U.S. NUCLEAR REGULATORY COMMISSION
REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT 50-387/85-98; 50-388/85-98

PENNSYLVANIA POWER AND LIGHT COMPANY

SUSQUEHANNA STEAM ELECTRIC STATION

ASSESSMENT PERIOD: MAY 1, 1985 - JULY 31, 1986

BOARD MEETING DATE: OCTOBER 10, 1986

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1.0 INTRODUCTION

1.1 Purpose and Overview

The Systematic Assessment of Licensee Performance (SALP) is an integrated NRC staff effort to collect observations and data on a periodic basis and to evaluate licensee performance. The SALP process is supplemental to the normal regulatory processes used to ensure compliance to NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful guidance to licensee management in order to improve the quality and safety of plant operations.

An NRC SALP Board, composed of the staff members listed in Section 1.2 below, met on October 10, 1986, to review the collection of performance observations and data in order to assess the licensee's performance at the Susquehanna Steam Electric Station. This assessment was conducted in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance". A summary of the guidance and evaluation criteria is provided in Section 2.0 of this report.

This report is the SALP Board's assessment of the licensee's safety performance at the Susquehanna Steam Electric Station, Units 1 and 2 for the period May 1, 1985 through July 31, 1986. The summary findings and totals reflect a fifteen month assessment period.

1.2 SALP Board Members

Chairman

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

Members

T. T. Martin, Director, Division of Radiation Safety and Safeguards (DRSS)
W. V. Johnston, Deputy Director, Division of Reactor Safety (DRS) (part time)
J. P. Durr, Chief, Engineering Branch, DRS (part time)
H. B. Kister, Chief, Project Branch No. 1, DRP
J. R. Strosnider, Chief, Projects Section No. 1B, DRP
L. R. Plisco, Senior Resident Inspector, Susquehanna, DRP
E. G. Adensam, Director, BWR Project Directorate No. 3, Division of BWR Licensing, NRR
M. J. Campagnone, Licensing Project Manager, NRR (part time)

Other Attendees

L. T. Doerflein, Project Engineer, RPS 1B, DRP
J. R. Stair, Resident Inspector, Susquehanna, DRP
R. L. Fuhrmeister, Reactor Engineer, RPS 1B, DRP
R. L. Nimitz, Senior Radiation Specialist, FRPS, DRSS

1.3 Background

1.3.1 Licensee Activities

Unit 1

Unit 1 began the evaluation period in its first refueling outage. Restart following the 123 day outage occurred on June 12, 1985. Operation continued uninterrupted until October 28, 1985, when a blown fuse during surveillance testing initiated an automatic scram. Startup was interrupted at 64% power on October 30, 1985 when a scram was initiated by a turbine trip due to a moisture separator drain tank high level. After startup on November 6, operation continued until December 2, 1985, when a reactor scram occurred on reactor vessel high level following a feedwater transient caused by the loss of an engineered safeguards system (ESS) transformer. The unit started up on December 4. Operation continued until a scheduled shutdown was initiated for the second refueling outage on February 14, 1986. The outage was completed on April 23, 1986. During startup, the unit was forced to shut down in order to repair a failed traversing incore probe (TIP) indexer. Operation continued on April 25, 1986. On May 24, 1986 the unit was manually scrammed due to failure of an emergency service water (ESW) pump. An alert was declared when a diver identified that another pump had erosion damage similar to the failed pump. The unit was restarted on June 14, 1986 following repair of the pumps. During the turbine warmup, a loud noise was heard from the low pressure turbine. The unit was shut down and investigations determined the turbine was acceptable for continued operation. The unit was restarted on June 19. During the period from May 1985 to July 1986, the plant operated with an average capacity factor of approximately 63 percent, which included two refueling outages. Section 5.6 provides an analysis of the unplanned automatic scrams and unplanned outages. Figure 1 summarizes the Unit 1 operating history during the assessment period.

Unit 2

Unit 2 began the evaluation period in a forced outage due to generator stator cooling repairs which were completed on May 2, 1985. On May 31, unidentified reactor coolant system

(RCS) leakage exceeded the Technical Specification limit and the unit was manually scrammed. Repairs were performed to the 'A' recirculation discharge bypass valve and the unit was restarted on June 3. On June 30, a low voltage bushing failed on the 'C' phase main transformer causing a generator load reject and reactor scram. The unit returned to power on July 6 after replacing the bushing. On August 5, an unplanned automatic scram occurred when an I&C technician error was made during a reactor vessel level instrument surveillance test. The unit restarted on August 7 and operated until October 5 when a lightning strike on the 500KV transmission line initiated a turbine trip. The unit returned to operation on the following day and operated until December 2, 1985 when the unit scrammed on reactor vessel low level during a feedwater transient caused by a loss of an ESS transformer. The unit restarted on December 7, 1985. On January 15, 1986 the unit was manually scrammed because of an excessive oil leak from one of the main generator transformers. Following repairs, the unit was started up on January 21, but another scram occurred during startup due to operator error when insufficient feedwater flow was provided upon opening of the turbine bypass valves. The unit reached End of Cycle on May 8 with all rods out and 100 percent core flow. The unit operated at reduced power levels until May 24, 1986 when the unit was manually shut down, along with Unit 1, due to ESW pump erosion failures. The pump repairs were completed and the unit was started up on June 18, 1986. On July 17, the unit was again manually shut down due to high unidentified RCS leakage. Repairs were completed on a residual heat removal (RHR) injection check valve and the unit returned to operation on July 21, 1986. The average capacity factor for Unit 2 during the assessment period was 82.3%. Figure 2 summarizes the Unit 2 operating history during the assessment period.

1.3.2 Inspection Activities

Two NRC resident inspectors were assigned to the site throughout the assessment period, except for one month when one inspector was assigned. During this fifteen month assessment period, 3702 hours of direct NRC inspection were performed at Susquehanna. This represents 2962 hours on an annual basis for both units. Of the total hours during this assessment period, 1473 hours were performed by Region I based specialist inspectors and 2229 hours were performed by resident inspectors.

During the assessment period, three NRC team inspections were conducted to examine the following areas:

1. Evaluation of a full scale annual emergency exercise.

2. Evaluation of a partial scale annual emergency exercise.

3. Appraisal of the emergency response facilities.

Two special inspections (one resident and one specialist) were conducted which examined the inoperability of the ESW system due to modification activities and the radiological controls associated with the Unit 1 steam dryer repairs.

This report also discusses "Training and Qualification Effectiveness" and "Assurance of Quality" as separate functional areas. Although these topics, in themselves, are assessed in the other functional areas, through their use as evaluation criteria, a synopsis of these two areas is provided. For example, quality assurance effectiveness has been assessed on a day-to-day basis by resident inspectors and as an integral aspect of specialist inspections. Although quality work is the responsibility of every employee, one of the management tools to measure this effectiveness is reliance on quality assurance inspections and audits. Other major factors that influence quality, such as involvement of first-line supervision, safety committees, and worker attitudes, are discussed in each area.

Due to limited inspection activities in the fire protection area, it is not included as a separate functional area in this report. Inspection activity that was performed in the area of fire protection is included in the Plant Operations functional area and related licensing activities are discussed in Section 4.8.1.

Tabulations of inspection activities and associated enforcement actions are contained in Tables 3, 4 and 5. The percentage of total inspection time devoted to a functional area, tabulated in Table 3, is included at the heading of each area analyzed in Section 4.

2.0 CRITERIA

Licensee performance was assessed in selected functional areas significant to nuclear safety at operating facilities.

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 resolution of technical issues from a safety standpoint.
3. Responsiveness to NRC initiatives.
4. Enforcement history.
5. Reporting and analysis of reportable events.
6. Staffing (including management).
7. Training effectiveness and qualification.

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. Reduced NRC attention may be appropriate. 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 is being achieved.

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

Category 3. Both NRC and licensee attention should be increased. 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 is being achieved.

The SALP Board has also assessed each functional area to compare the licensee's performance during the last quarter of the assessment period to that during the entire period in order to determine the recent trend for each functional area. The trend categories used by the SALP Board are as follows:

Improving: Licensee performance has generally improved over the last quarter of the current SALP assessment period.

<u>Consistent</u>: Licensee performance has remained essentially constant over the last quarter of the current SALP assessment period.

<u>Declining</u>: Licensee performance has generally declined over the last quarter of the current SALP assessment period.

3.0 SUMMARY OF RESULTS

3.1 Overall Facility Evaluation

The assessment concludes overall that station management has continued to improve operational performance and that there is effective management attention and involvement oriented toward nuclear safety in all functional areas evaluated. This is the first assessment period in which both units were in commercial operation. In completing this transition, the licensee has concentrated its efforts on improving plant operations and site support activities. Active corporate and site management actions have resulted in a Category 1 assessment in nine of the ten functional areas, which demonstrates a high level of performance.

Management attention has resulted in noticeable improvement in the area of plant operations. The number of operational events has significantly decreased as the plant operators have gained more experience and design deficiencies are corrected. During the same length assessment period (fifteen months), unplanned reactor scrams were reduced from 13 in the previous period to 8 during this assessment period for two units. In addition, recurrent cause scrams such as moisture separator drain tank high levels and feedwater control system transients have been reduced due to modifications, procedure revisions, and improved operator training. There was one unplanned automatic scram caused by an operator error during the assessment period.

Significant improvement has also been noted in the surveillance testing program, especially in the area of missed surveillances, which was a major area of concern in the last SALP period. The number of missed surveillances has been reduced by increased attention to scheduling at the work group level and by a higher level of management involvement.

The one area identified in this assessment where improvement is needed is the licensee's corrective action programs. While internal review programs have been effective in identifying problems in programs, procedures and system design, timeliness and completeness of corrective actions, on occasion, have not been adequate. A noticeably large number of NRC findings during this period relate to items previously identified by the licensee's organizations, where corrective actions were incomplete, delayed, or insufficient to prevent recurrence. This weakness was noted in several functional areas, and management involvement appears to be needed in evaluating the prioritization and resolution process and ensuring that problem resolution is elevated to the appropriate decision making level.

3.2 Facility Performance

Functional Area	Category Last Period	Category This Period	Recent Trend
1. Plant Operations	2	1	Consistent
2. Radiological Controls	1	1	Consistent
3. Maintenance	1	1	Declining
4. Surveillance	2	1	Consistent
5. Emergency Preparedness	1	1	Consistent
6. Security and Safeguards	1	1	Consistent
7. Outage Management, Modification and Technical Support Activities	1	1	Consistent
8. Licensing Activities	1	1	Improving
9. Training and Qualification Effectiveness	Not Evaluated	1	Consistent
10. Assurance of Quality	Not Evaluated	2	Consistent

4.0 PERFORMANCE ANALYSIS

4.1 Plant Operations (49%, 1819 hours)

Analysis

Plant Operations was assessed as a Category 2 during the previous SALP period. Problems identified were the number of operational incidents; operator awareness; Technical Specification interpretations; and operator logkeeping. Significant improvement was shown during this assessment period as discussed below.

During the previous assessment period, there were several significant operational incidents, three of which led to escalated enforcement. No common root cause for the incidents was identified, other than lack of extensive operating experience and interpretation problems with Technical Specifications. There were no significant operational incidents during this period that led to escalated enforcement action.

This functional area was under continuous review by the resident inspectors throughout the assessment period. In addition, initial operator licensing examinations were given to 12 candidates.

Plant operations continues to be characterized by strong management involvement. The station management aggressively addresses plant problems and acts conservatively when nuclear safety concerns exist. Task forces are routinely established by the licensee to investigate and resolve more complex and urgent problems. These task forces include individuals from various organizations including the corporate engineering staff. Examples of plant problems where task forces were effectively used include persistent reactor water high conductivity, Unit 1 steam dryer repairs, and mechanical snubber inspections.

Management's conservative approach to nuclear safety and plant problems is exemplified by two incidents which occurred during this period. In October 1985, a potentially severe radiological hazard existed due to a spill of water and resin from the reactor water cleanup system. As a precautionary measure, the affected reactor building was evacuated of all non-essential personnel and the Technical Support Center was manned. Very little personnel exposure was received during the spill cleanup due to strong management control of the event. Extensive, well planned testing was performed during system restoration to verify the piping integrity. During the event review, a significant deficiency in the system design was identified and a modification to correct the deficiency on both units was designed and implemented on an expedited basis.

The other example concerns management's actions after discovering that an emergency service water (ESW) pump had failed due to severe

erosion. Within hours of discovering the condition of the failed pump, the licensee made arrangements to have another ESW pump inspected by a diver. The diver identified similar erosion on another pump and the licensee immediately declared an ALERT and shutdown both units, which were operating at full power, based on the assumption that similar damage probably existed on the remaining two ESW pumps. Contingency plans were developed by technical engineers to provide alternate water sources in the unlikely event the remaining pumps failed while shutdown. The licensee restored all four pumps to their original configuration as an interim measure prior to startup of both units, and is evaluating long term fixes to prevent a similar occurrence later in plant life.

The Operations Department has a large number of operators, both licensed and non-licensed, to meet all staffing positions. The operators are in a five shift rotation with plans for a sixth shift in early 1987. The department also maintains a large support staff composed of plant engineers and contractors for such functions as procedure maintenance, human factors and various improvement projects. Use of this capable full-time staff relieves the on-shift operating staff from a large administrative burden. Overall operator performance has improved as further experience has been gained. In addition, the turnover rate for operators has been very low. On a number of plant transients, such as offgas isolations, recirculation pump speed oscillations, and loss of all station air compressors, quick action by both licensed and non-licensed operators prevented trips of the reactors. Reactor startups and shutdowns observed by the inspectors were well controlled. There was only one unplanned reactor scram caused by an operator error during this period. One unplanned outage was caused by an operator error in conjunction with a design deficiency and equipment failure.

The department annually formulates the Operations Enhancement Program to organize improvement efforts in the following major categories: Shift Scheduling and Staffing, Training, Radwaste, Operator Environment, and Procedures and Administrative Controls. Goals are established and progress towards their completion is closely tracked by management. Improvement items are generated from internal audits, NRC inspections, independent contractor audits, INPO findings, and station management. Examples of the more significant goals established included: 1) reduction of control room nuisance alarms; 2) improvement of plant labeling; 3) implementation of the Emergency Operating Procedures (EOP) Program; and 4) development of Local Alarm procedures for all local panels. The latter two goals were completed during this assessment period. Although not complete, marked improvements have been noted in plant component labeling, and control room nuisance alarms. The inspectors have also noted significant improvements in several other operations areas including operator logkeeping and common system controls which were noted as weaknesses in the last assessment period.

The control room operators, especially Unit Supervisors, have demonstrated an improved understanding of the Technical Specifications (TS). This has resulted in fewer Technical Specification violations and LERs. There were 35 percent fewer LERs submitted this period compared to the last assessment. In general, decisions to enter a Limiting Condition for Operation (LCO) Action Statement are made conservatively, and operators quickly get station management and the technical staff involved when interpretation questions arise. The licensee also has made progress in correcting ambiguous or incorrect Technical Specifications by submission of Technical Specification amendments. There was one occurrence this period where an operability determination was made by the operators concerning a frozen spray pond riser network with an invalid Technical Specification interpretation, but a violation did not occur. In a related occurrence, the licensee did not provide sufficient guidance to the operators concerning ESW alignment to the diesel generators to ensure the system was single failure proof. A licensee effort to formalize a Technical Specification Interpretation Manual for operator use, which was noted in the previous assessment, has not yet been completed.

There were two violations identified in the plant operations area, and both concerned valve alignment problems. In July 1985, a containment isolation valve was found by an NRC inspector to be not locked closed as required by operating procedures, although it was properly closed. In March 1986, several isolation valves to the scram discharge volume level transmitters were found by the inspectors not locked open as required by station administrative controls. Several other valve misalignment problems were also noted during the period, but none led to system inoperability. Prompt and adequate corrective actions were taken in response to the violations.

Near the end of the assessment period, a containment isolation valve on a TIP tube was made inoperable by an operator, by deenergizing the drive power with the TIP probe still inserted in containment. The inoperability was not recognized until a low level isolation failed to isolate the penetration as designed. A similar occurrence had occurred previously. In addition, the storage of the TIP probes inside containment was identified as a contributory cause, and an inspector identified the same practice several weeks later. This event exemplifies weaknesses in the licensee's corrective action program which is further discussed in Section 4.10.

One area, where improvements should be made is post-maintenance/modification testing. There is presently no comprehensive station program on post-maintenance or modification testing. Little or no guidance is provided to either the operators, who determine what operational testing is appropriate, or others such as system engineers and maintenance planners who recommend the operational testing.

The licensee has established a strong housekeeping and cleanliness program throughout the plant. Plant appearance has been outstanding and is routinely commended by visiting inspectors and NRC management. The program includes regular tours by plant management. It is evident that significant resources are employed to maintain the high level of material condition and cleanliness.

QA/QC staffing levels are adequate to provide independent inspection and program overviews. Surveillance and audit reports are comprehensive. The QA/QC department is well integrated into station programs and active involvement has been noted during routine inspection activities.

Overall, the licensee has demonstrated improved performance in the area of plant operations. Aggressive management attention has resulted in a significant reduction in operator-related events. A management approach which stresses conservatism when resolving nuclear safety issues has established this philosophy throughout the organization.

Conclusion

Rating: Category 1

Trend: Consistent

Board Recommendations

Licensee:

-- Continue implementation of Operations Enhancement Program.

NRC:

-- None

4.2 Radiological Controls (5%, 166 hours)

Analysis

This area was rated Category 1 during the last assessment period. Weaknesses identified last assessment period were: lack of a well-defined contractor radiation protection technician training program; lack of certification documentation for auditors of radwaste shipping activities; some failures to implement special chemistry sampling requiremens; and some minor problems with radiation protection oversight of work in controlled areas. Inspections this assessment period indicate that the licensee took aggressive and timely action to address these NRC identified concerns.

There were four routine unannounced inspections and one special inspection conducted by regional inspectors in the area of Radiological Controls during this assessment period. The special inspection focused on radiation protection activities associated with the repair of the Unit 1 steam dryer. Resident inspectors performed routine reviews of this program area throughout the assessment period.

The radiological controls program at Susquehanna is common to both units and is uniformly implemented. Staffing is adequate to implement the routine program and is supplemented by contractors, as necessary, to support outages. Corporate personnel are also used to augment the site staff. To provide cross-training, maintain morale, and retain qualified staff, the licensee routinely rotates personnel in the site and corporate Radiological Controls Groups. This practice has improved the overall performance and level of understanding of radiological control matters and minimized personnel turnover. Appropriate administrative controls are in-place to ensure compliance with Technical Specifications concerning personnel qualification requirements when positions are rotated.

The selection, qualification and training of Radiological Controls personnel is given appropriate attention by management. A well equipped training facility and superior training resources indicate a strong management commitment to training. A weakness identified during the last assessment period concerning lack of a well defined contractor technician selection, qualification and training program, was effectively addressed during this period. The program now provides for high levels of experience by contractors and requires passing written entrance examinations in addition to specified procedure training. Well trained and qualified personnel were found to be acting in responsible capacities both on day and back shifts.

The licensee has taken aggressive and timely action to address several other previously identified NRC concerns. Certification documentation of auditors was upgraded; adherence to special chemistry sampling requirements was improved through better

coordination and cooperation between the operations and chemistry personnel; and the oversight of work in controlled areas was improved.

The corporate radiological controls group is performing comprehensive, in-depth assessments of radiological control activities at the station. An inspection found that the station organization did not adequately respond to all of the assessments nor did the corporate group initiate action to ensure resolution of the findings, although appropriate corrective action was taken. Weaknesses in the internal review and corrective action program are further discussed in Section 4.10.

Review of the nonradiological chemistry area found the licensee's results were, with a few minor exceptions, in agreement with the prepared standard solutions. Several isolated areas where improvements were needed included: calibration practices (i.e. two point curves); completeness of analytical procedures; and, chemistry control charts.

In the previous SALP period, problems were noted with implementation of chemistry surveillances. The problems were a result of poor coordination between the chemistry and plant operation group and failure to implement sampling requirements. Appropriate procedures were revised and an improved tracking system was established to address this problem. There was only one problem with chemistry surveillances this period that involved a three hour delay in collection of a noble gas sample by a technician. This is a significant improvement over last period. No unusual releases occurred during the delay. The licensee revised his tracking systems to preclude recurrence and submitted an LER for this event.

With the exception of the previously discussed LER, Technical Specification surveillance requirements in the areas of chemistry and process and effluent monitoring and controls were found to be effectively implemented. However, NRC review did identify a need to strengthen procedural controls to ensure implementation of the appropriate actions in the event certain monitored parameters exceed their applicable limits (e.g. initiation of a report when the SJAE increased). NRC review of this matter is not complete.

The radioactive waste packaging and shipping program review found it properly implemented for the quantities of radioactive material currently shipped. All of the calculations reviewed were conservative. However, adequate program procedures to ensure compliance with regulatory requirements in the event larger quantities of radioactive material are shipped need to be developed. Some of these items included use of out-of-date regulatory hand books, and use of incorrect methods for determination of package curie content.

The licensee is implementing an aggressive ALARA program to minimize personnel exposures with the exception of an ALARA goals program. The program is adequately staffed with qualified personnel. ALARA procedures and policies are well documented to achieve implementation of the program. Licensee efforts in preparation for outage activities were appropriate, however, due to higher than expected dose rates; underestimation of staff-hours for the IHSI workscope; and expansion of initial workscopes (i.e. steam dryer repair), the licensee exceeded their 1985 ALARA goal. For 1986, the licensee did not establish a challenging goal based on industry guidelines. After discussions with the NRC, the licensee revised the ALARA goals ensuring they were challenging, yet realistic. Total exposures sustained thus far for 1986, are well within the newly established goals. In general, the average occupational dose per unit is significantly less than the average BWR.

A special inspection to review worker concerns relating to unnecessary exposure to repair the Unit 1 steam dryer found that that licensee implemented strict exposure control for the dryer repair and utilized appropriate means to minimize exposure. Reviews of in-plant radiological controls coverage of work found it to be generally effective. Internal and external exposure control programs were implemented, radiological surveys of work in progress were adequate, high radiation area controls were implemented, and in-plant ALARA controls as specified in ALARA reviews and Radiation Work Permits were adequate and appropriately implemented.

The licensee's Radiological Controls program is, in the aggregate, aggressively implemented and is considered effective and continues to improve. This effectiveness is attributed, in part, to active involvement in the program by station and corporate management and decision making at all levels.

Conclusion

Rating: Category 1

Trend: Consistent

Board Recommendations

Licensee:

-- Establish and implement an effective process for setting challenging and realistic ALARA goals.

NRC:

-- None

4.3 Maintenance (6%, 231 hours)

Analysis

The previous SALP rated the licensee's performance as Category 1. The NRC found the maintenance department well organized and staffed by experienced personnel. The licensee established and implemented an extensive preventive maintenance program. Minor deficiencies were noted in the battery maintenance program, which were corrected.

During this assessment period routine reviews of ongoing maintenance activities were performed by the resident inspectors. Three region-based inspections were conducted which reviewed the electrical and mechanical maintenance programs.

The maintenance organization is well staffed with knowledgeable and skilled personnel to support the required maintenance activities to maintain safety-related equipment in a proper condition. The maintenance training programs are very effective and the turnover rate is very low. There were no unplanned shutdowns during the period directly attributable to maintenance inadequacies. Maintenance-related work is promptly identified by the various work groups, and the maintenance and I&C departments are aggressive in scheduling and completing the work based on the priority assigned by management. Managerial involvement on a daily basis in supervising, tracking, prioritizing and resolving problems resulted in a high level of plant operational readiness.

The preventive and corrective maintenance programs for safety-related systems and components are adequate to support the station activities. There is consistent evidence of planning of work and assignment of work based on priorities. The administrative and implementation procedures are thorough, detailed and properly approved. The licensee has clearly defined methods and responsibilities for the implementation of the preventive and corrective maintenance activities. The Work Authorization (WA) system and the Equipment Release Forms (ERF) combined with the involvement of operations supervision provide adequate assurance that maintenance activities are well controlled and do not adversely affect plant safety. The maintenance department assembles a complete work package in a binder which includes all of the procedures, drawings, sign-off sheets, and references needed for each job and gives this to the mechanics assigned. This has proven to be an extremely effective method of ensuring that all the required information is available to the maintenance technician at the job site.

The licensee utilizes a comprehensive computerized data management capability to track maintenance activities. All of the work authorizations are coded with action taken, problem, and cause codes for use in historical evaluations. All of the work authorizations

are tracked in the work process chain (i.e. working, review, planning, released). This capability enables the generation of many useful management reports, including performance indicators.

The licensee has implemented an equipment performance and trending analysis program which should provide valuable information for the preventive maintenance program. The licensee issues a quarterly report which summarizes plant performance and equipment failure information from mechanical, electrical and I&C work authorizations. The report identifies trends and problem areas and tracks their resolution. Predictive maintenance tools, such as MOVATs, are also being extensively used to augment their program.

One programmatic weakness identified during the period was in the area of operational testing after maintenance and modification work. No written procedures or guidelines are currently provided to the operations staff performing the operational functional checks after maintenance activities. This concern was identified in April 1985, when it was noted during the ESW inoperability investigation that inadequate operational testing was performed following installation of modifications in the ESW system logic. Following the inoperable ESW incident, the inspectors observed individual operators paying increased attention to operational testing. While inadequate post-maintenance or modification testing has not directly resulted in inoperable safety equipment during this period, better post-modification testing could have prevented inoperability of the scram discharge volume (SDV) level instruments. Two SDV level instruments were left isolated for approximately eight months after completion of modification activities. The licensee is in the process of developing and implementing post-maintenance operational testing requirements.

A special review of the licensee's maintenance program affecting those valves which isolate primary coolant from low pressure ECCS piping and components was conducted in May, 1985. The review found that the system design and maintenance activities of the high/low pressure interface devices was acceptable, but determined that no detailed maintenance procedure for the ECCS testable check valves and air operators existed. The licensee promptly developed a procedure to control these important activities.

In February 1986, an expired squib valve was found installed in the Unit 1 SLCS. The causes included: incomplete shelf-life documention; a failure in the shelf-life control system; and, inadequate maintenance procedures. The maintenance procedures were promptly revised. The shelf-life control system had been previously enhanced, but subsequent to the squib valve installation. This appears to be an isolated case, and not a programmatic problem, since each individual contributing cause would not have led to the error.

In April 1986, an inspector identified that improperly controlled maintenance work was being performed in the recirculation plenum. In this case, maintenance technicians were not following the work plan correctly and effectively made the ventilation system inoperable without operations knowledge or approval. In another event, with Unit 2 shut down, an operator discovered that all of the low pressure ECCS systems were technically inoperable due to a series of equipment releases for maintenance and I&C work. Although a Technical Specification violation did not occur, it is of concern that administrative programs in place did not prevent this occurrence. The licensee is still evaluating this event to determine the root cause and appropriate corrective action. Previous assessments have found that the work control process and system status controls were a strength, but both of these events indicate that the current work control process may need improvement.

At the end of the assessment period, followup of generic issues concerning potential deficiencies in Limitorque motor operators identified weaknesses in the licensees controls of environmentally qualified equipment. The licensee recently identified that unqualified wiring was installed in motor operators inside containment. In addition, unqualified terminal blocks were installed during a recent outage.

Overall, the maintenance program is properly established, implemented and staffed. However, several recent occurrences reflected declining performances. These occurrences include improperly controlled maintenance work in the recirculation plenum and inoperability of all of the Unit 2 ECCS systems while shutdown. Another example outside the assessment period concerning inadequate torquing of a primary containment equipment access hatch further demonstrates the need for increased management attention in this area.

Conclusion

Rating: Category 1

Trend: Declining

Board Recommendations

Licensee:

-- Establish guidance on post-maintenance/modification testing.

NRC:

-- None

4.4 Surveillance (7%, 276 hours)

Analysis

During the previous assessment period, the licensee's performance in this area was rated as Category 2. Although the surveillance program was well established and utilized technically adequate procedures, there were problems with missed surveillances, especially with program controls at the work level.

Surveillance tests were routinely observed by the resident inspectors during this assessment period. The residents also performed detailed reviews of surveillance procedures and completed test results on several safety systems. In addition, a regional specialist reviewed the administration of the surveillance program.

The surveillance program is well established and, in general, well implemented. The governing administrative directive was completely revised during this period to reflect all aspects of the program and to more clearly establish responsibilities. The licensee maintains current matrixes to ensure all Technical Specification requirements have a corresponding, technically adequate surveillance procedure. Another program, which is ongoing, is maintenance of a system of highlighted drawings and electrical schematics to ensure all connections, contacts, and logic components are tested at required frequencies. A computer based matrix of highlighted drawings versus surveillances is also maintained. Another program established in this period, is the Surveillance Action Request program, where surveillance problems or discrepancies are identified, tracked, reviewed and dispositioned. The above program improvements have been very effective in upgrading the quality and completeness of the surveillance test program.

In the previous assessment period, missed surveillances were a major concern. There have been much fewer missed surveillances during this period. Only four LERs were submitted which described missed surveillances and none have been submitted within the last 6 months. There was no specific root cause for these occurrences. Three of the missed surveillances were identified by the licensee and promptly corrected. The fourth case was identified by an inspector during review of control room emergency ventilation surveillance procedures. The number of missed surveillances has been reduced primarily due to increased attention to surveillance scheduling by work group coordinators, and oversight by the surveillance program coordinator.

A major issue addressed during this assessment period involved the adequacy of the monthly Channel Functional Tests (CFT) performed on ECCS and Containment Isolation Systems. The licensee was not testing the entire channel as required by the Technical Specifications during CFTs. This issue was first identified by the NRC in 1983. The I&C Department, in accordance with a position approved by senior

management, had limited the scope of the CFT such that in some cases, only the first contact off the process transmitter was tested, instead of all the logic components in the channel. All logic components were tested as required in the 18-Month Logic System Functional Tests (LSFT). The licensee contested the violation and a management meeting was held March 14, 1986. As a result of the meeting, the licensee submitted a revised violation response which described specific cases where the Technical Specification requirement could not be literally met due to unique circuit configurations. This issue was resolved by NRC acceptance of the licensee's testing philosophy.

The licensee has undertaken a major program to rewrite Logic System Functional Tests and other 18-month surveillance procedures following transfer of responsibility of the tests from operations to the technical staff. The procedures are being rewritten and reissued by the cognizant System Engineer. This effort has made significant improvements to these very complex tests.

Surveillance tests witnessed by the inspectors have been well controlled and implemented. For more complex testing, a test director (usually the System Engineer) is assigned and detailed briefings are held before test commencement. Anomalies occurring during tests are properly addressed and dispositioned.

There were a number of inadvertent reactor protection system (RPS) and engineered safety feature (ESF) actuations which occurred during surveillance testing activities in this assessment period. These occurrences accounted for four RPS actuations, two of which were at power, and seven ESF actuations. Eight of the reported events could be attributed to personnel error. The causes included communication errors, mispositioned switches, and jumper installation errors. Several of the events occurred with one division tripped due to outage activities, and only one actuation signal was needed to cause an initiation. One unplanned reactor scram was caused by a blown fuse which occurred during an RPS surveillance. With one RPS division tripped for testing, a fuse in the other division blew for an unknown reason, initiating a scram. A second unplanned reactor scram occurred due to a I&C technician error during a Unit 2 reactor vessel level surveillance. The technician missed a step in the procedure and took a level detector out of service which was being utilized by the feedwater control system. Management attention should be directed to reducing the number of RPS and ESF actuations due to personnel errors.

One area which requires improvement involves followup of self-identified deficiencies. On more than one occasion, during inspector identification of a surveillance deficiency, a review of licensee records revealed that the deficiency had been previously identified, but not adequately or promptly corrected. For example, deficiencies in diesel generator lockout features and average drywell

air temperature surveillances found by inspectors, were previously identified by NQA, but timely resolution did not occur until NRC involvement. These particular practices were not significant safety issues, but clearly showed licensee identified (NQA) deficiencies which were not adequately addressed for a year. Both of these occurrences resulted in submission of Technical Specification changes to correct the problem. The issue involving monthly Channel Functional Tests, discussed above, was also a Technical Specification surveillance requirement which took several years to resolve. In addition, inspector review of Technical Specification required diesel generator maintenance procedures found that all of the vendor recommendations were not included in the 18-month inspection. It was later determined that a previous QA audit had identified similar discrepancies, but they had not been fully corrected. Some ambiguity existed in the Technical Specification requirements in all four of the above cases and was the subject of numerous internal discussions among licensee staff members, but a timely decision was not reached to fully resolve the issues. The concern of followup to self-identified deficiencies is further discussed in Section 4.10.

Overall, the licensee has effectively implemented an extensive surveillance program. Licensee performance has significantly improved, especially in the area of missed surveillances. One problem area noted during the assessment period was timely and thorough followup to self-identified procedural deficiencies, and further management attention may be required to resolve future issues.

Conclusion

Rating: Category 1

Trend: Consistent

Recommendations

Licensee:

-- None

NRC:

-- None

4.5 Emergency Preparedness (20%, 728 hours)

Analysis

During the previous assessment period, the licensee was rated as Category 1. This rating was due to a well-qualified staff, fully equipped emergency facilities, and the licensee's commitment of substantial resources to the program. No significant weaknesses were identified.

During this assessment period, there were three region based inspections of emergency preparedness activities which included observation of a partial and full scale emergency exercise and an Emergency Response Facility Appraisal. In addition, resident inspectors observed two semi-annual Health Physics Drills and two actual emergency plan activations.

The licensee has an ample staff of six full time individuals who are assigned to maintain the emergency preparedness program. In addition, there are several part time liaison personnel used in specific areas, such as reactor operations, health physics, and data processing.

The licensee's execution and participation in the observed exercises demonstrated thorough planning and a strong commitment to emergency preparedness. Emergency response personnel were observed to be knowledgeable in their duties and in use of plant EP Implementing Procedures, a reflection of a good training program. During both exercises, NRC inspection teams determined that the licensee's performance demonstrated that the Emergency Plan could be implemented in a manner that would adequately provide protective measures for the health and safety of the public.

During observation of the emergency exercises, several recurring minor deficiencies were noted: the radio communications between the in-plant teams and the TSC was poor; procedural problems were noted in the offsite monitoring practices; and the EOF Technical Status Board was not being maintained. These areas should be addressed prior to the next exercise since they have been noted during the last two observations.

In May 1986, the NRC conducted a special appraisal of the Emergency Response Facilities which covered the Technical Support Center (TSC), Operations Support Center (OSC), Emergency Operations Facility (EOF), data acquisition systems, and supplies and equipment for each facility. Overall, the assessment indicated that the licensee has well equipped emergency response facilities. The appraisal identified one deviation regarding meterological monitoring equipment measurement accuracy, and in addition, several items were identified relating to habitability monitoring of OSC holding areas for craft personnel.

The resident inspectors observed the licensee's emergency response implementation during two actual emergency events. In March 1986, an Unusual Event was declared when an individual was injured when he fell while replacing the CRD housing underneath the reactor vessel. The individual was decontaminated prior to being transported to the local hospital. The hospital was quickly alerted and was adequately prepared to minimize the spread of any contamination and there was no spread of contamination during the event. The licensee personnel acted quickly in response and the Unusual Event was terminated in less than an hour when the individual was transported to the hospital.

In May 1986, an Alert was declared based on declaring all of the ESW pumps inoperable. Due to a failure of the 'C' ESW pump and a diver inspection of the 'A' ESW pump, the licensee decided to declare all of the pumps inoperable and to shutdown both units. Although not specifically required by the Emergency Plan, an Alert was declared. The TSC was manned throughout the event, which was terminated when both units reached cold shutdown. The licensee's actions during this event were prudent and conservative and clearly exemplify their safety conscious attitude.

In summary, the licensee performed well in actual emergency situations and continued to perform successfully drills and annual exercises.

Conclusion:

Rating: Category 1

Trend: Consistent

Recommendations:

Licensee:

-- None

NRC:

-- Reduce Inspection Effort

4.6 Security and Safeguards (3%, 119 hours)

Analysis

During the previous assessment period, the licensee was rated as Category 1. No major security program issues were identified, and the licensee was effective in maintaining a high degree of overall security performance.

During this assessment period, there were two unannounced physical protection inspections performed by region-based inspectors. The NRC resident inspectors reviewed the security program throughout the assessment period. No violations were identified and no security events requiring reporting, pursuant to the requirements of 10 CFR 73.71, occurred during the assessment period.

The licensee has continued to implement an effective security program. This effectiveness can be attributed to strong management involvement. They have developed a well planned and integrated security program, utilizing state-of-the-art equipment combined with well trained personnel. The licensee develops and maintains an aggressive on-site and corporate security organization and staffs it with well qualified and dedicated personnel. Well-defined duties and responsibilities for organization personnel are established and they are held accountable for their actions. Corporate security management is also actively involved in the Region I Nuclear Security Association and other nuclear industry groups engaged in innovations and the development of security program standards.

To ensure the continued effectiveness of the program, unannounced surveillances of randomly selected aspects of the program are conducted by the licensee's quality assurance and corporate security staff, in addition to a comprehensive annual program audit by QA. Corrective actions on QA findings were noted to be prompt and effective in all cases with adequate followup to ensure their timely and proper implementation. The licensee's security organization also performs self-assessments, utilizing NRC inspection criteria and performance standards. Program monitoring in this manner has proven to be extremely effective in identifying potential weaknesses before they become problems and is a clear demonstration of the licensee's commitment to a high quality security program.

Maintenance of the security systems, while not performed by a dedicated staff, is effectively carried out, as evidenced by low turn around time for work requests, excellent on-line experience with equipment, and absence of equipment related events requiring reports to the NRC.

The training facilities for the security force have a professional appearance, with adequate classroom space, good training aids, modern equipment, an on-site firing range and a dedicated training staff.

Instructors utilize structured lesson plans which are supplemented, as appropriate, with on-the-job experiences, exercise critiques and guest speakers. Managers and supervisors also receive the basic training and qualification program, in addition to specialized training courses appropriate to their function and position. Members of the security force who demonstrate a potential for advancement are also provided with career broadening opportunities and training. The training programs provided by the licensee represent a substantial investment of capital and human resources and are another indication of the licensee's commitment to a quality security program and training.

All functions of the security organization are adequately staffed as evidenced by the minimal use of overtime and the high morale and professional demeanor exhibited by all personnel. In addition, the turnover rate in the security organization has been very low. The licensee conducted two contingency plan exercises during the assessment period that were observed by the NRC. The security organization was very professional in carrying out its preplanned response actions. At the conclusion of each exercise, a comprehensive and constructive critique was conducted among the participants and was well documented.

One change in the security plan submitted to the NRC was not considered acceptable under the provisions of 10 CFR 50.54(p) and could have been avoided had the licensee adequately reviewed the revision prior to submittal. This was considered to be an isolated case. The licensee's changes to security plans generally are well prepared.

The licensee continued to streamline the site access processing procedure to ensure that NRC inspectors have prompt and unfettered access to the site. The licensee's actions have significantly minimized inspector access delays without compromising the quality of their site specific training requirements.

In summary, the licensee has a well-established and effectively implemented security program. The security force is well-trained and professional, and the security organization has well-defined duties and responsibilities.

Conclusion

Rating: Category 1

Trend: Consistent

Recommendation

Licensee:

-- None

NRC:

-- None

4.7 Outage Management, Modification, and Technical Support Activities (10%, 363 hours)

Analysis

During the previous assessment, this area was rated as Category 1. This was due to a strong nuclear design organization and effective management involvement in outage planning. Several problems were noted related to the accuracy of Class 2 drawings, which were resolved.

Routine reviews of outage management, modification and technical support activities were performed by the resident inspectors. In addition, two corporate office visits were conducted to review outage planning, modification preparation, and technical support activities. One special inspection was conducted concerning ESW inoperability which occurred following modification activities. Five region-based inspections were conducted.

Outage Management

The licensee completed two major outages during this assessment period. The Unit 1 first refueling outage was performed from February to June 1985, and the Unit 1 second refueling outage was performed from February to May 1986. In addition, the licensee completed planning for the Unit 2 first refueling outage which commenced after the assessment period on August 9, 1986. The licensee has established a well organized and well directed outage management organization responsible for planning, prioritizing and coordinating outage work. The licensee develops very precise plans and schedules based on an early and well-defined scope. After completion of the Unit 1 first refueling outage, the unit established a new site continuous operation record of 138 days, which is evidence of the high quality work completed during the outage.

The licensee has implemented a comprehensive and technically sound Local Leak Rate Test (LLRT) and Containment Integrated Leak Rate Test (CILRT) program. The tests were conducted using acceptable procedures and equipment, and the test personnel were knowledgeable and well qualified. The test results on Unit 1 met the acceptance criteria as per 10 CFR 50, Appendix J, but an "as found" CILRT performed on Unit 2 at the end of the period resulted in a failure. Following completion of the necessary corrective action, a satisfactory retest was performed.

The licensee was closely involved in field examinations and data reviews during the Unit 1 Inservice Inspection Program (ISI). For example, a licensee ASNT Level III qualified individual was actively involved with the results of examinations of the reactor vessel internals. Additionally, observation of the licensee and contractor ISI staffs indicated more than adequate training and qualification of

these individuals. An increase in licensee oversight and involvement in the ISI program development is needed, however, as evidenced by the failure to include approximately 49 longitudinal welds in the Preservice Inspection/ISI program.

Also in the ISI inspection, a violation was identified concerning a QA audit finding not being promptly addressed by the Nuclear Support Group (NSG). The lack of timeliness of the audit finding response had resulted from the licensee management not aggressively resolving a disagreement between the QA organization and NSG.

The preplanning and preparation prior to the refueling outages has been extensive. Well prior to the start of the outage, final schedules, modification packages, and work documents are ready for issue. The scheduling philosophy also ensures that Technical Specification required system surveillances and logic system functional tests are completed at the end of the scheduled work as another verification that system restoration occurred properly. In response to previous open States link problems, a walkdown and visual inspection of electrical panels is also conducted at the end of each outage. The Nuclear Safety Assessment Group also performs a thorough review of the outage schedules to ensure that sufficient decay heat removal systems are available throughout the outage, and to verify that potential plant safety problems are not created. During the outage, numerous scheduling and planning meetings are conducted daily to effectively manage the activities.

If significant problem areas are identified during the outage, task forces are assigned to work full-time on resolution. During the Unit 1 refueling outages, linear indications were identified on the steam dryer and support block during invessel inspections. A large, multi-organizational task force was formed to evaluate the problems, develop a plan for resolution, and implement the corrective actions. Major repair activities and an increased inspection scope was performed with a minimized impact on the outage schedule. In addition, a large failure rate occurred during snubber testing. A task force was formed to determine the scope of the problem, and the volume of snubbers to be tested was increased significantly. A larger sample was tested with minimal impact on the outage schedule. In addition, revised sample plans were submitted to the NRC based on their experiences. The licensee also is evaluating a program to reduce the total number of snubbers. Although the scope of the outages increased significantly due to these occurrences, the task forces assigned to these issues effectively corrected the problems.

Modifications and Technical Support

Two inspections were performed on the modification involving the addition of a fifth emergency diesel generator (EDG) to be used in place of any of the four existing EDGs. The Safety Evaluation, receipt inspection records, procurement specifications, installation

procedures, drawings and quality records were reviewed and found to be acceptable. Electrical equipment in storage was separately protected from ongoing construction activities, as was existing equipment in the EDG building.

The modification process was reviewed during two preoutage reviews in the corporate offices. The modification program procedures were found complete and effective in ensuring the proper reviews and verifications were conducted. In addition to the required independent design verification, the licensee utilizes a Design Review Board to provide independent reviews of major modifications. The Board is composed of senior design engineers and managers and assists in maintaining consistently high quality design change packages. All of the modification packages reviewed were thorough and complete.

Modification installation was observed in both Unit 1 outages. The work instructions were found to be detailed and complete. The craft personnel were found to be knowledgeable and capable, and well supervised. All activities observed were performed in a professional manner, and significant QA/QC involvement was evident.

In July 1985, the inspectors identified a situation where the licensee did not vigorously pursue resolution of a longstanding plant design deficiency. Over a two year period, eight occurrences of blown fuses were identified in the RCIC Topaz inverters. Significant resources were expended in investigating and determining a viable solution to the problem. Although the proposed solution, installation of a capacitor, was fairly simple, corrective action was continually delayed due to holdups in the modification review process. This appears to be an example where inadequate management control of a known plant deficiency resulted in a relatively simple problem not being corrected for an excessive period of time. Following identification by the NRC, the licensee promptly corrected the problem. In addition, revisions were made to streamline the modification process to prevent recurrence of the type of delays experienced with this modification. Timeliness of corrective action was also not evident in completion of modifications to prevent freezing of the spray network risers and installation of diesel generator air dryers mainly due to unanticipated technical difficulties. The followup of self-identified problems is a concern which is discussed further in Section 4.10.

The corporate engineering staff is very capable and produces high quality products. Detailed reviews of plant modifications, identified plant problems, and vendor supplied engineering products by corporate engineers have identified several safety issues. The expertise and safety consciousness of the engineering group was exemplified by the identification of items such as: 1) inadequacies in MSIV jet impingement analysis performed by the A/E; 2) inadequacies in the control and identification of containment isolation

valves in plant drawings and procedures; and 3) inadequacies in vendor provided reload analysis.

The licensee holds a monthly plant problem meeting on site which provides a very effective method for resolving and prioritizing the current major technical problems. The meeting focuses on determining the root causes for identified problems and team leaders are assigned to each problem. The Technical Group Supervisor heads the meeting.

Overall, the outage management and nuclear design and support organizations are well staffed and utilize well-defined procedures. The outage planning and preparation are extensive and have resulted in well controlled outage activities.

Conclusion

Rating: Category 1

Trend: Consistent

Recommendations

Licensee: None

NRC: None

4.8 Licensing Activities

Analysis

During the previous assessment period, this area was rated as Category 1. In that assessment, a high degree of management involvement in the resolution of licensing issues was noted. However, the licensee was found to submit incomplete amendment requests in some instances.

In the area of licensing the SALP board considered many major factors contributing to the licensee's overall performance, including: level of activity, quality and quanity of amendment requests, timeliness of amendment requests, cognizance and understanding of plant activities and operational occurrences, participation in meetings, overall management and scheduling of licensing activities and positive attitude towards the staff.

During the assessment period, the NRC issued 16 amendments each to the Unit 1 and Unit 2 licenses. These changes included changes to reflect plant modifications and new information based on operating experience. One amendment for Unit 1 was processed under emergency circumstances. Additionally, one exemption for each unit was processed as a result of a request for an LCO extension to facilitate tying in of a fifth diesel generator to the existing system without forcing a two unit shutdown.

The licensee has demonstrated an outstanding degree of management control and involvement. Licensee management has participated in site reviews and audits as well as corporate office audits with a positive attitude and a willingness to cooperate. All amendment requests reflect evidence of prior planning necessary to support licensing activity schedules. The licensee's ability to submit complete, well conceived, and technically sound amendment requests has greatly improved during this period. The quality of work submitted to the NRC, in almost all instances, indicates good licensee management level review. When necessary the licensee has provided the NRC with additional support necessary to expedite reviews. The strengths of the licensee's licensing staff are : 1) level of technical competence, 2) management philosophy and, 3) level of staffing. In the previous SALP period, the NRC expressed a concern about the licensee's need to evaluate more closely the necessity of and scheduling of amendment requests, and the licensee has greatly improved this situation. The licensee has continued to submit a large number of amendment requests, but these requests reflect their improved understanding of Technical Specifications. Due to the use of shared systems, the Technical Specifications are uniquely complex. The licensee has made it their practice to discuss any difficulties with the NRC and to pursue Technical Specification changes when appropriate. Additionally, many of the licensee's amendment requests provide operational ease without degrading safety.

The licensee has demonstrated a clear understanding of issues applicable to licensing activities. One example of this was their ability to identify, to the NRC, problem areas relating to single loop operation and the core reload analyses. The licensee was well informed and aggressively resolved issues relating to licensing and Technical Specification requirements. The licensee has proven to be responsible and competent in resolving technical issues from a safety standpoint. The licensee's licensing staff is technically knowledgeable and exceptionally sensitive to safety concerns.

Another major effort undertaken by the licensee during this period was the development of a new fire protection program. As a result of an Appendix R audit during the previous SALP period, the NRC and the licensee agreed upon the changes necessary for the licensee's fire protection program. The licensee has continued to make progress in order to meet their commitments, but has not been as aggressive in pursuing the resolution as the staff had expected. If the licensee does not make an improved effort on fire protection they will be unable to meet the resolution dates as committed to in NRC/PP&L meetings.

In response to NRC initiatives, the licensee generally has provided timely responses, with good resolutions proposed. In a few isolated cases the licensee has not been as timely as possible, but these instances did not pertain to safety significant issues. The licensee's overall responsiveness to the NRC has been evidenced by their promptly providing additional information to the NRC on topics such as: Single Loop Operation, Reload analyses and redefining secondary containment. The licensee has always made themselves available to talk with the NRC technical staff, and has participated in numerous conference calls and meetings with the NRC staff to resolve issues pertaining to licensing. In many instances the licensee has offered to meet with the NRC in person to resolve major technical issues.

Licensee response to IE Bulletins has been timely and generally adequate with the exception of two bulletin responses which were found to be incomplete during this period. The licensees response to IE Bulletin 84-03, concerning refueling cavity seal failures, did not adequately evaluate the consequences of a seal failure or the potential effect on stored fuel, as requested. However, a subsequent review by the Nuclear Safety Assessment Group produced an excellent evaluation of reactor cavity draining events and recommended corrective actions. The licensee response to IE Bulletin 85-03 concerning motor operated valves, did not supply the detailed program description as the bulletin requested. A revision was requested.

Licensing personnel have exibited a good systems knowledge of the plant as well as a good regulatory knowledge base. Licensing personnel are compentent and professional. The licensing staff has a sound technical knowledge of licensing activities and has dealt with

the staff in a straight forward manner. Appropriate personnel are in attendance at meetings with the NRC staff to make the meetings productive.

The licensee's overall performance in the area of licensing has been markedly good. The licensee responds favorably to staff criticism and has displayed a desire to better their own performance. PP&L works with the regulatory process and not against it. This attitude has contributed greatly to their success as a nuclear utility.

In summary, the licensee has demonstrated a clear understanding of licensing issues and has aggressively resolved issues related to improvement of the Technical Specifications. The licensing staff is knowledgeable and the completeness of amendment requests has improved during this period.

Conclusion

Rating: Category 1

Trend: Improving

Recommendations

Licensee: None

NRC: None

4.9 Training and Qualification Effectiveness

Analysis

During this assessment period, Training and Qualification Effectiveness is being considered as a separate functional area for the first time. Training and qualification effectiveness continues to be an evaluation criterion for each functional area.

The various aspects of this functional area have been considered and discussed as an integral part of other functional areas and the respective inspection hours have been included in each one. Consequently, this discussion is a synopsis of the assessments related to training conducted in other areas. Training effectiveness has been measured primarily by the observed performance of licensee personnel and, to a lesser degree, as a review of program adequacy. The discussion below addresses three principal areas: licensed operator training, non-licensed staff training, and the status of INPO training accreditation.

During this SALP assessment period, Susquehanna became the first nuclear facility to obtain full INPO accreditation in all ten training areas. In addition, the training center became the first member of the National Academy for Nuclear Training. Completion of these significant milestones is indicative of the management attention directed to the training area, and the high quality of their program.

During the assessment period, resident and specialist inspections routinely reviewed training activities. Two sets of replacement operator licensing examinations were administered by region-based examiners.

The licensed operator training and requalification programs function well as evidenced by NRC exam performance. A total of five (5) Senior Reactor Operators, seven (7) Reactor Operators, and one (1) Instructor Certification candidate were examined. There were no failures. Weak areas identified during the simulator portion of the operator exam included: classification of emergency events and implementation of the Emergency Plan, and auxiliary effects due to electrical malfunctions. Strengths identified during the operator examination included: effective communication and teamwork, use of prescribed procedures in response to abnormal situations, application and interpretation of the Technical Specifications, implementation of the Emergency Operating Procedures, and responsible attitudes toward the SRO and RO positions.

The licensee has a two-year rotational program for Shift Technical Advisors (STA) and six new STAs were assigned this period. These individuals have considerable plant experience and are a valuable asset to their shifts. The STA's responsibilities include initial

identification, followup and documentation of plant incidents for the station Significant Operational Occurrence Report (SOOR) program. The quality of incident followup and post trip reviews has improved dramatically due to their experience level. They have quickly integrated themselves into their shifts and are providing very useful advice/information to the shift supervisors.

The performance of licensed operators in the control room has been observed by the NRC to be excellent. The operators are proficient in recovering from plant transients and equipment malfunctions in a competent and professional manner and have demonstrated an overall sound knowledge of Technical Specifications as evidenced by daily discussions with NRC inspectors. Knowledge of system operational characteristics, familiarity with procedures, and actions on transient response were noted, and are indicative of effective and valid training for licensed operators. The licensee performed extensive training with the newly implemented emergency operating procedures (EOP), and it was evident by the smooth transition to their use. Daily discussions with the operators have found them to be attentive, knowledgeable, and possessing a questioning attitude toward off-normal conditions. There was one unplanned reactor scram during the fifteen month assessment period caused by an operator error. There was also one occurrence where failure to aggressively followup an annunciater contributed to an unplanned shutdown.

Evidence of overall training effectiveness is supported by the low number of non-licensed operator and I&C technical personnel errors. During the entire assessment period there was only one unplanned reactor scram caused by an I&C technician error. In addition, there were seven other reported events concerning inadvertent RPS and ESF actuations which occurred during surveillance testing activities. This number of events is a small percentage of the large number of surveillance activities completed each year. For example, during the first six months of 1986, approximately 5400 surveillance activities were performed.

Maintenance related training conducted prior to major work activities is considered a licensee strength. The licensee has a formal training program for CRD mechanism assembly and disassembly, which includes an under vessel mockup of a CRD mechanism. Several other extensive maintenance activities observed during the refueling outages included mockup training, which helped minimize personnel exposure and contributed to smoother evolutions. Similarly, the I&C group built a test fixture used to test, troubleshoot and repair Reactor Manual Control System electronic components. It is also being used as a training device.

Security related training was found to include good training aids, modern equipment, well designed facilities and a dedicated training staff. Formal training sessions are supplemented by exercise critiques, plant experience, and guest speakers. The professional

performance of the staff during NRC observed exercises demonstrated the effectiveness of the training program.

In summary, the licensee continues to display a strong commitment towards training, and its programs have been found to be excellent across all functional areas reviewed.

Conclusion

Rating: Category 1

Trend: Consistent

Board Recommendations

Licensee: None

NRC: None

4.10 Assurance of Quality

Analysis

Management involvement and control in assuring quality is being considered as a separate functional area for this assessment period. However, 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, this discussion is a synopsis of the assessments relating to the quality of work conducted in other areas. It should be emphasized that this functional area evaluates management assurance of quality; and, as such, is much broader than merely an assessment of QA/QC department performance.

One programmatic inspection was conducted concerning Quality Assurance. The QA program, specifically as it affects procurement control; receipt, storage, and handling of materials and equipment; and, maintenance and surveillance test programs was found acceptable. Implementation of the QA program was generally very good. The licensee was found to have responded effectively to the issues raised in the previous SALP concerning QA audits. Specifically, the licensee increased the number of NQA surveillances and factored into subsequent audits the results of these surveillances in order to improve the overall effectiveness of NQA's assessments.

The licensee has a very effective internal event reporting system. All occurrences meeting certain criteria, whether reportable to the NRC or not, are documented and investigated. Each resolution requires written responses from the appropriate work group addressing the corrective action taken. The responses are evaluated by the compliance group and must be approved by the Plant Operations Review Committee (PORC) prior to closure. This program has been relatively effective in minimizing repeated mistakes and identifying recurring equipment problems. However, there was one occurrence at the end of the assessment period where a containment isolation valve in the TIP system was made inoperable and it was not recognized by the operators. A similar event had previously occurred and was reported, but the corrective action was not sufficient to prevent recurrence. The licensee has made improvements during the period to trend and categorize internally reported events, and the number of open investigations has been significantly reduced.

The Nuclear Safety Assessment Group (NSAG) has continued to perform its independent safety review function in an outstanding manner. The NSAG event reviews and safety issue evaluations have identified many important recommendations that have been implemented by the station. During review of the generic issue concerning the refueling seal failure, NSAG identified several weaknesses in controls on operations with the potential for draining the reactor vessel, and much improved refueling operation procedures resulted. NSAG has also performed

preoutage safety reviews which evaluates the outage schedule on a safety basis, ensuring, for example, that sufficient decay heat removal capacity is always maintained. NSAG has also performed excellent investigations on the reactor water cleanup overpressurization event, relay calibration and an annual assessment of plant operations. NSAG develops recommendations in their reports and these items are tracked by the plant staff until resolution.

During this assessment period, it was noted that the licensee's corrective action programs was a weakness in the majority of functional areas. A large number of NRC findings have been identified where corrective action in response to a known deficiency is either incomplete, untimely or inadequate. For example, during followup of an NRC identified deviation, it was identified that although a needed modification to the 4KV switchgear was completed, the associated surveillance test to utilize the modification was not implemented in a timely fashion. During followup of an allegation concerning drywell temperature monitoring, it was found that conflicting interpretations were made in the plant organizations concerning a surveillance test requirement, but a decision was never reached to resolve the issue. The indecision led to the concern being brought to the NRC. In another event, teflon tape caused a failure of an SDV vent valve, although extensive corrective action had been taken to clean the piping, due to a previous valve failure from pipe debris. Other examples noted in the associated functional areas where resolution of issues was not timely or complete included: development of post maintenance/modification testing guidance; recurring deficiencies in emergency preparedness exercises; completion and followup of modifications to the 4KV switchgear, spray pond risers, and diesel generator air dryers; and licensee involvement in the ISI program.

To assist senior corporate management in monitoring the station, the licensee issues a monthly performance indicator report which covers activities of the entire nuclear department. The system trends approximately ninety indicators. The monthly reports contain a narrative and associated charts to track items such as generation performance, nuclear safety, fuel chemistry, health physics, effluents, maintenance, outage management, quality, licensing, and personnel. Department goals have been established for each indicator. In addition, each work group has more discretely defined performance indicators which are monitored and trended on a weekly basis. The indicators and goals are prominently posted on bulletin boards around the plant, and are discussed in the station weekly newsletter. This management tool demonstrates the licensee's concern towards identifying and addressing safety related issues and involving plant personnel in corporate goals.

In summary, the licensee has several very effective programs which identify programmatic, procedural and equipment deficiencies throughout all of the functional areas. The identified issues are

thoroughly documented, and their status is tracked by the responsible organization until corrective actions are complete. During 1985 approximately 640 SOORs, 510 NCRs, and 172 QA audit and surveillance findings were identified. In a typical month approximately 1000 open items are tracked including items from programs other than those mentioned above. Although the majority of items are satisfactorily resolved, a significant number of NRC findings concerned items which had been previously identified in the licensees programs, but had not been resolved adequately or in a timely manner.

Conclusion:

Rating: Category 2

Trend: Consistent

Board Recommendations

Licensee:

-- Improve corrective action programs

NRC:

-- Conduct inspection of corrective action programs

5.0 SUPPORTING DATA AND SUMMARIES

5.1 Investigations and Allegations Review

Seven allegations received during the previous SALP period were evaluated and closed. Three of the allegations were at least partially substantiated and involved security badge control, Class 2 drawing control and drywell temperature monitoring practices.

Eight allegations were received during this SALP period, seven of which were evaluated. Six of the seven allegations were found unsubstantiated and/or of no safety significance. The seventh allegation concerned drywell temperature monitoring practices and was partially substantiated, but was determined not to be a significant safety concern. The remaining allegation is currently under evaluation.

No investigations were conducted during the assessment period.

5.2 Escalated Enforcement Actions

Escalated Enforcement action related to findings from a 10 CFR 50 Appendix R inspection is pending.

5.3 Management Conferences

May 31, 1985 - Enforcement Conference at NRC Region I on ESW Inoperability due to open States Links.

July 30, 1985 - SALP Management Meeting in Allentown, Pa.

October 1, 1985 - Enforcement Conference at NRC Region I on findings from an 10 CFR 50 Appendix R inspection.

May 30, 1986 - Enforcement Conference at NRC Region I on inoperable scram discharge volume level transmitters on Unit 1.

5.4 Licensing Actions

NRR Site Visits

October 1985 - Site Tour Concerning RWCU System
June 1986 - Site Tour
July 1986 - Unit 2 Outage Planning Review

Commission Briefings

None

Schedular Extensions Granted

None

Reliefs Granted

None

Exemptions Granted

December 3, 1985 - Exemption from General Design Criterion 17, Appendix A, 10 CFR Part 50 for Facilty Operating License Nos. NPF-14 and NPF-22

License Amendments Issued

32 amendments issued (16 - Unit 1, 16 - Unit 2)

Emergency Technical Specifications Issued

1 emergency Technical Specification change

Orders Issued

None

Significant NRR/Licensee Meetings

During this SALP period there were several issues of interest. They are as follows:

1) Susquehanna Fire Protection Program,
2) Fifth Diesel Generator Project,
3) Unit 1 and Unit 2 Reload Analyses,
4) Long Term Single Loop Operation,
5) Inservice Inspection Program.

The staff met formally with the licensee several times to discuss each of the topics identified above.

5.5 Licensee Event Reports

Overall Evaluation

Unit 1

During this evaluation period, 53 reportable events in compliance with 10 CFR 50.72 and 46 Licensee Event Reports (LER) in compliance with 10 CFR 50.73 were submitted by the licensee concerning Unit 1. Thirty-six of the LERs related to the events reported under 10 CFR 50.72. Of the reportable events, seven were scrams involving control rod motion. These seven scrams were caused by three equipment failures, one personnel error, one natural cause (lightning) and two planned scrams. The current national average frequency of 5.9 trips per reactor-year makes Unit 1 with 5.6 trips per reactor-year

somewhat less than the national average. When compared with the national average reactor scram frequency in scrams/1000 hours critical of 1.14, Unit 1 is also less than average with 0.9. Of the 53 reported events, approximately half (25) involved activation of Engineered Safety Features (ESF), eight involved temporary inoperability of safety-related equipment requiring entry into a Technical Specification Action Statement, one involved personal injury and the remainder a collection of miscellaneous events. Unit 1 reported about twice the number of reportable events that Unit 2 reported during the evaluation period. The disparity in reportable events is probably largely attributable to the difference in outage time between the two units. Multiple, parallel surveillance testing and maintenance activities during plant outages appear to produce more reportable events than when the plant is operating and maintenance and surveillance testing is minimal. In addition events which involved both units were only reported under Unit 1.

Unit 2

During the evaluation period, 28 reportable events in compliance with 10 CFR 50.72 and approximately 20 LERs in compliance with 10 CFR 50.73 were submitted by the licensee concerning Unit 2. Eleven of the LERs related to the events reported under 10 CFR 50.72. Of the 28 reportable events, six were scrams with control rod motion; 11 were ESF activations; and 8 involved temporary inoperability of safety-related equipment requiring entry into a Technical Specification Action Statement; 1 radioactive spill and 2 miscellaneous. The six scrams were a composite of three equipment failures; one personnel error; one lightning strike; and, one of unknown cause.

Summary

An evaluation of the content and quality of a representative sample of LERs submitted during this period was performed by AEOD. The results indicate that the Susquehanna LERS were of average quality. The principle weaknesses identified involved the requirements to provide a safety assessment and to adequately identify failed components in the text. A noted strong point was that the requirement to provide a failure mode, mechanism, and effect of each failed component was satisfied for all applicable LERs in the sample. During the same length assessment period, fifteen months, the total number of LERs submitted has been reduced by 35 percent.

A Tabular Listing of the LER's is contained in Table 1.

Causal Analysis

Six common causal chains were identified:

Electrical System Transients

Six LERs (387/85-34, 85-35, 86-22; 388/85-20, 85-21, 85-25, and 86-04) describe five reactor scrams and three ESF actuations caused by electrical system transients. One scram and one ESF actuation were caused by lightning strikes. A dual unit scram occurred when a relay failure caused the trip of an ESF transformer, which initiated a feedwater transient. The remaining two scrams were caused by a main generator neutral phase overvoltage signal due to a failed transformer bushing and overheating of a main generator transformer. The licensee has performed several modifications to minimize the plant response to major electrical transients.

Surveillance Testing

Four LERs (387/85-27, 85-29, 85-33, and 86-01) describe events concerning missed surveillances and/or inadequate surveillance procedures. This area was addressed in the last SALP, where it was a common chain and is further discussed in Sections 4.4 and 5.5.3 of this report. There has been significant improvement in this area.

Inadvertent RPS and ESF Actuations During Surveillance Testing

Ten LERs (387/85-19, 85-22, 85-28, 85-30, 86-09, 86-17, 86-18, 86-20; 388/85-22 and 85-23) describe four RPS actuations and seven ESF actuations which occurred during routine surveillance testing. Eight of these LERs were due to personnel error. Two of the RPS actuations occurred with the reactor at power.

Inadvertent ESF Actuations Due to Shine

Two LERs (387/85-20 and 86-05) describe four inadvertent ESF actuations initiated by ventilation duct radiation monitors during outage related activities. A Technical Specification change was approved to allow disabling the refuel floor high radiation signal during certain conditions.

Entry Into LCO 3.0.3 to Perform Surveillance Testing

Five LERs (387/86-19, 86-25, 86-27; 388/85-19 and 86-09) describe events where LCO 3.0.3 was entered in order to perform routine surveillance testing. Technical Specification changes are being submitted to prevent recurrence.

Inadvertent RPS and ESF Actuations During Outage Activities

Twelve LERs (387/85-17, 85-18, 85-20, 86-05, 86-06, 86-07, 86-08, 86-11, 86-12, 86-13, 86-15, and 86-16) describe events where inadvertent RPS and ESF actuations occurred during refueling outage activities, other than routine surveillance testing. These were due to various causes including IRM spikes and blown fuses.

Review of Previous Causal Chains

The following causal chains were identified in the previous SALP assessment period:

SGTS Start on Refueling Floor High Radiation Signal:

Only one LER (387/85-20) was submitted this period which involved ESF Actuations due to a refueling floor high radiation signal from "shine", and it was early in the assessment period. There have been no occurrences since May 1985. To resolve this issue the licensee revised procedures to install jumpers during certain evolutions on the refuel floor and a Technical Specification change was approved allowing disabling the radiation monitor when not handling irradiated fuel.

High Moisture Separator Drain Tank Level

Only one LER (387/85-31) was submitted this period that involved a reactor scram due to moisture separator drain tank high level. This was also the first occurrence on Unit 1. The three scrams during the previous period were on Unit 2. To correct the problem the licensee implemented several modifications and incorporated a procedure change to direct operations personnel to open the drain valves during power ascension to ensure the crossaround piping was adequately drained.

SLCS Sodium Pentaborate Concentration

Two LERs were submitted this period, compared to three in the last period, describing occurrences where routine surveillance testing of the standby liquid control system sodium pentaborate solution found the available weight less than the Technical Specification limit. One occurrence was found to be caused by a leaking isolation valve, which was corrected.

Surveillance Testing

Four LERs were submitted this period concerning missed and/or inadequate surveillance procedures. This is a significant improvement over the 15 reported in the last period. Increased management attention in this area has been effective.

Electrical System Transients

As discussed in Section 5.5.2, six LERs were submitted which described plant transients due to electrical system transients. Although there are the same number of LERs as last period in this category, the licensee has devoted significant resources to prevent recurrence and/or minimize effects.

Fire Protection

There were no LERs concerning fire protection equipment during this period compared to six during the last assessment. There has been significant improvement in this area.

Diesel Generator Trips

There have been 4 special reports submitted during this assessment period concerning diesel generator trips. This was a causal chain in the last two SALP's, and the licensee has directed significant attention to correcting the various causes of the trips. Several modifications have already been completed. There were only 2 valid trips during the period, as discussed in Section 5.5.4.

System Inoperability and Inadvertent Initiation Due to Outage Activities

As discussed in Section 5.5.2, there have been twelve LERs discussing inadvertent RPS and ESF actuations which occurred during refueling outage activities. This is a significant increase over the six reported during the last period.

Special Reports

There were 4 special reports concerning diesel generator failures reviewed during this period:

May 3, 1985	'B' Diesel Generator Failure
June 13, 1985	'B' Diesel Generator Failure
February 18, 1986	'B' Diesel Generator Failure
June 20, 1986	'A' Diesel Generator Failure

The four special reports discussed two non-valid and two valid failures. On May 21, 1986, the 'A' diesel generator did not achieve the required voltage of 4160 V after starting. The failure was suspected to be due to misoperation of a relay. On January 18, 1986, the 'B' diesel generator experienced a crankcase explosion while running unloaded following testing. The suspected cause was loose cylinder piston pin bolts. The bolts on the other diesel generators were verified to be properly torqued. The licensee had directed significant attention to reducing the number of diesel generator trips, and several modifications have been incorporated during this assessment.

5.6 Automatic Scrams and Forced Outages

Automatic Scrams

Unit 1 experienced three unplanned reactor scrams during this evaluation period, which is a rate of 2.4 per year. One scram was caused by loss of an ESS transformer which initiated a feedwater transient when the feedwater control system lost power during the bus transfers. The trip of the ESS transformer was caused by the failure of a sudden pressure relay. The potential for feedwater control system power losses, which had occurred three times previously due to lightning, was corrected by the licensee by uninterruptable power supply modifications. The second scram was caused by a blown fuse which occurred during an RPS surveillance. With one RPS division tripped for testing, a fuse blew for an unknown reason in another channel, initiating a partial scram, which subsequently led to a full scram. The third scram occurred during a reactor startup when a turbine trip was initiated due to moisture separator drain tank high level. Evaluations determined that the turbine crossaround drains had not been opened during the short forced outage. To correct the potential for recurrence the licensee revised their operating procedures to ensure the crossaround piping was drained during reactor startup.

Unit 2 experienced five unplanned reactor trips during the evaluation period, which is a rate of 4.0 per year. Two scrams were caused by electrical transients. One was a lightning strike on the 500KV transmission system which initiated a turbine trip. The second involved an ESS transfomer trip which caused a feedwater transient as occurred on Unit 1. Two other scrams were caused by personnel error. In one event, an I&C technician error was made during a reactor vessel level surveillance and a turbine trip occurred on reactor vessel high level. The second trip occurred during a reactor startup, when control room operators failed to adequately feed the vessel as steam was drawn off through an open bypass valve. The fifth scram was caused by a failed bushing on a main generator transformer which initiated a generator neutral phase overvoltage signal. The bushing was replaced and the licensee is monitoring the condition of the bushings.

The unplanned automatic scrams are listed in Table 6.

Unplanned Outages

Unit 1 entered three unplanned outages during the period. Two were due to equipment failures. On April 24, 1986, a TIP indexer failed during power ascension and the unit had to be shutdown to perform a drywell entry for repairs. On May 24, 1986, severe ESW pump erosion was identified and both units were shutdown to perform repairs. During the startup, the third forced outage was performed due to noise heard from the LP turbine, which was later determined not to be a significant problem.

Unit 2 completed five unplanned outages during the period. Two were caused by reactor coolant system leakage in the drywell in excess of Technical Specifications. On May 31, 1985 the unit was shutdown due to packing leak from a recirculation pump discharge bypass valve. On July 17, 1986 the unit was shutdown due to a packing leak from a residual heat removal testable check valve. The remaining three shutdowns were due to equipment failures. On April 26, 1985, prior to the start of the assessment period the unit was shutdown to repair leaks in the generator stator cooling system. On January 15, 1986 an oil leak from a main transformer forced a shutdown. On May 24, 1986 the unit was shutdown, as was unit 1, when severe ESW pump erosion was identified.

The unplanned outages are listed in Table 7.

TABLE 1

TABULAR LISTING OF LERs BY FUNCTIONAL AREA

SUSQUEHANNA STEAM ELECTRIC STATION

Area	Cause Code						
	A	B	C	D	E	X	Total
1. Plant Operations	3	7	2	1	1	10	24
2. Radiological Controls	0	0	0	0	0	0	0
3. Maintenance	1	1	0	0	1	2	5
4. Surveillance	11	4	0	2	0	8	25
5. Emergency Preparedness	0	0	0	0	0	0	0
6. Security and Safeguards	0	0	0	0	0	0	0
7. Outage Management and Modification Activities	3	3	0	3	0	3	12
8. Licensing Activities	0	0	0	0	0	0	0
9. Training and Qualification Effectiveness	0	0	0	0	0	0	0
10. Assurance of Quality	0	0	0	0	0	0	0
Totals	18	15	2	6	2	23	66

Cause Codes:
- A. Personnel Error
- B. Design, Manufacturing, Construction, or Installation Error
- C. External Cause
- D. Defective Procedure
- E. Component Failure
- X. Other

TABLE 2

LER SYNOPSIS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT 1

LER NUMBER	EVENT DATE	CAUSE CODE	SUMMARY DESCRIPTION
85-017	05/05/85	X	ESF Actuation during IHSI.
85-018	05/13/85	X	Two RPS Actuations due to IRM spikes.
85-019	05/16/85	A	RPS Actuation During IRM Surveillance Testing.
85-020	05/16/85	B	Three ESF Actuations due to Shine on the Refuel Floor.
85-021	05/20/85	X	Three Diesel Generators Declared Inoperable.
85-022	05/28/85	A	ESF Actuation Due to Communication Error.
85-023	06/11/85	D	Containment Isolation Valve Left Open.
85-024	06/09/85	X	HPCI Inoperable Due to Failed Surveillance.
85-025	06/19/85	X	Three ESF Actuations Due to Contaminated Ventilation Screen.
85-026	06/24/85	B	HPCI Turbine Stop Valve Oil Leak.
85-027	08/08/85	D	Offgas Pretreatment Radiation Monitor Surveillance Not Met.
85-028	08/23/85	A	HPCI Inboard Steam Supply Valve Isolation During Calibration.
85-029	09/10/85	A	Five Inservice Inspection Surveillance Requirements Missed.

TABLE 2 (Cont'd)

LER SYNOPSIS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT 1

LER NUMBER	EVENT DATE	CAUSE CODE	SUMMARY DESCRIPTION
85-030	10/28/85	X	Reactor Scram Due to Blown Fuse During Surveillance Testing.
85-031	10/30/85	D	Turbine Trip/Reactor Scram on Moisture Separator 'B' Drain Tank High Level.
85-032	10/11/85	B	Reactor Water Cleanup System Spills and Isolations.
85-033	10/23/85	A	Noble Gas Sample Obtained Late Due to Technician Error.
85-034	12/02/85	X	Unit 1 and Unit 2 Reactor Scram Due to Loss of ESS Transformer 111.
85-035	12/16/85	C	ESF Actuation Due to 230 KV Transmission System Fault.
86-001	01/10/86	D	Four Isolation Dampers Not Adequately Tested.
86-002	02/06/86	A	Available Weight of Sodium Pentaborate in SLCS Less Than Technical Specification Limit.
86-003	02/16/86	E	ESF Actuation When Wrong Breaker Opened Due to Labeling Deficiency.
86-004	01/29/86	X	SGTS Placed In Service to Maintain Zone III Vacuum Due to Failed Damper.
86-005	02/28/86	B	Reactor Building Ventiliation Isolated on High Radiation Signal Due to CRD Shine.
86-006	03/04/86	A	ESF Actuation When 'States Link' Tightened.

TABLE 2 (Cont'd)

LER SYNOPSIS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT 1

LER NUMBER	EVENT DATE	CAUSE CODE	SUMMARY DESCRIPTION
86-007	03/15/86	X	Division I LOCA Isolation Occurred Due to Blown Fuse.
86-008	03/14/86	A	Six RPS Actuations Resulting From Maintenance Testing Combined With CRD Change-Out Activities Under-Vessel.
86-009	03/15/86	X	RPS Actuation Due to Intermediate Range Monitor Upscale Spike.
86-010	03/27/86	A	Violation of Secondary Containment When Recirculation Plenum Hatches Opened.
86-011	03/25/86	X	Two RPS Actuations Due to IRM/SRM Spikes With Shorting Links Removed.
86-012	03/28/86	A	SGTS and CREOASS Start Due to Blown Fuse When Wires Shorted by Maintenance Technician.
86-013	04/28/86	D	SGTS Initiated Due to a Procedure Deficiency.
86-014	04/10/86	D	Two Scram Discharge Volume Level Transmitters Found Isolated.
86-015	04/14/86	X	Division II LOCA Isolation Due to Blown Fuse.
86-016	04/12/86	A	Valve Packing Leak Leads to Reactor Scram Signal.
86-017	04/14/86	A	Two ESF Actuations Due to Inadequate Electrical Contact During Jumper Installation.

TABLE 2 (Cont'd)

LER SYNOPSIS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT 1

LER NUMBER	EVENT DATE	CAUSE CODE	SUMMARY DESCRIPTION
86-018	04/15/86	A	Division I LOCA Isolation When 'A' RPS Bus Power Lost.
86-019	04/28/86	B	Entry Into LCO 3.0.3 to Perform Surveillance Testing on 4KV Relays.
86-020	05/16/86	A	ESF Actuation Due to Improper Jumper Installation.
86-021	05/24/86	B	Unit 1 and Unit 2 Shutdown Due to Inoperable Emergency Service Water System.
86-022	06/01/86	E	ESF Actuation Due to Loss of One Off-Site Power Sources During Testing.
86-023	06/12/86	B	ESF Actuation Due to EPA Breaker Trip.
86-024	07/03/86	B	Automatic Start Relays for the Emergency Service Water Pumps Not Seismically Qualified.
86-025	06/27/86	B	Entry Into LCO 3.0.3 to Perform Surveillance Testing on 4KV Relays.
86-026	06/23/86	X	Available Weight of Sodium Pentaborate in SLCS Less Than Technical Specification Limit.
86-027	07/25/86	B	Entry Into LCO 3.0.3 to Perform Surveillance Testing on 4KV Relays.

TABLE 2 (Cont'd)

LER SYNOPSIS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT 2

LER NUMBER	EVENT DATE	CAUSE CODE	SUMMARY DESCRIPTION
85-017	05/30/85	B	Reactor Shutdown Due to Excessive Unidentified RCS Leakage.
85-018	05/29/85	B	Three ESF Actuations Due to RPS Breaker Trips.
85-019	05/24/85	X	Entry Into LCO 3.0.3 to Perform Surveillance on SGTS Dampers.
85-020	05/31/85	B	ESF Actuation Due to Lightning Strike.
85-021	06/30/85	X	Main Generator Neutral Overvoltage Resulting in Scram.
85-022	07/03/85	A	ESF Actuation Due to Technician Error.
85-023	08/05/85	A	Reactor Scram Due to Feedwater Surveillance Error.
85-024	08/07/85	X	ESF Actuation While Placing RWCU in Service.
85-025	10/05/85	C	Reactor Scram Initiated by Lightning Strike on 500 KV Transmission Line.
86-001	01/21/86	A	Opening of Turbine Bypass Valves Causes Reactor to Scram on Low Level.
86-002	01/22/86	X	HPCI Inoperable Due to Leaking Pressure Control Valve.
86-003	01/24/86	X	Emergency Core Cooling Systems Declared Inoperable.

TABLE 2 (Cont'd)

LER SYNOPSIS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT 2

LER NUMBER	EVENT DATE	CAUSE CODE	SUMMARY DESCRIPTION
86-004	01/15/86	X	Reactor Scram (Manual) Due to Main Transformer Overheating.
86-005	03/21/86	X	Standby Gas Treatment System Manually Initiated.
86-006	04/13/86	X	ESF Actuation While Placing RWCU in Service.
86-007	06/09/86	X	"As Found" ILRT Fails to Meet Acceptance Criteria.
86-008	06/19/86	B	HPCI System Inoperable Due to a Broken Control Valve.
86-009	07/08/86	X	HPCI and RCIC Systems Were Inoperable During the Performance of a Surveillance.
86-010	07/17/86	B	Reactor Shutdown Due to Excessive Unidentified RCS Leakage.
86-011	07/16/86	A	LCO Not Entered When Containment Isolation Valve Inoperable.

TABLE 3

INSPECTION HOURS SUMMARY (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

		Hours	% of Time
1.	Plant Operations	1819	49
2.	Radiological Controls	166*	5
3.	Maintenance	231	6
4.	Surveillance	276	7
5.	Emergency Preparedness	728	20
6.	Security and Safeguards	119*	3
7.	Outage Management and Modification Activities	363	10
8.	Licensing Activities	**	**
9.	Training and Qualification Effectiveness	***	***
10.	Assurance of Quality	***	***
	Total	3702	100

* Inspection hours by Resident Inspectors in these functional areas are included in the Plant Operations functional area.

** Hours expended in facility license activities and operator license activities not included with direct inspection effort statistics.

*** Hours expended in the areas of training and quality assurance are included in the other functional areas, therefore, no direct inspection hours are given for these areas.

TABLE 4

ENFORCEMENT SUMMARY (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

A. Number and Severity Level of Violations

Severity Level I	0
Severity Level II	0
Severity Level III	0
Severity Level IV	13
Severity Level V	1
Deviation	3
Total	17

B. Violations Vs. Functional Area

FUNCTIONAL AREAS	Severity Levels I	II	III	IV	V	DEV
1. Plant Operations	0	0	0	2	0	0
2. Radiological Controls	0	0	0	0	0	0
3. Maintenance	0	0	0	4	0	0
4. Surveillance	0	0	0	4	0	0
5. Emergency Preparedness	0	0	0	0	0	2
6. Security Safeguards	0	0	0	0	0	0
7. Outage Management, Modification and Technical Support Activities	0	0	0	3	0	1
8. Licensing Activities	0	0	0	0	0	0
9. Training and Qualification Effectiveness	0	0	0	0	0	0
10. Assurance of Quality	0	0	0	0	1	0
Totals	0	0	0	13	1	3

TABLE 4 (Continued)

C. Summary

Inspection Report Number	Severity Level	Functional Area	Violation
Unit 1			
387/85-16	IV	Modifications	One Loop of ESW Inoperable in Excess of LCO Action Statement.
	IV	Surveillance	Five Missed ESW Surveillance Tests.
	DEV	Technical Support	Thermal Overloads on ESW valves can be bypassed without Control Room indication.
387/85-28	IV	Surveillance	Failure to Test Entire Channel During Channel Functional Tests.
387/85-36	IV	Surveillance	CREOASS Dampers Were Not Verified Operable.
387/86-02	IV	Maintenance	Installation of an Expired Squib Valve in the SLCS.
	IV	Maintenance	Configuration Change That Was Made to Seismically Qualified Panels Without a Proper Safety Evaluation.
387/86-05	IV	Technical Support	Failure to Include Longitudinal Welds in ISI Program.
	V	Assurance of Quality	Failure to Respond to Audit Finding.
387/86-06	IV	Maintenance	Improperly Controlled Maintenance Work in the Recirculation Plenum.
	IV	Modifications	Inoperability of the SDV Level Transmitters due to Closed Isolation Valves.

TABLE 4 (Continued)

387/86-10	DEV	Emergency Preparedness	Measurement Accuracy of Met Tower Not IAW FSAR.

C. Summary

Inspection Report Number	Severity Level	Functional Area	Violation
Unit 2			
388/85-17	IV	Plant Operations	Not Locking Closed Manual Containment Isolation Valve.
388/85-23	IV	Surveillance	Failure to Test Entire Channel During Channel Functional Tests.
388/86-01	IV	Maintenance	Configuration Change That Was Made to Seismically Qualified Panels Without a Proper Safety Evaluation.
388/86-04	IV	Plant Operations	SDV Level Transmitter Isolation Valves Were Not Locked Open As Required By Station Administrative Controls.
388/86-10	DEV	Emergency Preparedness	Measurement Accuracy of MET Tower not IAW FSAR.

TABLE 5

INSPECTION REPORT ACTIVITIES (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

Report Number Unit 1	Report Number Unit 2	Inspection Dates	Inspection Hours Unit 1	Inspection Hours Unit 2	Areas Inspected
85-14	85-14	04/30/85-05/03/85	120	120	Observation of Annual Emergency Exercise.
85-15		05/01/85-05/02/85	12	0	Radiological Controls Program Associated With Steam Dryer Repair Activities.
85-16	85-15	04/22/85-05/08/85	38	27	Special Resident Inspection Concerning ESW Inoperability.
85-17		05/07/85-06/24/85	77	0	Containment Leakage Testing Program.
85-18	85-16	05/06/85-06/23/85	123	67	Routine Resident Inspection.
85-19			0	0	Report Cancelled.
85-20		06/04/85-06/07/85	32	0	Maintenance Program Review.
85-21	85-17	06/24/85-07/28/85	110	79	Routine Resident Inspection.
85-22	85-18	07/14/85-07/19/85	21	14	Radiological Controls Program.
85-23	85-19	07/22/85-07/26/85	42	41	Physical Security.
85-24	85-20	07/22/85-07/26/85	43	43	Preventive and Corrective Maintenance Programs and Fifth D/G Project.
85-25	85-27	08/06/85-08/09/85	0	0	Operator Licensing Exams.
85-26	85-21	07/29/85-08/25/85	61	53	Routine Resident Inspection.

TABLE 5 (Continued)

INSPECTION REPORT ACTIVITIES (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

Report Number Unit 1	Report Number Unit 2	Inspection Dates	Inspection Hours Unit 1	Inspection Hours Unit 2	Areas Inspected
85-27	85-22	09/17/85-09/20/85	14	13	Nonradiological Chemistry Program.
85-28	85-23	08/26/85-09/29/85	129	121	Routine Resident Inspection.
85-29	85-24	09/28/85-09/28/85	0	0	Rescheduling SRO Licensing Examination.
85-30	85-25	10/01/85-10/01/85	0	0	Enforcement Conference Concerning Appendix R.
85-31	85-26	09/30/85-09/28/85	201	46	Routine Resident Inspection.
85-32	85-28	N/A	0	0	Report Cancelled.
85-33	85-29	N/A	0	0	Report Cancelled.
85-34	85-30	11/04/85-11/08/85	39	39	Electrical and Control Activities Relating Fifth Diesel Generator.
85-35	85-31	11/11/85-12/15/85	95	63	Routine Resident Inspection.
85-36	85-32	12/16/85-01/16/86	168	82	Routine Resident Inspections.
86-01	86-05	01/14/86-01/16/86	0	0	Operator Licensing Examinations.
86-02	86-01	02/03/86-03/14/86	109	70	Routine Resident Inspection.
	86-02	N/A	0	0	Report Cancelled.
86-03		03/11/86-03/11/86	72	0	Radiological Controls Program.

TABLE 5 (Continued)

INSPECTION REPORT ACTIVITIES (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

Report Number Unit 1	Report Number Unit 2	Inspection Dates	Inspection Hours Unit 1	Inspection Hours Unit 2	Areas Inspected
86-04	86-03	03/17/86-03/21/86	17	17	Surveillance Testing and Calibration Control.
86-05		03/10/86-03/14/86	78	0	Review of ISI Program.
86-06	86-04	03/15/86-04/15/86	127	43	Routine Resident Inspection.
86-06	86-04	05/30/86-05/30/86	0	0	Enforcement Conference.
86-07	86-06	03/31/86-04/04/86	21	18	Maintenance and Modifications.
	86-07	04/07/86-04/09/86	0	186	Observation of Annual Emergency Exercise/
86-08	86-08	04/07/86-04/10/86	18	18	Physical Security Program.
86-09	86-09	04/16/86-05/27/86	97	80	Routine Resident Inspection.
86-10	86-10	05/12/86-05/16/86	151	151	Emergency Response Facility Appraisal.
86-11	86-11	05/28/86-07/15/86	87	153	Routine Resident Inspection.
86-12	86-12	06/11/86-06/13/86	10	10	Radiological Controls.
86-13	86-13	07/07/86-07/11/86	19	17	QA Program Review.
		TOTAL:	2131	1571	

TABLE 6

UNPLANNED AUTOMATIC SCRAMS (5/1/85 - 7/31/86)

SUSQUEHANNA STEAM ELECTRIC STATION

	Date	Power Level	Description	Cause
Unit 1	10/28/85	100	Reactor Vessel Low Level Caused by Blown Fuse During RPS Surveillance	Equipment Failure - Blown Fuse
	10/30/85	064	Control Valve Fast Closure Due to High Moisture Separator Drain Tank Level	Operations Procedure Deficiency
	12/02/85	100	Reactor Vessel High Level Caused by Loss of ESS Transformer and Subsequent Feedwater Transient	Equipment Failure - Sudden Pressure Relay (Design Related)
Unit 2	06/30/85	100	Generator Load Reject Caused by Generator Neutral Phase Over-voltage Signal.	Equipment Failure - Transformer Bushing
	08/05/85	100	Turbine Control Valve Fast Closure on Reactor Vessel High Level Due to I&C Technician Error During Vessel Level Surveillance.	I&C Personnel Surveillance Error
	10/05/85	100	Ground Fault on 500KV System Initiated Turbine Trip.	Lightning Strike on Offsite Transmission Line
	12/02/85	080	Reactor Vessel Low Level Caused by Loss of ESS Transformer and Subsequent Feed-water Transient.	Equipment Failure - Sudden Pressure Relay (Design Related)
	01/21/86	001	Reactor Vessel Low Level When Bypass Valve Opened and Vessel Feeding Was Not Promptly Commenced.	Operator Error

TABLE 7

UNPLANNED OUTAGES (5/1/85 - 7/31/86)
SUSQUEHANNA STEAM ELECTRIC STATION

	Dates	Cause
Unit 1	4/24/86-4/25/86	Failed TIP indexer required containment entry for repairs.
	5/24/86-6/14/86	Damaged ESW pumps caused by erosion.
	6/15/86-6/19/86	Noise from LP turbine and Recirculation Pump Seal Failure.
Unit 2	4/26/85-5/02/85	Main Generator Stator Cooling Repairs.
	5/31/85-6/3/85	Unidentified Drywell Leakage (valve packing) Exceeded 5 GPM.
	1/15/86-1/21/86	Oil Leak from Main Transformer, due to operator error and design deficiency.
	5/24/86-6/18/86	Damaged ESW pumps caused by erosion.
	7/17/86-7/21/86	Unidentified Drywell Leakage (valve packing) Exceeded 5 GPM.

SUSQUEHANNA UNIT 1

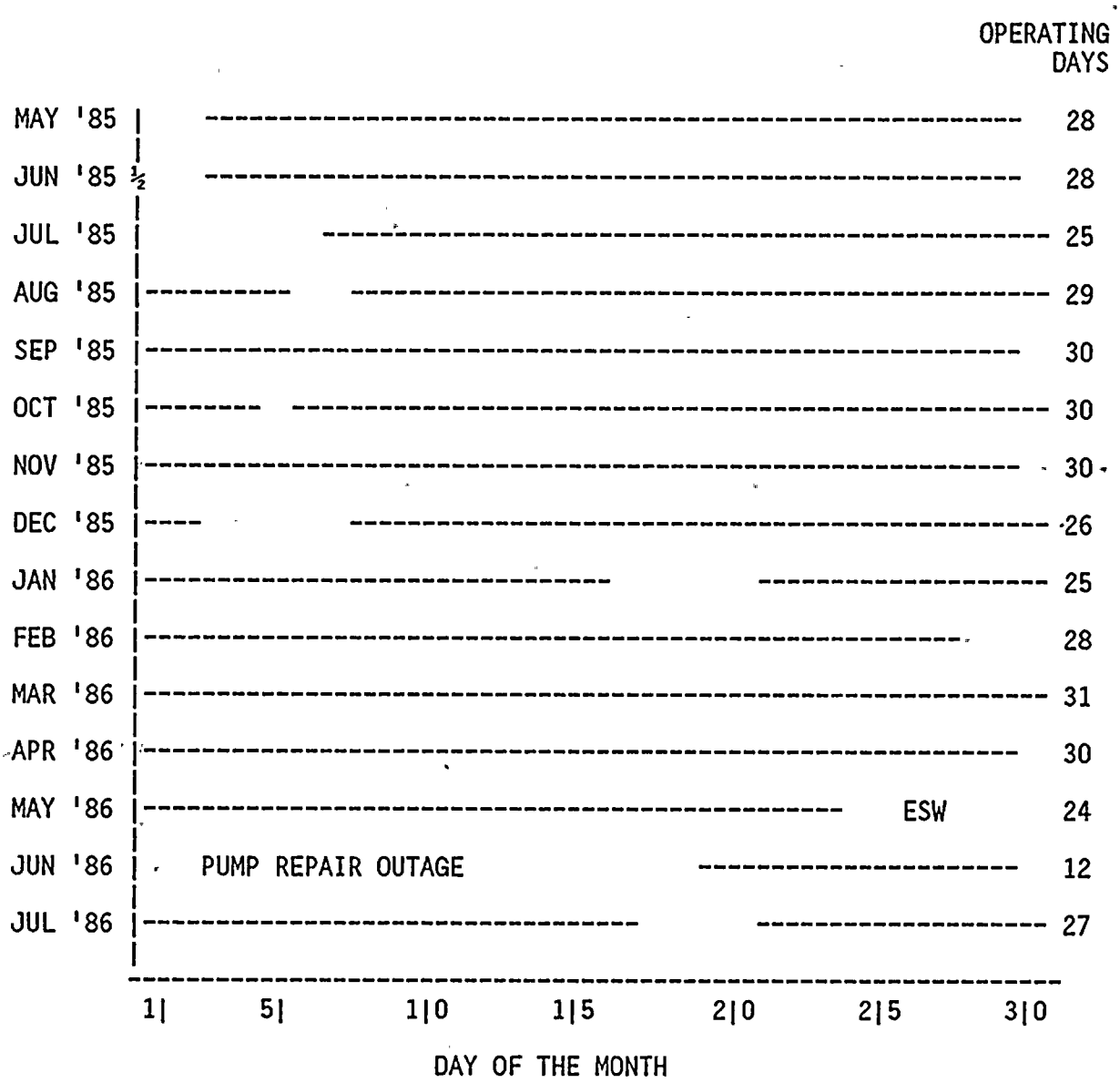
PLANT OPERATING SUMMARY

```
                                                                  OPERATING
                                                                     DAYS
MAY '85 |          FIRST REFUELING AND INSPECTION OUTAGE                0
        |
JUN '85 |                      ------------------------------------     19
        |
JUL '85 |------------------------------------------------------------- 31
        |
AUG '85 |------------------------------------------------------------- 31
        |
SEP '85 |------------------------------------------------------------   30
        |
OCT '85 |------------------------------------------------------  --    29
        |
NOV '85 |          ---------------------------------------------       25
        |
DEC '85 |----    ------------------------------------------------------ 29
        |
JAN '86 |------------------------------------------------------------- 31
        |
FEB '86 |---------------------------      SECOND REFUELING             14
        |
MAR '86 |      AND INSPECTION OUTAGE                                    0
        |
APR '86 |                                        --  ------------      6
        |
MAY '86 |---------------------------------------------  ESW           24
        |
JUN '86 |   PUMP REPAIR OUTAGE    ==            ---------------------   12
        |
JUL '86 |------------------------------------------------------------- 31
        |
        ----------------------------------------------------------------
         1|      5|        1|0       1|5       2|0       2|5       3|0

                          DAY OF THE MONTH
```

SUSQUEHANNA UNIT 2

PLANT OPERATION SUMMARY



SUSQUEHANNA UNIT 2

PLANT OPERATION SUMMARY

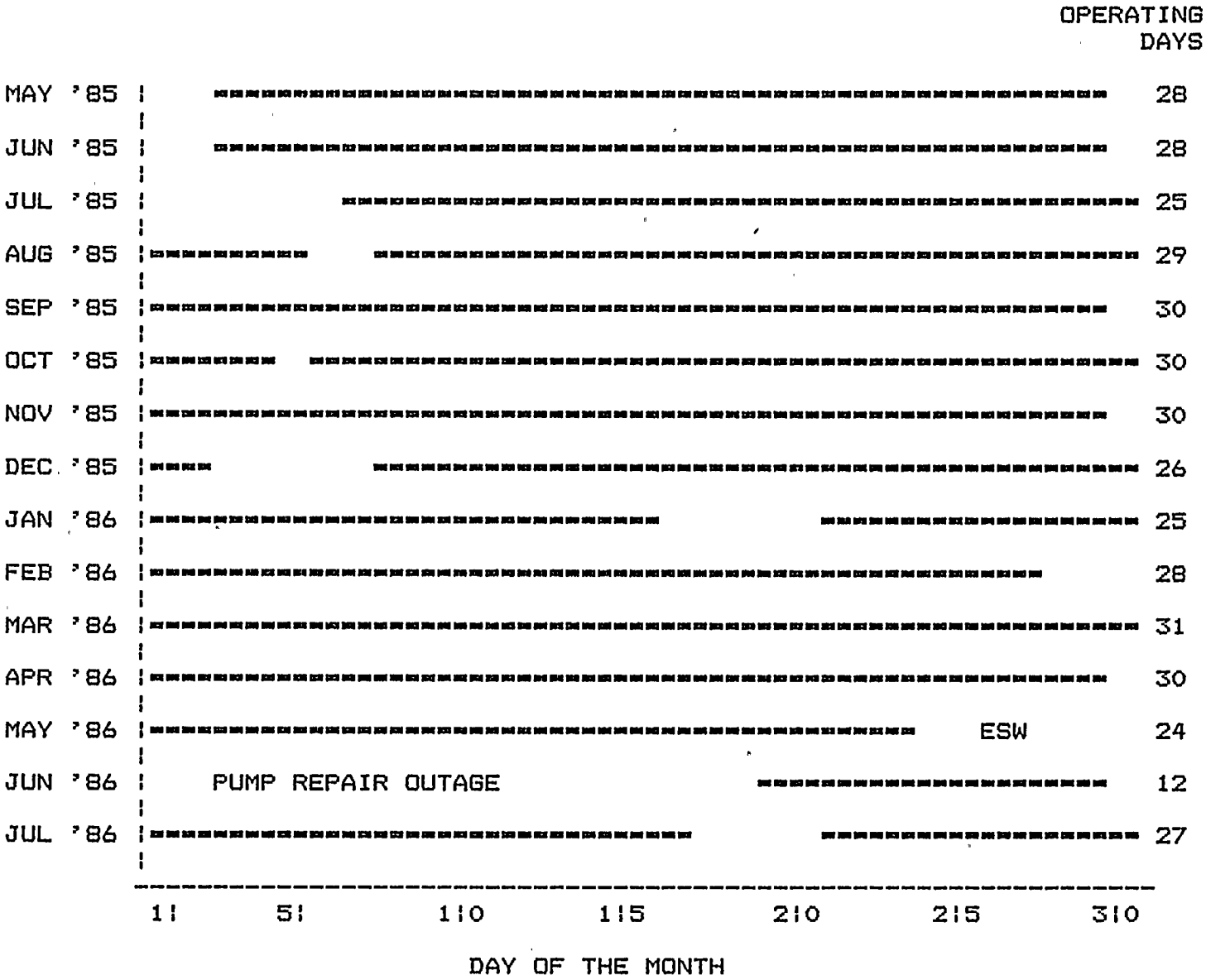


FIGURE 2

SUSQUEHANNA UNIT 1

PLANT OPERATING SUMMARY

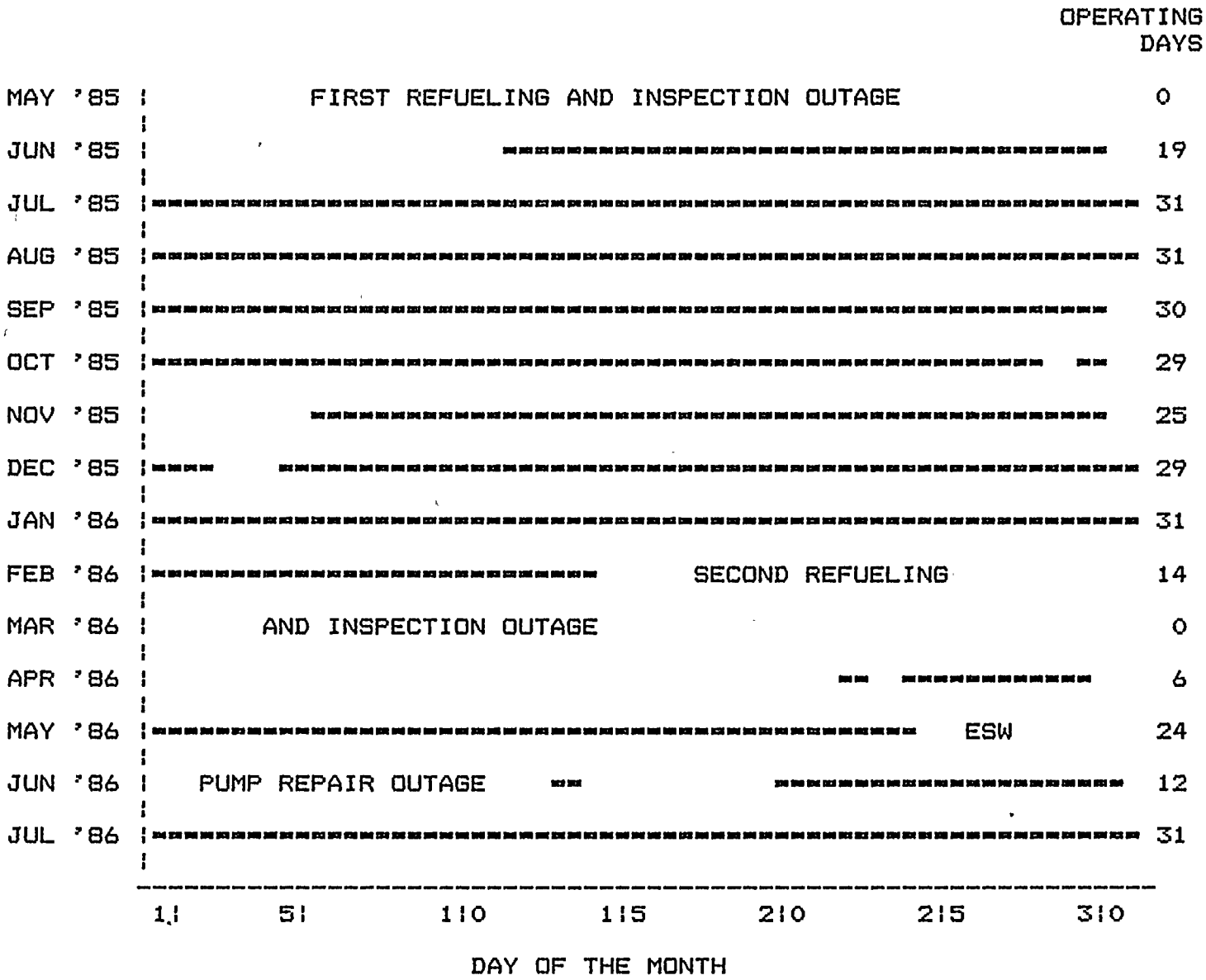


FIGURE 1