review is occurring and the licensee is keeping the NRC informed as significant deficiencies are identified. However, the above-noted deficiencies collectively reflect adversely on corporate management's ability to rigorously direct and control the engineering support work for this area.

In fact, there appears to be signs that previously identified performance problems in the environmental qualification area may be occurring in the fire protection area. These negative elements are: inadequate reviews, delays in meeting requirements, and apparent lack of understanding of requirements in this specialized area. This situation was similar to a condition identified in the EQ area noted in previous SALP reports.

Generally, the fire protection program at TMI-1 continues to be properly implemented. Housekeeping is acceptable and control of transient combustibles is generally not a problem. Unacceptable housekeeping conditions were noted in the auxiliary building just prior to Cycle 6 startup, but management was responsive and corrected the problem within a week after restart. These conditions resulted from the temporary storage of outage-related transient equipment taken out of safety-related areas to support restart. Also, fire protection engineer weekly walkdowns of the plant spaces identified some minor discrepancies, but they were promptly corrected. The inspectors noted proper implementation of this program.

Although a number of outstanding inspection findings in the fire protection area were identified in the last SALP period, the licensee was generally responsive toward the satisfactory resolution of related issues. The inspector noted that some items could have been precluded, in part, had better communications occurred between respective organization representatives and, in part, if licensee personnel would have given a more complete initial review of the issues.

Licensee-provided training for operators in this area appeared to be well thought out and substantial as evidenced by the remote shutdown panel test. Previously identified fire brigade training problems were also resolved.

In summary, the fire protection program is well established and it appears to be properly implemented. Isolated lapses in the high level of performance in the housekeeping area occurred, but management was responsive by providing adequate corrective action. Appendix R deficiencies appear to be due to weak engineering support. However, a substantial amount of Appendix R work was satisfactorily completed and properly tested.

2. Conclusion

Category 2.

3. Recommendations

See Engineering Support.

F. Emergency Preparedness

1. Analysis

During the previous assessment period, the licensee's program was considered a strength in this area. With the implementation of the first consolidated GPU Nuclear Emergency Plan for all three nuclear units, an effective emergency preparedness program was noted along with excellent performance during the annual exercise.

During this assessment period, an Unusual Event was declared, and there were: two failures of the primary emergency communications system; a full participation exercise [Federal Emergency Management Agency (FEMA) observed]; a partial participation exercise observed (observed by NRC); and, a routine inspection. Further, Revision 1 to the consolidated GPU Nuclear Emergency Plan for both GPU sites was submitted.

The primary emergency communications system failed on Saturday, May 9, 1987, when all twenty-three dedicated emergency phone lines, including NRC's Emergency Notification System (ENS) plus commercial phone lines, were inoperative. The shift supervisor promptly declared an Unusual Event in accordance with implementing procedures and used the alternate (back-up) microwave system. The NRC was contacted, but notification could not be made to the Pennsylvania Emergency Management Agency (PEMA) and the Dauphin County Emergency Operations Center until three hours later when partial phone service was restored. The failure was due to a malfunction in Bell of Pennsylvania's Harrisburg central offices phone system. Calls within and to and from the Harrisburg area were not possible. Off-duty GPU personnel assigned to the TMI initial and support emergency response organizations could not have been called to report in on May 9, 1987, since their pagers are activated via the Bell telephone system. GPU Nuclear recognizes a need to upgrade the alternate system and is working with the PEMA to do this, stressing communication system diversity. This failure was beyond any anticipated by the emergency plan; however, licensee response to this low probability event was very good, which demonstrated that the operations and emergency response personnel are well trained and knowledgeable.

A second failure of lesser magnitude took place on Thursday, May 13, 1987, when an off-site construction crew cut all phone lines between TMI and Harrisburg. This event did not warrant the declaration of an Unusual Event. The alternate microwave system was again placed in service. PEMA, the five surrounding counties, and the NRC were promptly notified. Phone service was restored in nine hours.

During the routine safety inspection, all program activities reviewed met regulatory requirements with one minor exception. A Notice of Violation was issued for failure to supply a procedure

revision to the NRC within thirty days of such changes, as required. All other procedure changes were appropriately incorporated into procedures and were reviewed, approved, and distributed in accordance with regulatory criteria.

Observation of the full and partial participation exercises indicated licensee actions were timely and adequate to provide protective measures for the radiological health and safety of the public. Although exercise performance was adequate, two weaknesses were identified. The first area involved a weakness in the ability of the Technical Support Center to analyze plant conditions and provide answers to technical questions asked by the control room and Emergency Operations Facility. The second involved slowness in activating the Parsippany Technical Functions Center. Both of these weaknesses had been noted to some extent in previous exercises. Although these weaknesses are not considered major, it appears that management has not provided sufficient attention to this area.

In summary, the licensee has committed sufficient resources and developed supporting policies for Emergency Preparedness. The efforts expended in the TMI-1 Emergency Preparedness Program exceed regulatory requirements. In general, correction of identified deficiencies has been good; however, a declining trend was noticeable in light of the above-noted repetitive deficiencies.

2. Conclusion

Category 1.

3. Recommendations

None.

G. Security and Safeguards

1. Analysis

During the previous SALP, the licensee's performance in this area was Category 2. This rating was influenced by a long-standing issue involving the perimeter intrusion detection system and the Regulatory Effectiveness Review (RER) identified program vulnerabilities.

During this assessment period, one routine and one special unannounced physical security inspection were performed by region-based inspectors; and routine inspections by the resident inspectors continued throughout the period. No violations were identified.

The licensee committed to have the issue involving the perimeter intrusion detection system (PIDS) resolved by December 1987. A new PID was installed and operational on August 19, 1987. The resolution of this long-standing issue approximately four and half months before the committed date is indicative of the licensee's desire to implement an effective program. Most of the RER findings were addressed prior to the issuance of the final report of the RER findings in January 1987. The licensee responded to the remaining RER findings in May 1987.

Corporate security management continued to be actively involved in all site security program matters. This involvement included visits to the site by the corporate staff to provide assistance, program appraisals, and direct support in the budgeting and planning processes affecting program modifications and upgrades. Security management personnel are also actively involved in the Region I Nuclear Security Association and other industry groups engaged in nuclear plant security matters. This demonstrates program support from upper level management.

The licensee's self-inspection techniques, which are independent of the NRC's required annual security program audit, were again an effective method of providing oversight of the implementation of the security program. The self-inspection teams are composed of experienced security management personnel from corporate headquarters and TMI-2 and Oyster Creek. The findings of the self-inspections are reviewed at the security corporate level and are forwarded to site security management for actions. This initiative is indicative of the licensee's desire to implement an effective security program and has contributed to the licensee's excellent enforcement history during the evaluation period.

The annual audit of the security program, performed by the licensee's quality assurance group, was extremely comprehensive in scope and depth. Audit reports are distributed to appropriate management

personnel for review and action, as necessary. Corrective actions on deficiencies identified were prompt and effective with adequate follow-up to ensure their proper implementation.

The licensee submitted no security event reports to the NRC during the assessment period. Review of the licensee's event reporting procedures found them consistent with the NRC's regulation (10 CFR 73.71) and implemented by personnel knowledgeable of the reporting requirements.

Staffing of the licensee's security organization is adequate. Defective security equipment is repaired in a timely manner, thus minimizing the need for compensatory security posts and overtime.

The security officer training and requalification program is well developed and administered by two full time instructors. In addition to initial and requalification training, self-initiated on-the-job performance evaluations are conducted which measure the retention and proficiency of individuals with regard to general and specific security program requirements. This initiative is further evidence of the licensee's desire to implement an effective program.

A programmatic problem was identified in the maintenance of training records. In transferring the source training documents from paper files to microfiche files, the licensee created an extremely cumbersome system of filing and retrieving training documentation. During a routine inspection, the licensee was unable to provide source training documents to the inspectors in a timely manner. The nature of the system is such that there is a potential for the licensee to overlook required training for individual members of the security force. This system was scheduled for internal QA audit in October 1987, as part of the annual security program audit.

During this assessment period, review of the licensee's security maintenance program revealed that a dedicated technician with authority to obtain assistance from other qualified technicians has been assigned to security equipment. The result is a maintenance and testing program that is very responsive to any equipment malfunctions, thereby minimizing system degradation and the need for manpower intensive and prolonged use of compensatory measures.

Security facilities and spaces were adequate and well maintained. Records, except for the aforementioned source training records, were readily retrievable, complete, and centrally located for ease of use.

Members of the security force exhibited excellent appearance and morale and a professional demeanor. The turnover rate among members of the security organization remains very low and those that do leave are generally promoted to other positions within the licensee's organization.

During this assessment period, the licensee submitted three revisions to the security plan in accordance with the provisions of 10 CFR 50.54(p), one revision to the security plan under the provisions of 10 CFR 50.90, and provided its response to the miscellaneous amendments to 10 CFR 73.55, codified by the NRC in August, 1986. That response is under NRR review. Two 10 CFR 50.54(p) revisions resolved NRC comments resulting from revisions submitted in the prior SALP period. The third is currently under review. The 10 CFR 50.90 revision is also currently under review and involves the consolidation of the TMI-1 and TMI-2 security forces. The quality of the revisions was acceptable and these revisions provided sufficient detail to describe the changes. The licensee has continued to upgrade the security program and revise program plans consistent with current operations and requirements and, as noted previously, resolved a long-standing safeguards licensing issue ahead of schedule.

In summary, the licensee continues to implement a very effective security program that goes beyond mere compliance with regulatory requirements and security plan commitments, such as noted in their self-assessment techniques. The initiatives undertaken by the licensee are indicative of the licensee's intention to implement a high quality security program.

2. Conclusion

Category 1.

3. Recommendations

None.

H. Outages

1. Analysis

The previous SALP period did not specifically evaluate this area. For that period, outage-related activities were included in Engineering Support area (previously termed "Technical Support"). The findings of the SALP were, overall, positive. The licensee was adequately prepared for the then upcoming refueling outage. Some engineering delays were evident.

This assessment is based on the following: substantial resident and region-based inspections during the refueling outage and Cycle 6 startup; a Readiness Assessment Team inspection; and, twenty-four hour resident coverage of the transitional periods in between the two outages and power operations.

The licensee demonstrated an ability to realistically schedule their outages considering the planned work. The refueling outage was completed essentially on schedule and the letdown cooler outage ahead of schedule. A number of contingencies were factored into these schedules; these contingencies were not realized for the letdown cooler replacement outage. Contributing factors to this scheduling ability were frequent and routine site/corporate staff meetings and a staff dedicated to long-range planning. The licensee recently further enhanced this aspect with a reorganization to consolidate planning, licensing, and safety review under one corporate vice president. The ALARA and radwaste generation considerations were factored into this planning, along with contingencies for unexpected problems. New initiatives were also included, such as for recommendations as a result of the Babcock & Wilcox (B&W) designed reactor reassessment. Overall, substantial management attention and involvement in this area has produced positive results.

The licensee intentionally delayed the four-week refueling evolution to prevent interference with other reactor building work, such as the containment leak rate test. Refueling procedures were well written and thorough for controlling necessary fuel movements and verifications. Staffing was ample and personnel from operations and oversight organizations exhibited a well qualified and trained attitude when performing activities that had not been accomplished since 1978-79. The licensee also used the most experienced senior reactor operators (SRO's), including the Plant Operations Director, to provide twenty-four hour overview coverage of refueling activities. In addition, operations QA monitors provided twenty-four hour coverage. The licensee had its site personnel well prepared for this somewhat unique activity with respect to procedures, training, and staffing.

Implementation of fuel movement was proper and in accordance with procedures. Site management was frequently observed in the plant and as part of deliberations on technical problems with refueling. They also interfaced with the QA department to assure proper implementation. In addition, QA conducted a special audit to verify proper positioning of fuel assemblies. When problems in the housekeeping area occurred, site management was responsive to correct the situation. Overall, refueling was conducted in a safe manner and in accordance with regulatory requirements.

The quality and control of the workmanship during the outages were generally acceptable. Inspections confirmed that required modification installations were in accordance with essential design elements and regulatory requirements. Examples included the new fuel handling building ventilation system, the new Heat Sink Protection System (HSPS - safety-grade initiation and control system for emergency feedwater system (EFW)), and control building ventilation system modifications. This was attributable to good verbal and formal communications between the licensing, engineering support, and construction groups. However, there were some problems that resulted in significant events, some of which were reportable, as addressed below.

Installation errors did occur; and, in most cases, they were identified by test activities. Some resulted in significant events during the refueling outage. Three LER's, one violation, and a number of inspection findings in this area indicated that these errors were a result of: (1) poor work instructions, such as unclear drawings reflecting, in part, weak engineering support; and, (2) personnel errors primarily due to inattention to detail and, to a lesser extent, to failure to follow work instructions. The most significant of these events which reflects all of these causes was the incomplete Appendix R wiring work on the "1B" emergency diesel generator, failure of test personnel to identify the incomplete work prior to diesel functional testing, and repeated operator attempts to synchronize the diesel generator output breaker for functional testing despite repeated excitation circuit trips and no control room voltage indication. Although the licensee identified and corrected these problems primarily through the test program, they do reflect poorly on the adequacy of supervisory direction and control. Review of these events revealed no programmatic deficiencies.

The test program was adequate in that it detected work installation errors. Test personnel were knowledgeable of plant design and their duties. Substantial training occurred for the remote shutdown panel test, along with HSPS modifications. The licensee was responsive to NRC concerns to conduct a functional test of the remote shutdown panels. The tie-in system adequately controlled the transition from

construction to test to operations despite implementation problems. The licensee initiative of a company-wide startup prerequisite list provided an added measure of plant/system readiness for startup. However, there were deficiencies noted. Static zero shift alignment for HSPS level transmitters was not done in plant and resulted in operator confusion during Cycle 6 startup boil-down of the OTSG's. Other examples included an inadvertent feedwater (FW) injection to a steam generator (SG) during HSPS testing and FW heating/cleanup. Schedular pressures were noted to influence these activities.

The Cycle 6 startup physics tests were performed in accordance with approved test procedures by highly qualified personnel. Test results were properly evaluated. Information derived from the test results, such as the power imbalance detector correlation test, was quickly disseminated to the appropriate groups. Records were well prepared, complete, and readily retrievable. Staffing was observed to be ample and reactor engineers involved in these tests were found to be knowledgeable in their assigned areas. Excellent support from the headquarters fuel design group and fuel vendor (B&W) was also evident. This resulted in efficient and timely test data reduction and evaluation.

Modified or new systems remained operable and in good working order throughout power operations. For example, there were no inadvertent HSPS/EFW actuation during power operations, nor were there inadvertent engineered safeguards (ES) or EFW actuations during post-trip recovery periods. Modification and testing activities continued through power operations without any significant plant upsets. This record reflected the high quality coordination of a number of groups working closely together.

The QA activities in this area included procedure review, test witnessing, and test results review. The QA monitoring program for all outage activities was thorough and comprehensive.

In summary, outage planning had dedicated resources, provided for contingencies, and reflected initiatives for improvement. Refueling was well controlled. In general, there was high quality and control of workmanship during the outages; but problems existed, and there was apparently heavy reliance on the test program to identify these problems. This reliance reflects a lack of defense in depth to assure that modification installation errors are not carried through the test program with adverse results on operations. Operations-test interface problems occurred when schedular pressures increased. The startup physics program was well established and adequately implemented. Substantial QA/QC and management attention and involvement were noted in this area.

2. Conclusion

Category 2.

3. Recommendations

None.

I. Licensing Activities

1. Analysis

During the previous SALP period, the licensee was rated as Category 1 with the trend declining in this functional area.

During the current SALP period, fifty-two licensing actions were under review. Of these, thirty were completed. The majority of these were complex and difficult. Twenty-two licensing actions remained open at the end of the SALP period.

The significant licensing actions completed in the SALP rating period include the following: reactor coolant pumps trip review; RG 1.97 requirements for instrumentation (a few remaining open items); NUREG 0737, Item II.E.1.2, long-term EFW items; reload amendment; Appendix R Exemption Review; certain Salem ATWS (Anticipated Transient Without Scram) items; review of RCS high pressure reactor trip setpoint; resolution of asymmetric loss of coolant actuation (LOCA)/ multi-plant action item D-10; and, revised steam safety valve operability requirements.

The licensee has shown evidence of prior planning and assignment of priorities. This has been demonstrated in the good working relationship between the former and present NRC project managers and the licensee. This is also shown in the licensee's excellent response to the Safety Issues Management System (SIMS), and, at the NRC project manager's suggestion, the maintenance of a priority list for licensing actions.

The licensee has continued to demonstrate an active role in licensing-related activities. Management involvement has been especially evident where issues such as steam generator tube corrosion and power reduction due to steam generator fouling have potential for extended shutdowns.

The licensee has demonstrated an understanding of the technical issues involved in licensing actions and has generally proposed technically adequate and timely resolutions to these issues. Management attention and involvement has generally been good, showing prior planning and assignment of priorities. An exception has been the fire protection issue. In mid-1982, the licensee proposed a course of action to satisfy Appendix R, which the staff described as acceptable in a Safety Evaluation Report. Since that time, the licensee has changed course repeatedly, preferring a less conservative approach and causing delays in resolving the fire protection issue. In late 1986, the staff denied certain proposed exemptions for protecting heating, ventilation, and air conditioning (HVAC) related systems. By February/March 1987, the licensee was ready for restart but had made little apparent progress to resolve the

staff's stated concerns in previously denying the exemption requests. This caused considerable last minute review activity for the staff and resulted in exemptions based on fire watches to resolve the problem. There was a clear understanding with the licensee that the fire watches were a "short term" expedient. However, alternative modifications to permit removal of the fire watches were not proposed at the end of the period. The less conservative route of trying to show by analysis that fire damage will not occur has been chosen and delays in meeting Appendix R are continuing.

Some improvement has been noted in timeliness of submittals. However, delays were experienced in submitting an amendment proposed to update pressure-temperature limits to account for irradiation effects on the reactor vessel through ten effective full power years. This required the NRC staff to immediately review the submittal because the plant would have had to shut down or violate the existing technical specification limits in about two and a half months from the time the submittal was received. Other licensing issues which could have been dealt with better were: (1) the reorganization of the Radiological Controls Department, which required repeated submittals to correct minor oversights; and, (2) the chlorine detection system technical specifications for which inadequate justification was proposed to meet RG 1.95. These delays appear to be attributable to the engineering support staff.

The licensee has been responsive to NRR in meeting on an approximately monthly basis to discuss all active licensing actions including their priorities and future submittals. These meetings were well conducted, well prepared for, and helpful in resolving the issues.

The licensee has been responsive to NRR initiatives. The quality of its "no significant hazards consideration" analyses has improved. For one issue, the proposal of revised technical specifications for radiological effluent treatment systems (RETS), a revised submittal was received because the staff had concerns about the "no significant hazards" evaluation. Although the "no significant hazards" evaluation was improved from the original submittal, it was still insufficient in that a meeting was required to clarify significance. Also, several items in that submittal were improperly characterized as administrative in nature. This problem was noted in the previous SALP report, but it was only partially corrected.

On other issues, the licensee has responded promptly to several surveys from the staff during the reporting period. This was particularly evident in the licensee's response to the staff's request for SIMS information. Also, in response to the staff's initiative in Generic Letter 85-07, the licensee submitted its integrated living schedule in July 1987.

With regard to reporting of operational events, the Licensee Event Reports (LER's) appear to be thorough and adequate. With few exceptions, LER submittals are made on a timely basis and contain detailed information on the event description and evaluation. For one issue, the reportability of inadvertent actuations of the EFW system, the licensee's approach was less than satisfactory, but it has improved. Initially, the licensee resisted reporting those actuations (in distinction to logic actuations) on the basis that the EFW is not described as an engineered safeguards feature in the Final Safety Analysis Report (FSAR). However, in the staff's view, that approach was not consistent with the intent of the regulation for reporting. The licensee has now agreed to report such events.

In summary, the licensee's performance for the licensing activity was generally found to be acceptable. Management attention and involvement was generally good, showing prior planning and assignment of priorities. The submittals have demonstrated an understanding of the issues and have generally been technically adequate and timely. The technical approach to the resolution of issues is sometimes not as conservative as it should be or somewhat shortsighted. Staffing levels and quality of staff are, therefore, adequate. Staffing in the licensing area is especially strong with approximately ten personnel evenly divided between headquarters and the site.

2. Conclusion

Category 2.

3. Recommendations

None.

J. Engineering Support

1. Analysis

The last SALP continued to note a well established modification control program with improvements noted, in part, due to an extensive NRC inspection related to TMI-1 restart. In certain instances, procedures lacked clarity and definitiveness, putting an undue burden on personnel. Implementation problems persisted, especially in the area of drawing control and environmental qualification. Support for routine operational problems appeared to be appropriate, but, again, this function was not severely taxed because of the good operating record at TMI-1 during that last period. The SALP Board recommended that the licensee conduct a self-analysis for this area to determine the causes for inconsistent performance and that an NRC team inspection complete a similar review.

This assessment is based on the following: substantial resident and region-based inspection during the Cycle 6 refueling and startup period; a Cycle 6 startup Readiness Assessment Team (RAT) inspection, focusing on the design of the HSPS; resident inspections at the corporate office; and, Appendix R and EQ team inspections.

During this assessment period, the licensee was generally responsive to the last SALP and, in particular, to the above-noted board recommendation. Specifically, the licensee started the "technical support" self-assessment. In their SALP response, they also committed to initiate an audit-type review by Technical Functions on implementation of the replacement-in-kind parts program. Licensee plans in this area appeared to be adequate, but a target completion date appears to be well into the next SALP period for both actions. Definitive and appropriate corrective actions, along with completion dates, were not specifically formulated and completed to reverse continued inconsistent performance aspects noted below.

Overall, Technical and Safety (T&S) review of modifications was adequate, but technical deficiencies continued to be noted. Safety evaluations were reasonably thorough and, in some instances, quite extensive. This was a direct result of substantial controls established by procedures at the Technical Functions level. However, revisions to SE's did not have documented 10 CFR 50.59 evaluations. Further, despite a substantial safety evaluation (SE) on HSPS, the OTSG water level design incorporated at least two blind channels in the control room. This necessitated only weekly channel checks (in lieu of shift or daily) because test and measuring equipment was needed for four channel comparisons. Also, the procured water level transmitters appear to have a high failure rate and an alignment shift problem which required several transmitter replacements. The licensee was actively reviewing Operations' concerns on HSPS for proper resolution. For this problem, schedular pressures did

not permit operations feedback to engineering in time to enhance HSPS design. As an additional example, the reactor water level design has a single failure susceptibility apparently to alleviate concerns for too many instruments in the control room. This indicates that the licensee's technical approach in the design area, at times, is shortsighted in that all factors, such as human and safety factors are not fully considered and properly evaluated.

Similarly, T&S review of technical problems was adequate, but documentation deficiencies continued to be noted. Corporate and site engineering effectively resolved the performance problems noted in a previous SALP on the steam generator safety valves and steam admission relief valves for the emergency feedwater pump. Also, these engineering groups were actively pursuing resolution of the steam generator fouling problem and strongly supported the refueling and startup physics test effort. Licensee review (by internal memorandum) of the apparent OTSG boil-dry event at Cycle 6 startup due to water level alignment shift was very thorough and extensive. However, licensee documentation of the review of the early criticality event was fragmented because it was not consolidated under the T&S review process. In fact, a number of technical problems are routinely resolved and then documented by internal memoranda in lieu of a rigorous use of the T&S process.

Technical review deficiencies continued to be noted in the other areas, such as design control, drawing control, EQ, and fire protection areas. This has resulted in four of ten violations and it has contributed to one additional violation, two of ten LER's and several other internally reported events or inspection findings. Poor work instruction/drawings were contributing factors in the wire error problems addressed in the outage functional area. Despite substantial licensee attention to the drawing control area, persistent deficiencies raise concern on the attention to detail of personnel working in this area. Deficiencies in the EQ area are addressed below and deficiencies in the the fire protection area are addressed in the fire protection section.

It is apparent that the licensee has not allocated sufficient time and effort to correct past deficiencies in the EQ program documentation. Deficiencies in technical EQ documentation are repetitive. Specifically, the EQ files lacked sufficient information necessary to support equipment qualification. These deficiencies led to the licensee having to perform additional testing of quality materials as a result of an NRC evaluation performed during the period. Licensee response to the identified deficiencies was prompt and effective; and, although cognizant licensee personnel were generally knowledgeable of EQ issues, the failure to correct past deficiencies

persisted. This is indicative of a lack of attention to detail on the part of engineering personnel and a weakness in effective corporate management oversight of the program.

The shortcomings identified in this functional area appear to be due to personnel error related to poor attention to detail and a lack of effective supervisory review to compensate for such errors. However, despite these weaknesses, both formal and informal communications appear to have improved between engineering support group and site operations staffs. As noted in the outage area, installed modifications were in essential conformance with design and regulatory requirements. Project status meetings enhanced verbal communication in the long-range planning and status area. Although minor lapses were noted, the organization appears to be effective in translating design requirements into installation and test activities.

Technical Functions Division oversees the shift technical advisors (STA's) and plant analysis groups, both corporate and site based. The STA has been functionally integrated into the shift operations despite a technical reporting chain that is corporate based. The STA's routinely trend parameters/problems and are usually very knowledgeable about plant design and status. During major manual mode control evolutions, such as during plant startups/shutdowns, the STA provides a supportive role to assure operator awareness that the controlling parameter is reaching limits. The plant analysis section is also supportive by its periodic reports and active participation in the post-trip review process. Overall, the STA and analysis personnel have been effectively integrated into plant operations.

In summary, engineering groups were substantially challenged with the two outages during this period. Overall, these groups were supportive of operations in resolving certain technical problems. However, inconsistent performance continued to be noted in the areas of design and drawing control, fire protection, environmental qualification and safety review. The licensee's technical approach at times appeared to be shortsighted in not considering all factors in problem resolution. Site and/or operational feedback on certain designs was not effective due to schedular pressures. The corporate organization appears to be effective in translating design requirements into installation and test activities despite minor communication lapses. Overall, plant analysis support groups were effective in support of operations. Although the licensee's technical support reassessment is incomplete, some signs of improvement were noted.

2. Conclusion

Category 2.

3. Recommendations

Licensee: Revisit current corrective action plans for the technical support reassessment to assure that the underlying causes of the technical review deficiencies in such areas as fire protection, environmental qualification, and other regulatory-required modifications are identified for effective resolution.

NRC: None.

K. Training and Qualification Effectiveness

1. Analysis

During the previous assessment, the licensee's training programs appeared to be very effective and performance oriented despite isolated lapses in conservatism with respect to operator performance. Personnel were knowledgeable of plant design and status. Poor engineer training or poor maintenance training in the equipment qualification (EQ) area appeared to have contributed, in part, to poor performance in the engineering support and maintenance areas, respectively. Licensee management continued to be supportive of the training programs which appeared to be contributing to overall safe plant operations.

This assessment is based on the examination of four senior reactor operator (SRO) license candidates, routine review of operator performance by the resident inspectors, and review of the requalification program. The requalification process was further evaluated using a trial program in which NRC questions were substituted in the licensee exam in selected areas. The training program evaluation by INPO was completed and fully accredited in December 1986.

The four SRO candidates examined during the period were well prepared for the licensing examination. The one failure was in the simulator portion of the examination and the individual passed the retake portion of the examination later in the assessment period. No major weaknesses were identified during this examination. The initial license training program continued to provide license candidates with the requisite knowledge and skills to assume licensed operator duties.

The requalification program was adequate, but minor weaknesses were noted. One of the licensee's requalification examinations contained a large majority of recall-type questions in lieu of analysis-type questions. When candidates were re-examined with the substitute NRC exam, using more analysis-type questions, the results were less satisfactory. All candidates had satisfactory results on two other exams that were reviewed. Also, the oral and simulator examinations were adequately conducted. The scenarios were detailed and key points for evaluation were identified. The operations department and upper management were an integral part of the requalification evaluation process. However, for both oral and simulator examinations, a currently licensed SRO was examined at an RO level. For the simulator exam, team performance was documented rather than individual performance. The licensee took adequate corrective action to resolve these concerns. Overall, the requalification program was judged to be adequately implemented.

The plant specific simulator continued to be an integral part of the training program for both initial training classes, requalification classes, and non-licensed operator training, including training for engineers. The basic principles training was also effectively used. A tracking system was in effect to follow plant modifications. The simulator is about two years behind current modifications. Although the simulator still had some problems to be resolved, the functional and physical facility was acceptable.

These programs are supplemented by specialized training for new system modifications involving handout material, classroom session, and in-plant walkthrough. As an example, the training for the HSPS and remote shutdown panel was substantial and beneficial. Operator response to HSPS level problems was good and the cooldown from outside the control room went smoothly without major performance problems. All plant modifications have at least a training handout prepared by operations engineers. Overall, the licensee uses good initiatives and communication methods to translate new system or design change information into training elements.

Operators continued to exhibit detailed knowledge of plant design and to demonstrate specialized skills for plant transient maneuvering, especially with the integrated control system (ICS) in the manual mode. Overall, response to events or trips was quite good despite isolated errors which were distributed over the entire assessment period. None of the reactor trips that occurred during this period could be directly correlated to operator training deficiencies. Examples were: (1) not manually tripping the reactor during one automatic trip; and, (2) lack of awareness on the unique aspects of controllers for EFW control valves during the May planned trip. Although additional training was used as corrective action, in part, for personnel errors, the training program does not seem to be a source of the problems, especially in the area of procedure nonadherences (see Assurance of Quality section).

Similarly, a number of other functional areas have quality training programs; such as, radiological control, security, emergency preparedness, and maintenance, which recently enhanced EQ training. However, it appears that, when new programs are initiated, training plans are not well established. For example, the licensee underestimated the training and/or guidance needed for the new technical and safety review process. Additionally, a violation could be attributed to inadequate training on the independent verification requirements for lifted leads on important-to-safety (ITS) systems. It had, as an underlying cause, poor understanding of safety system classification and the applicability of the independent verification program on the part of individuals. Further, although the licensee changed the ITS classification to "regulatory required", it is likely that licensee personnel do not understand the concept which

now has a new label. It appears that site and corporate management does not provide sufficient time for thorough review and assessment of change impact prior to implementation.

The procedure adequacy problems does not appear to be directly related to poor training. With respect to initial procedure/revision review, personnel are capable of doing a thorough and comprehensive review, but poor guidance and schedular pressures seem to adversely affect performance. Likewise, with respect to biennial review, personnel are similarly capable, especially with excellent guidance for review; but, workload appears to cause errors to be made (see Assurance of Quality).

Poor performance in specialized areas, such as EQ and fire protection, appears to be due to lack of time and thoroughness for engineering support review and, to a lesser extent, on personnel understanding of applicable design basis and/or regulatory requirements. No direct correlation to training can be made.

In summary, many training programs were considered strengths and were oriented toward good performance in the interest of nuclear and radiation safety/safeguards. Isolated weaknesses were noted, but the licensee was responsive toward strengthening those areas. The personnel errors and procedure adequacy problem did not appear to be directly correlatable to weaknesses in the training area. It appears that, when new programs are initiated, training plans are not well formulated.

2. Conclusion

Category 1.

3. Recommendations

Licensee: Re-evaluate the proportion of recall-type versus analysis-type questions used in licensed operator requalification exams.

NRC: None

L. Assurance of Quality

1. Analysis

The previous assessment noted that individual procedural step inadequacies and procedural nonadherences did not adversely affect safety, but they continued to be too numerous and too significant to be considered isolated cases. These problems were due to personnel error or inattention to detail and due, in part, to middle management efforts to excel and meet schedules. The technical and safety (T&S) review program had weak guidance and, in certain instances, poor implementation. Also, the program was changed in that requirements were relaxed making it questionable that the program met applicable requirements for procedure changes. In certain instances, corrective actions were weak and/or excessively delayed. Collegial review and other licensee initiatives were apparently needed to compensate for the above-noted weaknesses. The prior SALP board provided two recommendations: (1) continue efforts in correction of the procedure adherence and procedure adequacy problems; and, (2) independently meet with NRC staff on the T&S review program and Procedure Compliance Task Group (PCTG).

In general, worker attitudes are oriented toward nuclear safety as a result of licensee training, but they falter at times during implementation. The board's review of events identified that the underlying causes for the majority of events due to personnel error are varied. They are: (1) failure to follow procedures due to a cognitive error or due to failing to properly change the procedure when needed; (2) inattention to detail such as failure to verify correct action; and, (3) attempted implementation of an administrative control (procedure) or controlling procedure from memory. The leading cause of personnel error is procedure nonadherence. The long-term actions of the PCTG involving programmatic changes continued to be worked on by the licensee and these will be extended into the next SALP period. Inspections noted skeptical improvements in this area, such as with licensee performance during transition into and out of the letdown cooler outage. However, problems persisted as manifested by the QA and NRC inspection findings. Many of the causes may be related solely to individual worker poor attitudes, but there are signs that first-line supervision and, perhaps, middle management has not done enough to instill a sense of quality in individual worker attitudes. Supervisory failures at this level may be negative attitudes or inaction to reverse negative trends. Apparently, the licensee has recognized this problem and they have initiated an INPO sponsored program for self-evaluation in the area of personnel error.

Further, impromptu decisions to side-step procedure step inadequacies or non-applicability without formal review of procedure changes (the graded approach) contributes to the procedure nonadherence problem. There is evidence that licensee upper management unintentionally condones this apparent middle management policy as evidenced by the licensee's response to a failure to follow an alarm response procedure violation, which was identified in the last SALP period. This managerial attitude has not, as yet, created a safety problem.

Similarly, individual procedural step inadequacies continued to be noted and are not totally correlatable to poor worker attitudes. Since 1979, the facility procedures have been through at least three biennial reviews; yet, significant discrepancies or inconsistencies continue to be noted, especially with procedures that are routinely used. It is clear that: (1) personnel performance to take the initiative to change or improve procedures is not at as high a level as it should be; (2) despite an up-to-date biennial review status, the quality of such reviews (possibly because of the required two-year schedule) is lacking contrary to the detailed administrative controls for such reviews; and, (3) technical reviews on new procedures/procedure changes are not as thorough as they should be in assuring other facility procedures do not become outdated by the apparent isolated action of a new procedure or a procedure revision. Here, again, there are signs that first-line supervision and middle management were responsible for poor results. The daily activities and production schedules appeared to be easy distractions from the seemingly unproductive attention to the long lasting quality of procedures that can be effectively implemented.

The outage and engineering support functional areas reflect a well established modification control program. A high level of performance, overall, is achieved in this area because of: (1) good outage planning at all managerial levels; (2) good middle level management of personnel for special evolutions, tests, or situations; (3) enhancement of formal and informal communications between site and corporate groups; and (4) utilization of upper management initiatives to assure overall control of the outage and system readiness for startup, as in the use of startup prerequisite lists. The recent corporate reorganization should also enhance this area. However, poor direction and control by first-line supervisors and middle management resulted in: (1) significant errors that have occurred during outage work and (2) poor communications in the vendor interface area. Further, there were signs that upper management was inattentive to the adequacy of design to practically and realistically support operations in performing their complex duties along with meeting safety requirements.

The NRC staff issued a violation on the failure to properly document T&S reviews in accordance with 10 CFR 50.59 requirements. Licensee response to the violation indicated their failure to fully understand the staff's position on the matter with respect to revising important-to-safety (ITS) procedures. The relatively good performance for SE's in the facility modification area is due, in part, to both steps in the licensee's two-step process (safety determination (SD) and safety evaluation (SE)) being used. That same level of consistent performance does not occur for changes to ITS procedures because only the SD, in general, would be used. Inspections also noted several instances of unclear guidance in the T&S corporate procedure, which the licensee is attempting to resolve. The new process was adapted from an industry methodology that was unreviewed and unapproved by NRC staff, as yet.

A higher level of performance was noted by the TMI-1 Division which, in general, still uses the SD and SE for ITS procedure changes until the apparent impasse with NRC staff is resolved. However, site forms provide little room for narrative justification, which, generally, are squeezed in a corner of the form, giving an unprofessional appearance. Other examples were noted which indicated that the unified T&S review concept is not well understood, nor is it rigorously implemented (see Engineering Support Section). Also, the licensee reorganized in June 1987 without using this process to justify whether or not a technical specification change was needed. The licensee acknowledged that better training could have occurred before implementation of the new T&S process. However, it appears that the root cause of poor performance in this area was due to program weaknesses created by the change in methodology.

The three levels of QA continue to be rigorously implemented (control, monitoring, and audits). The control and monitoring functions have been implemented on a twenty-four hour basis in support of outage or operations work. The Quality Deficiency Reporting (QDR) system appears to be an effective tool to gauge performance, such as for the procedure adherence and adequacy problems. Audits continued to be thorough and extensive using innovative ideas and techniques. The "escalation of issues" procedures was enhanced, but its effectiveness remains to be determined.

There is a substantial upper management involvement in site and licensing activities, both at the corporate and site managerial levels. The daily planning meetings usually have representatives from the various corporate-based organizations assigned to the site in addition to intra-division departments at TMI-1. This contributes to good communications, especially as noted during post-outage startups. In particular, back shift tours reflect management's involvement, such as its use when the TMI-2 sleeping operator allegation arose. Also, this level of management rigorously uses the prerequisite list for outage startups as documentation to complement

verbal communications on a daily basis. It was noted that this initiative may be overemphasized since a number of refueling job ticket packages were still "administratively open" well after the refueling outage was over. The other performance elements noted herein also reflect upper management's involvement to control activities and to take appropriate corrective action for problems as they arise. However, the poor performance problems noted above also indicate that the effectiveness of management's involvement remains to be realized.

There are signs that performance problems that have plagued the EQ area have crept into the fire protection area. Substantial management attention appears to be lacking in the fire protection area.

Oversight personnel and/or groups continue to implement regulatory requirements and/or implement licensee initiatives. The T&S process was separately addressed above. Most notable licensee initiatives are: Plant Review Group; General Office Review Board; and, Board of Director, Nuclear Safety and Compliance Committee. Their reviews, along with regulatory-required reviews continue to be effective in problem identification, especially in light of the available expertise and they do generate upper management involvement on these problems. However, in light of persistent performance problems noted herein, there appears to be weak attentiveness by upper management to selected facets of operation; in particular, problem solving.

In summary, performance has been good but longstanding performance problems persist in the areas of procedure adequacy and implementation, engineering support, or technical and safety review while licensee middle and upper management continues to work on resolving these problems. These problems are not solely correlatable to poor worker attitudes, but there are signs that first-line supervisors and middle management continue to negatively affect performance in this area by not reversing negative trends. Middle and upper corporate/site management involvement is substantial; but, at times, attentiveness and/or attitude toward problems appears to be weak. Regulatory-required and licensee-initiative reviews collectively appear to be effective in problem identification, but the effectiveness of upper management's involvement in specific problem solving remains to be realized, such as for the procedure nonadherence problem. Although being assessed by the licensee, personnel errors may be related to poor management attitudes or weak programs in addition to the poor quality of individual performance.

2. Conclusion

Category 2.

3. Recommendations

None.

VI. SUPPORTING DATA AND SUMMARIES

A. Investigations and Allegations Review

There are no open investigations for TMI-1. An ongoing investigation concerning operator sleeping at TMI-2 is still being pursued, but the implications at TMI-1 were evaluated and the issue closed (NRC Inspection Report No. 50-289/87-13).

An allegation concerning the qualifications of signal persons for the reactor building crane was reviewed and not substantiated during this SALP period (see NRC Inspection Report No. 50-289/87-19). An allegation dealing with reactor fuel "candling" effect was also unsubstantiated and closed during this period.

B. Escalated Enforcement Actions

There were no escalated enforcement actions.

C. Licensee Meetings Held During Appraisal Period

The following management meetings were held:

-- On December 4, 1986, an enforcement conference with Region I to discuss the findings of an investigation concerning deficiencies identified in the environmental qualification (EQ) program previous to this SALP period.

-- On February 12, 1987, a management meeting with Region I to discuss the implementation of the licensee's new technical and safety review process. Also, the results of the licensee's task force designed to resolve procedure adherence were reviewed.

-- On February 24, 1987, the last SALP period management meeting was conducted.

-- On March 10, 1987, a management meeting with Region I to discuss the EQ inspection team findings.

-- On July 13, 1987, a management meeting with Region I to discuss the implications of the TMI-2 sleeping allegation on TMI-1 (see also NRC Inspection Report No. 50-289/87-13).

-- On September 10, 1987, a management meeting with Region I to discuss licensee methodology and resolution of logs error analysis in the EQ area.

The following licensing meetings were held with the licensee during the period:

-- On November 13, 1986 to discuss Appendix R issues.

-- On December 1, 1986 to discuss steam generator tubes plugging criteria.

-- On December 3, 1986 to discuss SALP II Board meeting.

-- On February 5, 1987 to discuss an Appendix R exemption requests.

-- On May 21, 1987 to discuss steam generator tube tests.

-- On July 16, 1987 to meet new management and discuss reorganization.

-- On August 24, 1987 to discuss radiological effluent treatment systems.

-- On September 9, 1987 to discuss Safety Issues Management System (SIMS).

-- On September 10, 1987 to discuss Appendix R.

D. Licensee Event Reports and Other Events

The last SALP period (six months) had five LER's of which two were due to personnel error. For this one-year period, eight of ten Licensee Event Reports (LER's) (Table 4) were due to personnel error and procedure deficiencies. No conclusion can be drawn by this. However, for this period, inspectors reviewed a non-duplicate event listing involving violations (Table 3), LER's (Table 4) and other licensee internal plant incident reports (five events). The number of these events were relatively small; but, again, a substantial majority are due to human elements of personnel error and/or procedure deficiencies. Of the subset, many were attributed by the licensee to be personnel error, but further review of corrective action revealed that, in addition to personnel counseling, corrective actions were oriented toward procedure enhancements. In fact, some of these events could have had their roots in procedure deficiencies.

The majority of the personnel errors are directly correlated to failure to follow procedures. Personnel error, along with the six procedure adherence and adequacy problems, is addressed in assurance of quality section.

E. Licensing Activities

1. Reliefs Granted

IST 2nd 10-Year Interval - 3/19/87
ASME Code 1, 2, 3 - 3/20/87

2. Exemptions Granted

Section III.G.2, 3 and J of Appendix R - 12/30/86
Section III.G.2, of Appendix R - 3/19/87

3. Licensee Amendments Issued

Amendment	Title	Date
122	ESF Filtration System	12/12/86
123	Testing Silcon Controlled Rectifiers	12/16/86
124	EFW System	3/9/87
125	Main Steam Safety Valves	3/9/87
126	Cycle 6 Reload	3/20/87
127	Fire Detection System	3/31/87
128	Organizational Titles and Operator License for Shift Personnel	5/13/87
129	Reporting Requirements	5/14/87
130	New Condenser Vent Stack Iodine Sampler	6/8/87
131	Organizational Reporting Structure for Radiological and Environmental Department	8/14/87
132	Functional Responsibilities in GPUN Corporate Organization	9/1/87
133	Main Steam Safety Valves Minimum of Two Operable	10/15/87

TABLE 1

INSPECTION REPORT ACTIVITIES

REPORT/ DATES	INSPECTOR/ TYPE	HOURS	AREAS INSPECTED
86-20 11/4-6/86	SPECIALIST/ RESIDENT	89	ANNUAL EMERGENCY PREPAREDNESS EXERCISE
86-21 10/31-12/5/86	RESIDENT/ SPECIALIST	498	REVIEW OF POWER (PWR) AND COLD SHUTDOWN (SD) OPERATIONS (OPS), RELATED RADIOLOGICAL CONTROLS, OUTAGE STARTUP ACTIVITIES, OUTAGE SURVEILLANCE (SUR), COLD WEATHER PREPARATIONS, FIRE PROTECTION
86-22 12/5/86-1/9/87	RESIDENT/ SPECIALIST	270	REVIEW OF OUTAGE ACTIVITIES INCLUDING REFUELING PREPS, ISI WORK, AND PWR OPS CHEMISTRY CONTROL, MODIFICATIONS REVIEW
86-23 12/15-19/86	SPECIALIST	172	10 CFR 50 APPENDIX R, FIRE PROTECTION REVIEW
86-24 12/4/86	SPECIALIST	6	ENFORCEMENT CONFERENCE ON PAST ENVIRONMENTAL QUALIFICATION (EQ) ISSUES
87-01 1/12-21/87	SPECIALIST	302	EQ QUALIFICATION PROGRAM REVIEW
87-02 1/9-2/6/87	RESIDENT/ SPECIALIST	243	REVIEW OF OUTAGE ACTIVITIES, DIESEL GENERATOR REPAIR, MODIFICATIONS FOR STARTUP, SUR PROGRAM
87-03 3/2-6/87	SPECIALIST	*266	FOUR SRO EXAMINATIONS - THREE OF FOUR PASSED
87-04 2/12-18/87	RESIDENT	4	MANAGEMENT MEETING ON LICENSEE'S NEW TECHNICAL AND SAFETY REVIEW PROCESS AND PROCEDURE IMPLEMENTATION ISSUES
87-05 2/6-3/6/87	RESIDENT	169	OUTAGE ACTIVITIES, ELECTRICAL EVENTS, FIRE PROTECTION UPGRADES, DIESEL GENERATOR REPAIR/TESTING
87-06 2/17-3/3/87	RESIDENT/ SPECIALIST	459	SPECIAL INSPECTION TO ASSESS LICENSEE READINESS FOR CYCLE 6 STARTUP
87-07 2/20-3/12/87	SPECIALIST	*160	REQUALIFICATION PROGRAM REVIEW AND OPERATOR LICENSING REQUAL EXAMINATIONS

Table 1

REPORT/ DATES	INSPECTOR/ TYPE	HOURS	AREAS INSPECTED
87-08 5/13-6/16/87	RESIDENT	13	REVIEW OF PERFORMANCE APPRAISAL TEAM (PAT) II FINDINGS PRIMARILY IN THE AREA OF TECHNICAL AND SAFETY REVIEW - OTHER PROCEDURE CONTROL ISSUES
87-09 3/6-4/24/87	RESIDENT/ SPECIALIST	800	TRANSITION FROM COLD SHUTDOWN TO PWR OPS, STARTUP READINESS, EQUIPMENT PROBLEMS, STARTUP TESTING, SURVEILLANCES, REPORTS
87-10 4/24-5/29/87	RESIDENT	248	ROUTINE PWR OPS - OPERABILITY REVIEWS, REACTOR PHYSICS DATA, MODIFICATIONS, SAFETY VALVE REPAIR, REACTOR TRIPS, VENDOR INTERFACE, PAST FINDINGS
87-11 5/29-7/9/87	RESIDENT	210	ROUTINE PWR OPS, REACTOR TRIP AND OTHER EVENTS, EQUIPMENT OPERABILITY, FIRE PROTECTION PROGRAM IMPLEMENTATION
87-12 6/29/87	SPECIALIST	*58	OPERATOR LICENSING EXAMINATION - 1/1 SRO PASSED
87-13 7/9-9/4/87	RESIDENT/ SPECIALIST	253	ROUTINE PWR OPS AND OPERABILITY REVIEW, TMI-2 SLEEPING ALLEGATION, MAINTENANCE (MNT) PROGRAM, RCITS MOD, SALP RESPONSE, AND OUTSTANDING ITEMS (OI) FOLLOW-UP
87-14 7/20-24 - 8/12-13/87	SPECIALIST	84	ANNUAL EMERGENCY PREPAREDNESS PROGRAM AND IMPLEMENTATION REVIEW ALONG WITH OI FOLLOWUP
87-15 8/10-14/87	SPECIALIST	102	SECURITY PROGRAM AND IMPLEMENTATION
87-16 10/23/87	SPECIALIST/ RESIDENT	200	ANNUAL EMERGENCY PREPAREDNESS EXERCISE 10/20/87
87-17 9/4-10/2/87	RESIDENT	142	ROUTINE PWR OPS, OPERABILITY REVIEW, DIESEL CONTROL LOGIC, REACTOR TRIP, PLANT STARTUP, RAD MONITOR OPERABILITY, LER'S (LICENSEE EVENT REPORTS)
87-18 9/14-25/87	SPECIALIST	50	CALIBRATION PROGRAM AND FOLLOWUP TO OI'S

Table 1

REPORT/ DATES	INSPECTOR/ TYPE	HOURS	AREAS INSPECTED
87-19 10/2-31/87	RESIDENT	160	ROUTINE PWR OPS, MNT, SUR, INOPERABLE DIESELS, INDEPENDENT VERIFICATION, CONTROL ROOM ENVIRONMENT, STORAGE OF TRANSIENT EQUIPMENT, CORPORATE INSPECTION, ALLEGATION OI, TECHNICAL & SAFETY REVIEW
87-20 9/14-24/87	SPECIALIST	8	CALIBRATION PROGRAM AND OI FOLLOWUP

*Includes licensed operator examination preparation and documentation time in addition to actual examination time.

TABLE 2

INSPECTION HOURS SUMMARY

		ACTUAL	PERCENT
1.	PLANT OPERATIONS	1433	29
2.	RADIOLOGICAL CONTROLS	246	5
3.	MAINTENANCE	424	9
4.	SURVEILLANCE	465	9
5.	FIRE PROTECTION	440	9
6.	EMERGENCY PREPAREDNESS	373	7
7.	SECURITY AND SAFEGUARDS	194	4
8.	OUTAGES	419	8
9.	LICENSING ACTIVITIES	N/A	N/A
10.	ENGINEERING SUPPORT	972	20
11.	TRAINING AND QUALIFICATION EFFECTIVENESS	N/A	N/A
12.	ASSURANCE OF QUALITY	N/A	N/A
	TOTALS	4966	100

TABLE 3

ENFORCEMENT SUMMARY

A. Violations Versus Functional Area by Severity Level

FUNCTIONAL AREA	SEVERITY LEVEL V	IV	III	II	I	TOTAL
PLANT OPERATIONS						0
RADIOLOGICAL CONTROLS		1				1
MAINTENANCE		1				1
SURVEILLANCE		1				1
FIRE PROTECTION	1					1
EMERGENCY PREPAREDNESS		1				1
SECURITY/SAFEGUARDS						0
OUTAGES		1				1
LICENSING ACTIVITY						0
ENGINEERING SUPPORT		3				3
T&Q EFFECTIVENESS						0
QUALITY ASSURANCE		1				1
TOTALS	1	9	0	0	0	10

Table 3

B. Violation Summary

INSPECTION REPORT/DATE	REQUIREMENT	SEVERITY LEVEL	FUNCTIONAL AREA	BRIEF DESCRIPTION
289/86-23	10 CFR 50 APP R SEC.III	5	FIRE PROT./ ENG. SUPP.	FAILURE TO INSTALL EMERGENCY LIGHTS IN THE CONTROL ROOM
289/86-24	10 CFR 50 APP B CRIT. XVI	4	ENG. SUPP.	FAILURE TO TAKE TIMELY AND ADEQUATE CORRECTIVE ACTION ON ENVIRONMENTAL QUALIFICATION (EQ) PROGRAM DEFICIENCIES
289/87-01	10 CFR 50 APP B CRIT. V	4	OUTAGE/ENG. SUPP.	FAILURE TO FOLLOW VENDOR INSTRUCTIONS FOR SEISMIC MOUNTING OF RCS PRESSURE INSTRUMENTATION
289/87-06	10 CFR 50 APP B CRIT. III	4	ENG. SUPP.	FAILURE TO DESIGN REVIEW AND APPROVE AN HSPS CALCULATION BY VENDOR
289/87-06	TS 6.8.1	4	SURVEILLANCE	FAILURE TO PROPERLY FOLLOW CALIBRATION PROCEDURE FOR REACTOR BUILDING PRESSURE INSTRUMENTATION
289/87-08	10 CFR 50.59B	4	ASSURANCE OF QUALITY	FAILURE TO PROPERLY DOCUMENT SAFETY REVIEWS
289/87-09	10 CFR 20.201 (B)	4	RAD-CHEM	FAILURE TO SURVEY FOR WORK IN LETDOWN PREFILTER CUBICLE
289/87-09	10 CFR 50 APP B CRIT. III	4	ENG. SUPP.	FAILURE TO ADEQUATELY DESIGN REVIEW PRESSURIZER INSULATION SUPPORT PLATFORM
289/87-14	10 CFR 50 APP E ITEM 5	4	EMERG. PREP.	FAILURE TO PROPERLY CLASSIFY AND AND SEND TO NRC AN EMERGENCY PLAN IMPLEMENTING PROCEDURE
289/87-19	TS 6.8.1	5	MAINTENANCE	FAILURE TO FOLLOW PROCEDURE ON LIFTED LEAD AND INDEPENDENT VERIFICATION

TABLE 4

LICENSEE EVENT REPORTS

A. LER By Functional Area

FUNCTIONAL AREA	NUMBER BY CAUSE CODE A	B	C	D	E	TOTAL
PLANT OPERATIONS	3				1	4
RADIOLOGICAL CONTROLS						0
MAINTENANCE						0
SURVEILLANCE	2			1		3
FIRE PROTECTION						0
EMERGENCY PREPAREDNESS						0
SECURITY AND SAFEGUARDS						0
OUTAGES	1*	1*		1*		3
LICENSING ACTIVITIES						0
ENGINEERING SUPPORT						0
TRAINING AND QUALIFICATION EFFECTIVENESS						0
ASSURANCE OF QUALITY						0
	6	1	0	2	1	10

*Involves other functional areas, but event occurred during outage activities.

Cause Codes

A - Personnel Error
B - Design, Manufacture, Fabrication
C - External
D - Procedure Inadequacy
E - Component Failure/Malfunction

Table 4

B. LER SYNOPSIS

LER NUMBER	SUMMARY	FUNCTIONAL AREA	CAUSE CODE
86-13	REACTOR BUILDING LEAK TEST FAILED DUE TO PENETRATION PRESSURE VALVE LEAKAGE NOT DETECTED DURING PREVIOUS LOCAL LEAK RATE TESTS	SURVEILLANCE/ ENG. SUPPORT	D
87-01	AUTO START OF A DIESEL DUE TO DEFECTIVE WORK INSTRUCTION	OUTAGE (MODIFICATION)/ENG. SUPPORT	D
87-02	DIESEL GENERATOR AUTO START DURING ADJUSTMENT OF RELAY COVER DUE TO IMPROPERLY "DRESSED" WIRING WHICH DID NOT ALLOW FOR COMPLETE FIT OF RELAY COVER	OUTAGE (MAINTENANCE)	B
87-03	FIRE BARRIER PENETRATION SEAL NOT INSTALLED DUE TO ENGINEERING SUPPORT PERSONNEL OVERSIGHT	OUTAGE (FIRE PROTECTION - SURVEILLANCE)	A
87-04	REACTOR TRIP ON HIGH PRESSURE DUE TO OPERATOR FAILURE TO VERIFY ACTION DURING HEAT BALANCE SURVEILLANCE	SURVEILLANCE	A
87-05	MISSED SAMPLE PRIOR TO INDUSTRIAL WASTE FILTERING SYSTEM RELEASE DUE TO FAILURE TO FOLLOW PROCEDURES	OPERATIONS	A
87-06	REACTOR TRIP ON HIGH RCS PRESSURE DUE TO OPERATOR ERROR ON MANUAL FEEDWATER CONTROL DURING LOW POWER OPERATIONS	OPERATIONS	A
87-07	INADVERTENT REACTOR PROTECTION SYSTEM ACTUATION DUE TO COGNITIVE ERROR IN PERSONNEL NOT READING THE MOST CONSERVATIVE PRESSURE INSTRUMENT WHEN COMING OUT OF SHUTDOWN BYPASS	OPERATIONS	A
87-08	REACTOR TRIP FROM TURBINE TRIP DUE TO EQUIPMENT MALFUNCTION IN A MOISTURE SEPARATOR LEVEL CONTROL VALVE	OPERATIONS	E
87-09	EFFLUENT RADIATION MONITOR INTERLOCK DEFEATED DURING RELEASE DUE TO FAILING TO FOLLOW PROCEDURES	SURVEILLANCE	A