ENTERGY OPERATIONS, INC.

Grand Gulf Nuclear Station

Pre-SALP Report for SALP Period

February 25, 1996 Through September 6, 1997

Please Note:

Information contained in the report is through March, 1997.

Grand Gulf's previous SALP period was 24 months, this SALP period is for 18 months.

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GRAND GULF SALP PERIOD OVERVIEW

Grand Gulf began the SALP period with the challenge to appropriately manage our staff's reaction to the loss of one of our four SALP 1 scores from our prior SALP period. As with most strong performing organizations, Grand Gulf Employees possess a winning spirit and take very personally the failure to achieve desired team goals. Thus, our challenge was not to allow an over reaction to this temporary setback. In addition, we had to find ways to motivate a staff that has enjoyed tremendous success and is accustom to routinely exceeding stated goals.

After a great deal of reflection on our past performance, we have learned that Grand Gulf, by nature, is a good problem solver. When presented with a specific challenge, the staff rallies together and appropriately focuses its attention, resulting in achievement of desired results in a reasonable time period. Our success in these circumstances is fundamentally a result of our staff's possession and superior execution of skills referred to as "hard skills" -- technical competence, root cause determination, and project management skills.

On the other hand, we also found that when there is not an immediate challenge, or the staff's attention is not fully directed to the next "big challenge", GGNS has room to improve. We believe that these are times that the "soft skills" become important. Soft in the sense that they focus on culture, communication and areas of management emphasis/oversight.

What we learned, after months of evaluations and assessments by internal and external groups, is deceptively simple at first glance:

> Having developed mature organizations and processes, the major challenge faced by nuclear plant management is the effective oversight and guidance of organization focus.

In other words, once you have the "hard skills" in place; continued excellence is more and more dependent on your ability to apply the "soft skills." Recognizing that we could never relinquish, or accept degradation in our proficiency in the "hard skills," we entered this SALP period determined to improve in our ability to appropriately focus our resources, motivate our staff, develop our people and to communicate our expectations.

Grand Gulf management primarily placed its attention during this SALP period on challenging the organization with new initiatives to combat complacency and on implementing a new progressive senior leadership style. Key areas of focus included:

- **Safety:** Stress the importance of focusing on safety first and using that focus to allocate resources to activities of the highest safety significance.

- **Organization change:** Motivating personnel through movement of personnel and challenging new concepts and styles.

- **Continuing Excellence:** A management philosophy which recognizes and rewards past performance but instills the need for achieving even better performance .

Without exception, our strategy proved correct. Performance during the current SALP period equaled, and in many respects exceeded, that achieved in the previous SALP cycle. Some highlights of note are:

- Our personnel error rate has been consistently maintained at low levels of quantity and safety significance. Concerted attention in this area has resulted in extremely low personnel error rates compared to the industry as a whole.

- By all measures, the last refueling outage (RFO8) was the safest and shortest in Grand Gulf history. We accomplished this while experiencing no reportable events.

- The fifth consecutive SALP period without a significant safety event.

- A capacity factor in the top quartile of the industry - approximately 89.3% on a three year average basis.

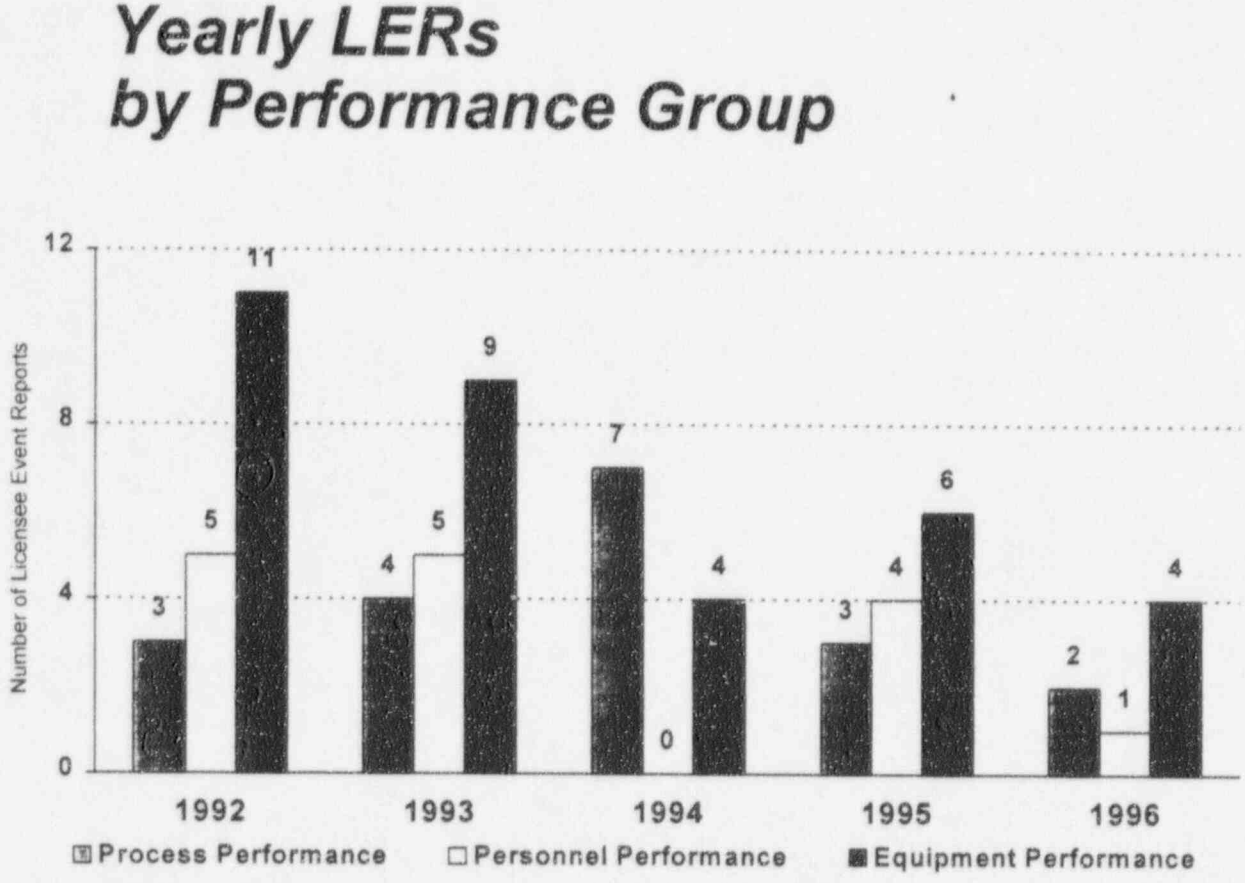
- The lowest number of reportable events ever in a SALP cycle.

Safety Performance

From a SALP point of view, safety performance is the fundamental indicator of competence. While no single measure exists, there are a number of measures that, when taken collectively, provide a comprehensive picture of Grand Gulf's safety performance.

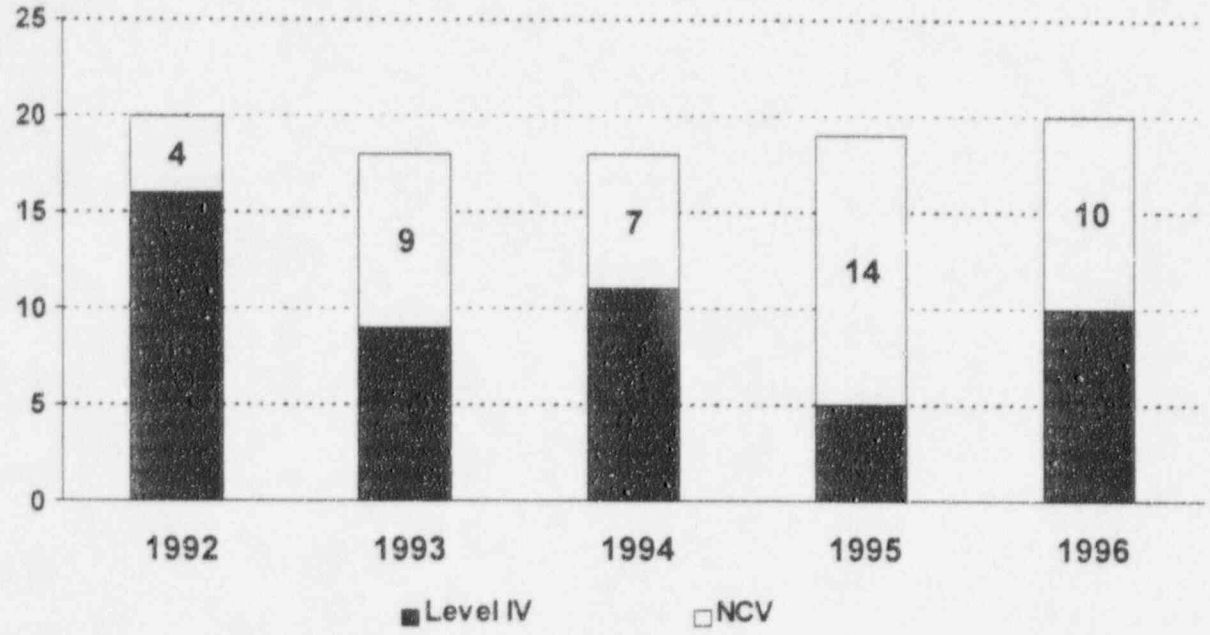
Yearly LERs and Violations

LERs are a good measure of the occurrence of safety significant events. Although not all LERs are safety significant, the reporting requirements do ensure that any safety significant events that do occur are reported as LERs. For some time, the total number of LERs has been on a declining trend at Grand Gulf. Individual categories of LERs are either declining or remaining at a low level.



Like LERs, not all violations are safety significant but do tend to capture safety significant activities. More importantly, the mixture between cited and non-cited violations provides information about the effectiveness of the licensee's corrective action program in identifying deficiencies. At Grand Gulf, the total number of violations is low relative to our peers.

GGNS Violations



Escalated enforcement actions are also an indication of the level of safety significance of a violation. The last level III violation for Grand Gulf occurred in November 1988. The last civil penalty was issued in March 1985.

Another measure of the safety significance of an event is the NRC's classification of "significant events" in their quarterly release of performance measures. No such events have been identified at Grand Gulf for at least the last four SALP periods as determined by the Nuclear Regulatory Commission.

However, Grand Gulf employs a threshold somewhat lower than the NRC's for determining "significant events". The following issues are considered by Grand Gulf as "significant issues". These issues are good examples of difficult corrective action problems that were only solved through persistence and unwillingness to accept an easy answer.

- **Lo-Lo Set Event**

  On June 6, at 11:26 a.m., Grand Gulf was manually scrammed based on increasing suppression pool temperatures. It was noted that six Safety Relief Valves were open. These SRVs were identified as the low-low set valves: Based on the Sequence of Events (SOE) Log from the Plant Data System (PDS), all twenty SRVs received a signal to open. After a short duration of time of approximately 200 ms, the open signal was removed from the fourteen non low-low set SRVs. The low-low set SRVs remained open until after the manual scram was inserted. The duration of time which the low-low set SRVs remained open was between 2.5 to 3 minutes. For additional information, please see page 75.

- **Motor Pinion Keys**

  On October 27, 1996, Low Pressure Coolant Injection (LPCI) "A" system injection valve E12F042A was disassembled for maintenance, which was to include replacing the motor pinion key. The motor pinion key was found sheared and was removed in two pieces. The key was scheduled for replacement during the current refueling outage with an AISI 4140 steel key. Grand Gulf had not previously experienced key failures. Based on industry experience and vendor recommendations, Grand Gulf had been methodically replacing the keys with the new 4140 steel keys at each valve's next scheduled testing period.

  In addition on November 12, 1996, during planned key replacement activities, the motor pinion key for LPCI "B" Injection Valve E12F042B was found sheared and was removed in two pieces. However, this valve had been cycled at least twelve times during the current outage and had successfully stroked each time.

  Because the key failure for E12F042A likely existed during Cycle 7 Operations (we conservatively assumed since no actions/strokes of the valve occurred during the cycle), LER 96-005 was submitted to the NRC. CARB review of condition reports GGCR-1996-0260-00 and GGCR-1996-0260-01 designated them as significant and

  requested a formal root cause analysis be performed. The scope of the root cause analysis report was to investigate how Grand Gulf addresses this type of operating event and how Grand Gulf predicts or prioritizes actions needed in response to the operating events.

  As a result of these motor pinion key failures, all motor operated valves subject to this type of pinion key failures were corrected. The motor pinion keys for the MOVs scheduled for RFO9 were changed out during RFO8. All other known MOV industry issues and their associated actions taken were compiled and presented to PSRC prior to plant restart from RFO8.

Long term, the corrective actions are to prioritize significant industry experiences until completion, and develop an MOV improvement plan to evaluate past industry issues, and schedule for implementation any additional actions determined necessary from the evaluation.

- **CRD Pump Trip**

On November 27, 1996, plant startup was commencing from the eighth refueling outage, with vessel pressure less than 600 psig and the "B" control rod drive (CRD) pump in service. The "B" CRD pump tripped and plant operators implemented the applicable off-normal event procedure requirements. Actions were taken to restore CRD flow by swapping components. With a low CST level, CRD flow was unable to be restored.

The scram accumulator alarm for multiple control rods was received (only one alarm associated with a withdrawn control rod). When the in-service CRD pump could not maintain adequate suction pressure, the Shift Superintendent directed the Mode switch to shutdown. The Operations Shift Superintendent elected to conservatively scram the reactor based upon accumulator low pressure alarms and CRD low suction pressure in lieu of verifying that the accumulator pressure had decreased below the Technical Specification minimum pressure and to prevent damage to the CRD pump. The reactor Mode switch was placed in SHUTDOWN and the plant was stabilized in accordance with applicable procedures. Technical Specification (TS) 3.1.5 requires reactor shutdown with vessel pressure below 600 psig concurrent with one or more control rod scram accumulators inoperable associated with a withdrawn control rod and charging water header pressure less than 1520 psig.

Subsequent investigation indicated that a malfunctioning CST level transmitter resulted in a erroneous CST level reading. The transmitter was replaced, satisfactorily tested and returned to service.

The ability to achieve and maintain safe shutdown was not adversely impacted, nor was public health and safety compromised by this event.

Outage Related LERs

Refueling outage safety performance also has some compelling measures associated with it.

The following chart compares the number of *IRs (Incident Reports - the lower level document preceding a LER) and LERs normalized to outage length. The IRs and LERs (which capture all potentially safety significant events during an outage) show a strong downtrend attributable to the extensive effort devoted to pre-outage risk management and contingency planning as well as ongoing focus on safety as the outage progresses.

*For RF08, IRs were no longer used as Grand Gulf converted to a single deficiency process, Condition Report (CR). CRs that met the old IR criteria were used to determine this number

Outage IR/LER

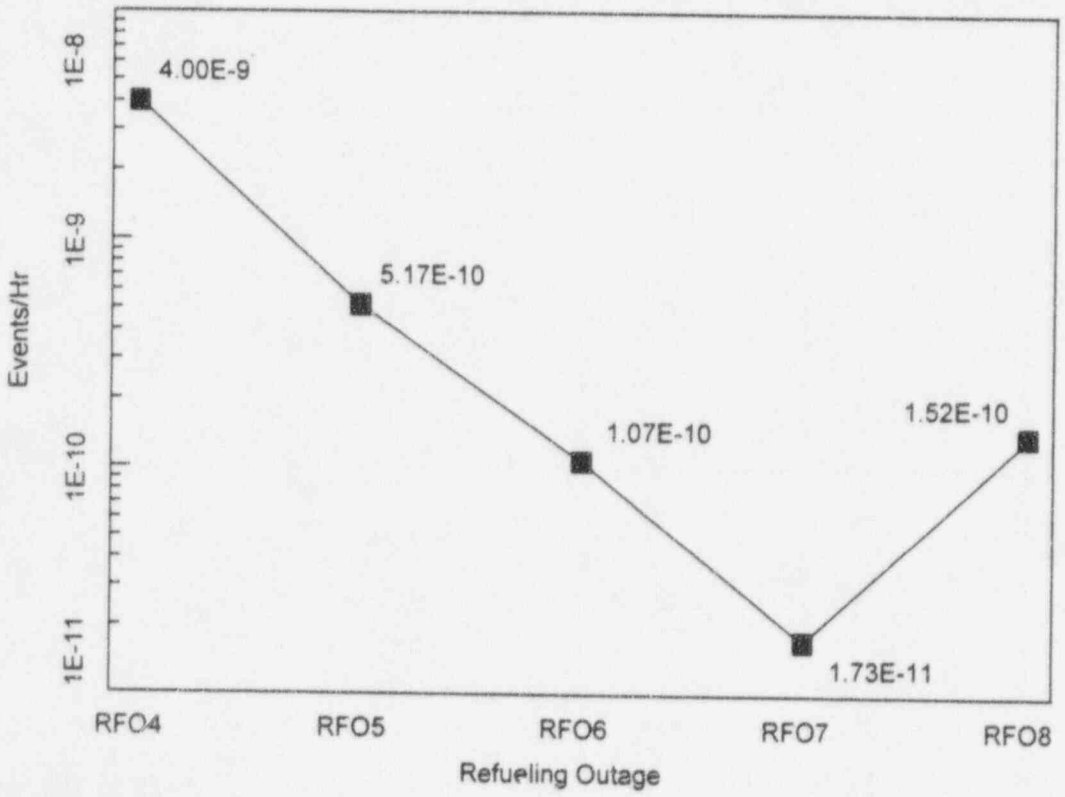
Chart

Comparison of RF01 through RF08						
	Outage Dates	Length (days)	#IRs	#LERs	IR (day)	LER (day)
RF01	09/05/86 - 12/03/86	88	52	20	0.591	0.23
RF02	11/07/87 - 01/06/88	61	46	12	0.754	0.20
RF03	03/18/89 - 04/30/89	44	25	5	0.568	0.11
RF04	09/30/90 - 11/26/90	57	27	9	0.474	0.16
RF05	04/17/92 - 06/09/92	52	20	4	0.385	0.08
RF06	09/28/93 - 12/04/93	67	27	8	0.403	0.12
RF07	04/15/95 - 06/20/95	66	17	2	0.257	0.03
RF08	10/02/96 - 11/30/96	41	22	1	*0.537	0.02

Problem Risk Analysis

Utilizing our Problem Risk Analysis (PRA), we can determine after completion of the outage, the relative average outage risk compared to previous outages. Extensive use of the shutdown PRA began prior to RF05. Insights from the PRA are routinely used to assess an outage schedule prior to implementation and to adjust scheduled activities to reduce risk. Although disagreement may exist over the absolute values and meanings of the core damage frequency numbers, the application of a focused outage management risk program has resulted in a dramatic lowering of relative outage risk over an extended period of time.

Outage Core Damage Frequency



The above graph depicts CDF for RFO8 as higher than RFO7. This is explained by (1) the shortness of the outage, and by (2) scope of work for RFO8. The principle contributor was control rod drive work scheduled for RFO8 with none scheduled in RFO7. The only other outages where control rod drive work was performed in RFO4 and RFO5 and a comparison with RFO8 shows that RFO8 was safer.

Conclusion

Grand Gulf's performance during the current SALP period continues to improve. Major strides have been made in safety and related performance areas.

Overall, performance met or exceeded all expectations this period contrary to previous SALP periods. Grand Gulf has not been challenged by plant performance issues this period but, has faced another significant challenge, dealing with organization changes and fostering continuing excellence.

NOTABLE SITE-WIDE ACTIVITIES

Grand Gulf has not experienced a repeated analmoly in regards to the scram rate this period. Though it is too early to claim success, we are confident that the continuous focus on eliminating scrams will lead us to the type of performance record we are noted for.

Scram Reduction Committee

A key element for the future success in this area is the Scram Reduction Committee. The renewed vigor of this group has been fostered by our new Senior Management. Their personal involvement is evident and has refocused the whole organization on not only fixing the problem but solving the root causes of our scrams.

The short term trend in this area is very favorable, and we have every expectation of continuing this positive trend. The scram rate is not the only indicator for showing the commitment Grand Gulf has in reducing scrams. Another good indicator is the number of action items closed through the Scram Reduction Committee. The most notable item worked has been the Lo-Lo Set Logic and the separation of power supply to each division.

Organization Change

The number of new faces in the current organization is noteworthy and may even appear alarming to some. The most remarkable thing about all of this change is that it has made a strong performance by Grand Gulf even stronger.

The new management team from the Vice President to the new Manager, Plant Operations has come together with renewed zeal that has carried over to the whole organization. A key point is that Grand Gulf views these changes as a strength and not an area of concern. Several key factors can be pointed out for supporting this position and hopefully help ease any apprehension felt by the Region in regards to the large amount of changes at Grand Gulf.

One key factor is the strength of the processes utilized at Grand Gulf. These processes are all proceduralized and engrained in the day-to-day operations of the site. These processes are being continually assessed and revised and are considered one of the corner stones of the Grand Gulf foundation. Managers and supervisors are effectively using an integrated computerized database and trending process to monitor information on declining trends and repetitive problems.

The second key factor is the workforce at Grand Gulf and their strength. Our people have always taken pride in running the best nuclear power operations in the country. They always take pride in their work and are always focused on safety. Our people are also highly trained and motivated, with a desire for achieving the best operations possible. Grand Gulf personnel are also very experienced and sought out by other utilities for assessments and advice.

Given this chemistry of people and processes, it's no wonder why changing out the whole senior management team is viewed as a plus. With the new ideas and philosophies being brought in, we recognize that we can only get better and welcome the opportunity to show the "we can do it spirit" once again.

Continuing Excellence Process

This is a major initiative kicked off in 1997 which is intended to keep Grand Gulf focused on the future and not reminiscing on our past successes. This initiative was designed by the "new" Senior Management Team and was intended to recognize that past performance at Grand Gulf hasn't been bad but to be really successful, performance must be better tomorrow.

The continuing excellence process is being established as the way for doing business at Grand Gulf in the future. Through this process, Senior Site Management will be routinely apprised of status of action plans and changes in top plant issues. This is not a top down management driven process but is a bi-partisan effort which solicits ideas and concerns from all levels at Grand Gulf.

Key elements of this process includes:

- Focus on continuing to improve
- Identify top site issues (technical and people)
- Development of action plans for top site issues
- Establishment of two-way communications between management and employees on top site issues
    - ◊ Details of important issues, activities, and focus areas are effectively communicated to personnel during quarterly meetings.
    - ◊ Managers also use these meetings to clarify and reinforce expectations.
- A long range strategic plan (ten years)
- Adoption of the site integrated scheduling process
- Personnel development and rotation

- Continued scram reduction focus

To initially start the ball rolling, four major areas were picked as the top site issues for development of an action plan. The following four areas are:

TOP PLANT ISSUES
CEP LIST

Item	Strategic Area	Owner
Improvement Culture	Safety/Regulatory Performance	C. Hayes
Human Performance	Operating Performance	C. Ellsaesser
Materiel Condition	Operating Performance	R. Moomaw
Operationally Focused Organization	Operating Performance	J. Venable

Each item in the above table has had a detailed action plan developed and presented to the Site Lead Team. The status of each plan is reviewed when appropriate during the Site Monthly Focus Meetings, which are held by the site Vice President and attended by the Site Lead Team.

Continuous Improvement Culture (SLT Sponsors: C. Hayes, B. Eaton, T. Williamson)

- Problem/Barrier/Issue:

  Effective problem identification, root cause determination and corrective actions are essential to the establishment of a culture of continuous improvement. A questioning attitude, self-identification of problems, vigorous problem investigation, implementation of timely and effective corrective actions and follow-through on effectiveness of corrective actions are all critical program elements. Extensive improvements to the Grand Gulf root cause and corrective action programs have been implemented over the last several years. It is now time to check and adjust the programs to achieve the next level of performance and to definitively tie the programs to the establishment and maintenance of a culture of continuous improvement across the site.

  Avoidance of complacency in a high performing organization is one of the greatest challenges to continued success. Due to the subjective nature of complacency, it

does not lend itself to direct measurement. However, there are secondary indicators of complacency that can be measured and can provide management

valuable information on adverse trends. The development and implementation of complacency indicators can be an integral part of the establishment and maintenance of a culture of continuous improvement.

- General Solution:
  - Check and adjust the root cause and corrective action programs
  - Develop and implement complacency indicators
- Objectives:
  - Check and adjust root cause and corrective action programs as a primary means to establish and maintain a culture of continuous improvement at Grand Gulf.
  - Establish a measurement system that provides management an early warning of a trend toward complacency and supports the concept of a continuous improvement culture.
- Expected Results: Upon completion of this Action Plan, the following results are anticipated:
  - Root cause determinations will be performed effectively and efficiently.
  - An environment that more actively promotes self-identification and documentation of problems will be established.
  - Management involvement in the corrective action process will increase.
  - Management expectations pertaining to the root cause and corrective action programs will be clearly communicated.
  - Corrective actions will be timely and will address and correct the root cause of the deficiency.
  - A measurement system will be established that will display indicators of a trend toward complacency or the lack of an improvement culture.
  - Periodic review of the complacency indicators will provide a vehicle for focused management action to establish and maintain an culture of continuous improvement.

Improving Human Performance (SLT Sponsors: J. Roberts/C/ Hayes/C. Ellsaesser)

- Problem/Barrier/Issue:

  Human performance at Grand Gulf has been cyclical in nature, a typical cycle being that error rates are seen to go up, awareness of the particular issue is raised in the work force, and error rates level off or go down. To break the cycle, Grand Gulf must shift to a prevention mentality, putting in place a culture that detects and corrects error likely situations, before they cause an event.

- General Solution:

  Conduct Human Performance training with the work force, preferably with the supervisor and crew trained together. Additionally, the section superintendents and managers will attend the training. One of the later modules is action planning, where the teams identify actual error likely situations they are familiar with. The Human Performance team will incorporate these error likely situations, and the actions needed into the overall action plan, to track and follow through to eliminate them.

- Objectives:

  To put in place a culture at Grand Gulf that detects and corrects error likely situations before they lead to an event.

- Expected Results:

  Each year the number of events at Grand Gulf decrease, until sustained event free operation is achieved.

Operationally Focused Organization (SLT Sponsor: J. Venable)

- Problem/Barrier/Issue:

  Grand Gulf Nuclear Station may improve the effectiveness of daily operations by developing the organization's operational focus.

- General Solution:

  Identify the key traits of an operationally focused organization and implement methods to ensure that all members of the Grand Gulf team internalize and exhibit the traits.

- Objective:

  Achieve higher standard in performance at Grand Gulf Nuclear Station through development and implementation of operationally focused initiatives.

- Expected Results: Upon completion of this Action Plan, the following results are anticipated:

  - Key traits of an operationally focused organization will be defined.

  - The Safety Culture at Grand Gulf Nuclear Station will improve.

  - Grand Gulf's management of work will become more effective.

  - The identification, development, and rotation of individuals into leadership roles of selected departments (i.e., Operations, Maintenance, Systems Engineering, Planning/Scheduling, Quality, Nuclear Safety and Regulatory Affairs, and Emergency Planning) will provide more effective team members.

  - Departmental roles, responsibilities, and accountabilities will be refined and motivate self-critical teamwork toward improving operational focus.

Plant Materiel Condition (SLT Sponsor: R. Moomaw/C. Smith)

- Problem/Barrier/Issue:

  Safety, production, and cost performance are all positively impacted by the condition of the plant. As the standards of the commercial nuclear power industry change and improve over time, the concepts and behaviors that allow us to maintain an excellent materiel condition will allow us to maintain a high position of relative performance in the industry. Our goal of top decile performance in all areas will be more efficiently accomplished if we demonstrate the ability to support the highest standards of materiel condition.

- General Solution:

  Establish a program for upgrading the plant materiel condition at Grand Gulf , and promote a culture change within all in-house and contractor personnel. Encourage continuous self-critical assessments of work processes and work performance. Encourage an atmosphere that promotes candid cross-discipline feedback.

- Objectives:

  To establish and maintain the materiel condition of the plant in a manner that provides a safe and desirable workplace, ensures that equipment operates properly when called upon, and minimizes dose and contamination.

- Expected Results: Upon completion of this Action Plan, the following results are anticipated:

  - A measurement system will be established that will display a single indicator of the plant materiel condition. This will promote:
    - ◊ An environment that promotes identification of materiel equipment deficiencies.
    - ◊ Management feedback on perspective of the plant materiel condition on a quarterly basis.
    - ◊ Ownership of all personnel on the plant materiel condition.

  - A measurement indicator will be established that will display schedule adherence. This will promote:
    - ◊ Completion of scheduled activities with minimum risk to the plant.
    - ◊ Timely and aggressive correction to equipment/material issues.
    - ◊ Resolution of shortfalls identified in accomplishing scheduled work.
    - ◊ Monitor effectiveness of supporting activities in resolving material/equipment issues.

RF08

- Outage preparation

  The integrated outage schedule controls and directs the outage activities. Integration process begins approximately six months prior to the outage start date. Early involvement of area coordinators, department coordinators, health physics, project managers, and outage management personnel enable timely identification and correction of schedule logic, work durations and work prerequisites. The team approach to schedule integration increases work group ownership and improves understanding of the sequence of activities.

  An initial integration of the outage schedule is lead by the Outage Scheduling Superintendent. The first phase of the process focuses on system windows logic and work scope inclusion. During the second phase of schedule integration meetings, the Outage Scheduling SRO leads the review of work coordination, conflicting activities, logic errors, contingency requirement, and work calendars. Once schedule contingency work items are identified, contingency plans are documented and contingency schedules are developed.

- Outage Implementation

  Some major scope performed during the outage were:

  - Recirculation Pump Rotating Element - a shaft impeller replacement was successfully performed on Recirc 'A' pump to eliminate vibration.

- Feed Water Upgrade - the C34 feed water upgrade was performed without problems to improve the reliability of the plant feed water controls.

- Low Pressure Turbine - replaced the low pressure turbine number one rotor, lower inner casing, and blade rings as an efficiency upgrade consisting of a new blade design. This change has yielded about 22 megawatts electric additional generator output. This was the second phase of upgrades scheduled for implementation.

- The low pressure turbines two and three are scheduled for upgrade in RFO9 and RFO10.

- Refuel - replaced 24 Jet Pump Beams and 8 Control Rod Blades. Replaced 26 Control Rod Drive Mechanisms and 42 LPRMs

- Drywell Insulation - removed insulation from accumulators in the Drywell to eliminate a potential source of emergency core cooling pump strainer clogging.

- Outage Performance

Outage performance was enhanced by resource sharing between Entergy Nuclear Units. Approximately 233 personnel from Entergy's other sites were loaned to Grand Gulf during RFO8. Personnel from our other plants brought with them skills, knowledge, and spirit to get the job done. Records were set with the shortest and safest Refueling Outages in Grand Gulf's history.

PROGRESS SUMMARY OF SALP PERIOD

Grand Gulf's last SALP report for the period of February 27, 1994 , through February 24, 1996 contained no challenges but the NRC did touch on some areas that need improvement. These areas are briefly summarized in this section and are discussed in greater detail in the "functional area" section.

OPERATIONS

- Operators still demonstrated some knowledge and performance weaknesses during the recent requalification examinations.

- While administrative controls for plant configuration were effective, occasional deficiencies with clearance order implementation adversely affected plant operation.

- Overall, operator performance was outstanding; however, occasional instances of inattention to detail occurred during the second half of this assessment period that may indicate the onset of complacency in the performance of routine operations activities.

  Management continues to focus on human performance issues. This is evident with the declining number of LERs and Violations due to operator error.

SALP PERIOD	# of LERs
'89 - '91	12
'91 - '92	8
'92 - '94	6
'94 '96	6
'96 - '97	1

SALP PERIOD	# of Violations
'92 - '94	14
'94 - '96	6.5
'96 - '97	2

- Self-assessment activities were detailed and extensive; however, corrective actions taken to prevent recurrence of identified problems were not always effective as evidenced by repetitive configuration control errors and inadvertent partial draining of the suppression pool.

MAINTENANCE

- Problems created by maintenance activities and undetected materiel problems in the plant caused transients and resulted in several reactor scrams. Implementation of a scram reduction program appeared to improve performance, but additional improvements are necessary to return to superior performance.

- Problems were identified with fundamental craft activities that resulted in plant challenges and reactor scrams. These problems were often not identified or well-defined in a timely manner to afford correction before impacting plant operations.

- Overall materiel condition of the plant declined, particularly with regard to balance-of-plant (BOP) systems. Equipment failures were known by some plant staff but had not been documented for correction.

ENGINEERING

- Plant modifications were generally well designed and effectively implemented; however, examples were identified where engineers did not adequately consider the full implications of design modifications.

PLANT SUPPORT

- There are opportunities for improvement in the area of emergency preparedness.

Functional Area Regulatory Summary

OPERATIONS

(Plant Operations and Nuclear Training Operations Program)

Previous SALP Ratings:	**Previous SALP Recommendations:**
05/88 - 09/89: 1 10/89 - 02/91: 1 02/91 - 08/92: 1 08/92 - 02/94: 1 02/94 - 02/96: 1	None

Event/Enforcement Comparison:

	Previous SALP (24 Months) (02/27/94 - 02/24/96)		**Current SALP** (18 Months) (02/25/96 - Present)	
LERs	4		0.5	
Violations	**IV**	**NCV**	**IV**	**NCV**
	6.5	7	2	1

Inspection History (other than Resident Inspector):

Inspection	**Date**	**Notes***
96-12	7/25/96	NV

* **NV** - no violations or deviations
V - violation identified
S - strength identified
W - weakness identified

OPERATIONS PERFORMANCE ANALYSIS

PLANT OPERATIONS

SALP PERIOD	# OF LERs
'89 - '91	12
'91 - '92	8
'92 - '94	6
'94 - '96	4
'96 - '97	1

SALP PERIOD	# OF VIOLATIONS
'92 - '94	6
'94 - '96	6.5
'96 - '97	2

Strengths

Control Room Formality, Communication, and Teamwork

The Operations Department has made many improvements in control room formality and communication, which was identified as a "strength" during a recent INPO evaluation. Following are comments made during this INPO evaluation:

- Supervisory oversight of panel operations during routine operations.
- Clear assignment of RO duties, licensed operator dedication to reactivity control, and dedication of operators to important I&C surveillances.
- Clear and concise transfer of command function.
- Development of "Principles of Operation" by operating crews resulting in higher standards in areas of control room formality, communication, shift briefings, and peer checks. This participation helped create a sense of ownership among the operators for the higher standards.
- Control room distractions are reduced by limiting control room access to those necessary to perform work.
- Consistent use of 3-part communication during routine operation.

Conservative Decision Making

Conservative decision making continues to be a standard focus of plant operations. Examples of conservative decisions include:

- Insertion of manual scram on inadvertent safety-relief valve opening.
- Insertion of manual scram on loss of CRD system.

Event Free Program

An Operations Event Free Program has been implemented which provides operations personnel a method to easily identify both good practices and problem areas. The basic intent of the program is to allow operators a mean to address a wide spectrum of issues encountered, such as procedure adherence, communications, and self-verification. One aspect of this program tracks 'Event Free Days' in control rod, valve, and red tag positioning, which provides a focus on positive aspects of performance issues.

The program is not used in place of the Condition Report program; however, input into this program may require additional deficiency documents. Each item identified is reviewed by Operations management and additional corrective action documents are initiated as necessary.

Configuration Control

A Configuration Control Review team was formed to address an increasing trend in configuration errors associated with valve positioning, system lineup verification, and system restoration, none of which posed any risk to plant safety. The team consists of representatives from Operations, Engineering, Maintenance and Chemistry. The team performed a review of 18 incidents to evaluate the effectiveness of identified corrective action and to provide additional insights into improving the approach for component configuration controls. The team also performed a review of many of the processes by which plant components are manipulated to identify weaknesses which could contribute to inappropriate plant configuration. The team has preliminarily identified specific enhancement areas and is currently working to establish a plan for implementation of improvements to address these areas.

Human Performance

Human performance is an area in which continued improvements can be made to ensure safe and reliable operation of the plant. Grand Gulf has formed a team to identify and address areas in which performance reliability can be improved. The team is focused on the individual aspect of processes which plant personnel use to accomplish work. This includes providing "tools or keys" to all levels of the

plant to identify error likely situations and methods to be used when these situations are encountered.

Protective Tagging

The protective tagging process was significantly revised to improve the tagging of components, and to utilize the use of electronic technology in the preparation and tracking of component status. This program improves the availability of component configuration status for Operations personnel and provides other plant departments a means to access plant configuration status through the plant computer network. The program provides the means to recreate previous tagging boundaries for repetitive types of maintenance, and trigger the preparer when a potential conflict exists with a component already tagged.

As part of this effort, a 'tagging' group of licensed operators was also formed. This group interfaces with the maintenance disciplines to ensure that the scope of work is well understood so that effective tagging boundaries can be established.

Operator Work-Arounds Aggregate Effects

A method has been developed to quantify the aggregate effect of operator actions as a result of operator work arounds. The method applies to those work arounds which require mitigating operator action during transient conditions. This program determines the operator time required due to the work around during the first four hours of an event. The program applies a weighting to times associated with non-licensed operators versus control room operators. The aggregate number is used as one of the Operations performance indicators reviewed by plant management each month.

Procedure Upgrade

In response to self-assessment comments, the Operations department has started a procedure upgrade program. The program is directed at procedures with outstanding changes and areas identified that do not fully implement the requirements of the Grand Gulf Author's Guide. Contractors have been retained for this effort with operations overview/approval.

Implementation of Radwaste Task Force

A Radwaste Task Force was implemented with the purpose to significantly reduce radwaste liquid releases. The following initiatives were initiated with various results:

- The new Advanced Resin Cleaning system (ARCS) is now fully functional, resulting in reducing the amount of water required to process each resin bed by 50,000 gallons. The ARCS system is more efficient in cleaning resins than the

ultrasonic resin cleaner and eliminates major sulfate spikes when placing resin bed in service.

- Success with Reverse Osmosis system: The system resulted in improved processing of water. Unfortunately a tough decision had to be made to remove the contractor from the site because of the inability to meet contract requirements. Monitoring other vendors in the industry indicated we can expect reverse osmosis to be a viable option in the future.

- Initiated steps to provide portable demineralizers for more flexibility in processing chemical wastes.

- Total radwaste in-leakage has been decreased by repairs made during recent refueling outage.

Peer Checks

Operations has implemented peer checks as a practice to reduce human performance errors. The recent INPO evaluation in January 1997 identified that operating crew performances were enhanced during simulator exercises and in the plant as a result of peer checking practices.

Realism During Simulator Training

INPO identified that simulator training was enhanced by a high level of realism established and maintained by the operating crews.

RF08 Performance

Operations performance during Fall 1996 Refueling Outage was excellent as supported by the following:

- No Loss of Shutdown Cooling

- 41.5 day outage

- No LERs

Work Control

The following improvements to work control processes have been implemented recently:

- Scheduling system work weeks instead of system work days.

- Use of Risk Based Planning (EOOS) for scheduling daily work and system outages.

Self-Assessments

During the SALP period, Operations conducted a self-initiated assessment with emphasis on the locked valve program. The assessment identified weaknesses in the following:

- Operators living with long-term problems and accepting low levels of performance.
- Plant perception of QDRs is negative, driving the threshold upward.
- Materiel Condition/Housekeeping expectations may not be well understood.
- Operations personnel appear to take a casual approach to the usage of procedures.

The following initiatives have been taken since the assessment to correct noted weaknesses:

- Increased focus on correcting plant problems including periodic reviews of operator work-arounds, inoperable annunciators, inoperable control room instrumentation, and temporary operations.
- Implementation of single corrective action document (Condition Reports). The program is computer initiated which makes for easy initiation and the single document allows for easier tracking.
- Management has emphasized that housekeeping is everyone's job.
- Initiated upgrade of operations procedures.
- Management has held meetings with Operations personnel to gain a consistent understanding of expectations concerning operation of the plant.
- Benchmarking tours of other plants by almost all operators were made during SALP period. Future trips in 1997 and 1998 are planned.

Areas for Improvement

Improvement Areas Identified by Self-Assessment

- Operations not assuming leadership role, is living with long-term problems, and accepting low levels of performance.

  Operations has and will continue to be involved in scheduling maintenance. Increased emphasis has been placed on correcting operator work arounds, clearing temporary operations, and correction of long standing problems.

- Negative perception of QDR's is driving threshold for initiation upwards.

  This has been improved by implementation of new Condition Reporting (CR) system which allows for easy computer initiation of problems.

- Materiel Condition/Housekeeping expectations may not be well understood.

  Housekeeping has become a top priority of management. New programs for inspections and clean-up schedules were developed. Management has placed emphasis that housekeeping is the responsibility of all personnel.

NUCLEAR OPERATIONS TRAINING PROGRAM

Strengths

- Continued a very successful onsite degree program. Three participants received their Bachelor of Science Degree in Nuclear Engineering Technology.

- Training Department support of RFO8 was key to the completion of RFO8. Training personnel were utilized to coordinate outage scheduling and control, LLRTs, water movement, refueling floor operations, shared resources, and contractor processing. Also, training personnel were utilized to assist health physics, maintenance, and operations by performing various functions for these departments.

- Continued use and expansion of interactive video and computer based instruction allows other station personnel to receive training in specialty areas. These areas include maintenance initial training topics, hazardous communications training, and all lower level qualifications of hazardous material training.

- The use of mockups and spare plant equipment for training purposes provides hands-on experience with actual plant equipment during training. Items such as nuclear instrumentation panels, rod control and information system panels, recirculation system modicon control system, recirculation system flow control valve actuator, and digital feedwater control system are used to train maintenance, operations, and engineering personnel. These mockups and panels have also been instrumental in troubleshooting plant problems and in development of design changes.

- The Training Review Groups (TRGs) have been strengthened by transferring the responsibility for chairing the TRGs from a single individual to the respective department managers. This provides direct line manager involvement in the scheduling, topic selection, and program changes affecting the training received by their personnel.

- Position specific training for selected Emergency Response Organization (ERO) positions has been developed, and ERO personnel are in the process of completing qualification cards for the selected positions.

- The training and implementation of the digital feedwater control system modification resulted in a smooth startup from RFO8 and completion of the required startup testing for the modification without any operational events.

Technical Training

- Maintenance personnel have been cross-trained to perform low impact health physics tasks commonly associated with maintenance tasks in the plant. These personnel have completed the classroom training phase and are currently completing practical factors to become qualified to perform the selected tasks.

- The Site Training Procedure has been revised to include guidance for preparing site training materials that meet the criteria of the systematic approach training methodology.

- Plant Access Training and Radiation Worker Training have been revised to implement a common program between all Entergy sites. This allows for quicker access for Entergy personnel who have previously qualified at their home site.

Operations Training:

- During 1996, Training evaluated the Fuel Handling Operator Training Program for contractors and found additional training was needed on plant specific procedures and industry lessons learned. The program now consists of approximately 40 hours of classroom training with a comprehensive written examination and qualification cards for each refueling component. Performance of fuel handlers during RF08 indicated that the training was very successful.

- Continued tracking of crew performance in the simulator has provided areas for improvement for each crew. This information is provided the crew's shift superintendent following each requal training week and is reviewed with the crew prior to the start of their next training week. Discussions are held on activities the crew has completed to improve in the identified areas. These items are checked during simulator training to determine if improvements have been made.

- Simulator training effectiveness is enhanced by a high level of realism established and maintained by operating crews.

Functional Area Regulatory Summary

MAINTENANCE

Previous SALP Ratings:

05/88 - 09/89: 1
10/89 - 02/91: 1
02/91 - 08/92: 1
08/92 - 02/94: 1
02/94 - 02/96: 2

Previous SALP Recommendations:

None

Event/Enforcement Comparison:

	Previous SALP (24 Months) (02/27/94 - 02/24/96)		**Current SALP** (18 Months) (02/25/96 - Present)	
LERs	9		5	
Violations	**IV**	**NCV**	**IV**	**NCV**
	2.5	5	6	3

*Level IV/Non-Cited Violations

Inspection History (other than Resident Inspector):

Inspection	**Date**	**Notes***
96-18	11/29/96	NV, S, W

* NV - no violations or deviations
V - violation identified
S - strength identified
W - weakness identified

MAINTENANCE PERFORMANCE ANALYSIS

MAINTENANCE

Strengths

Maintenance has continued to improve in this SALP period in several areas such as training, work order backlog reduction, and materiel condition. Results of internal and external audits indicate strong performance due to employee experience, knowledge, attitude, and teamwork in oil leak control and water leak, small area of contaminated floor space, the Training Review Group, and the trouble ticket process. Effective team work in planning is most visible in the implementation of a twelve week schedule which focuses resources to critical jobs as demonstrated by the SSW A pump overhaul. Also, effective teamwork is demonstrated by the maintenance organization in a number of important activities that measurably reduced the maintenance backlog. These activities include:

The reduction of the maintenance backlog was demonstrated by the maintenance organization in a number of important activities that included:

- Involvement in a utility-wide maintenance team
- The establishment of a site fix-it-now team
- An aggressive approach to some plant modifications

Innovative management and technical solutions for leakage repairs have contributed to an overall reduction of steam and water leaks in the plant. Leakage into Radwaste was reduced by 50% following refueling outage # 8.

Maintenance continues to use the program, established as "Maintenance Standard of Repetitive Excellence", to detect areas needing attention before they become significant. The Maintenance Standard of Repetitive Excellence is composed of the following major elements:

Maintenance Assessment process

Maintenance continues to use independent assessments to gain insight from the industry and other Entergy sites ensuring continued benefit from other viewpoints.

Internally used tools to measure the effectiveness of maintenance and to identify opportunities for improvement include the following:

- Internal assessments such as:
  - Condition Report trends
  - Quality Program Audits
- Post Trip Analysis (SCRAM Reports)
- NRC Inspection Reports

- Personnel interviews
- Plant walkdowns
- Benchmarking other plants and industries

These activities are used to measure how well customer expectations and regulatory requirements are being met.

Three external assessments were conducted this SALP period that focused on Maintenance directly. These assessments revealed and reinforced positive areas as well as areas requiring continued emphasis on improvement.

Maintenance Enhancement Process (MEP)

This part of the maintenance program is directed at improving maintenance processes such as human performance. The following elements are included in this program:

- STAR (Self Checking)
- Trip Critical/Trip Sensitive Systems
- Supervision involvement on critical jobs
- Contractor oversight
- FME (Foreign Material Exclusion)
- Improved Maintenance Retest (more stringent)
- Procedure Use and Control (Level of Use)
- Supervisor assessment of crew performance (crew assessment cards)
- Spill prevention

Maintenance Initiatives Process (MIP)

This aspect of the program focuses on the use of resources to meet the "core business function" of Maintenance, (i.e., maintain the plant such that it is the safest and most reliable plant in the world). Initiatives include:

- Minor Maintenance Program
- Shared Resources
- SFRC (SCRAM Frequency Reduction Committee)
- Procedure enhancements
- DCP/MCP review (more critical review by the work discipline)
- Training Review Group (TRG)
- Maintenance Rule

Maintenance Corrective Action Tracking/Trending (MCT)

This part of the program is intended to provide a method of tracking action items important to Maintenance. The items tracked will include the following:

- Corrective actions
- Planned improvements
- Periodic surveys/ assessments
- Maintenance Monitoring Checklist

Maintenance management tracks and trends key indicators routinely and holds appropriate personnel accountable if performance degrades. Examples of items monitored include:

- Weekly maintenance work order status
- Weekly preventive maintenance status
- Weekly tracking of schedule and tagout performance by comparing the ratio of items actually performed to those planned.
- Minor Maintenance Trouble Tickets
- Maintenance procedures with outstanding Change Notices
- Maintenance Safety Backlog (percentage)

In addition, a Monthly Maintenance Performance Report aids in focusing upper station management's attention on performance in numerous maintenance-related areas including:

- Industrial safety
- Radiation protection
- Security
- Budget
- Contaminated floor space

Improved Human Performance

The following changes were made due to findings from the Maintenance Assessment Process (MAP) and have significantly improved human performance in Maintenance during this SALP period.

- Maintenance manager review and reinforcement of expectations with all maintenance staff (accountability).
- Use of specialists to monitor supervisors.
- Increased monitoring by supervisors of in-plant maintenance performance.
- Upgraded supervisors not used on complex or plant sensitive jobs.
- Established Supervisors Training Review Group for Maintenance Supervisors Specific Training

Also, the maintenance work force has continued to be very stable. The experience level of the craft personnel continues to increase due to longevity and training. In addition, the Grand Gulf management rotation program has allowed other department personnel such as System Engineering, Design Engineering, and

Health Physics management to hold positions in maintenance, thereby strengthening the working relationship between departments.

Materiel Condition

Materiel condition of the plant continues to be a priority. Maintenance management has lowered the threshold for equipment deficiency (CI) reporting (i.e., Condition Identifier). In addition, senior plant management focuses on plant materiel condition by performing routine plant inspections. This ensures plant personnel are aware of the importance of plant materiel condition. All discrepancies are tracked and trended through the maintenance work order process and trend reports are generated monthly.

Reduced Work Order Backlog

Maintenance excelled by reducing the backlog to the lowest level ever attained at Grand Gulf. Our monthly performance indicators show the results of new programs and efforts to improve maintenance processes. At the end of RFO8 there were 382 open work orders including Minor Maintenance Trouble Tickets (MMTTS). Achievement of this new low for Post-Outage Backlog is primarily due to the "Fix-it-Now" Team (FIN) performance during RF08.

One of the most significant programs that led to a reduced backlog was the Minor Maintenance Program/FIN Team:

- The effective use of the Minor Maintenance program has resulted in reduced cycle time for work that does not require formal planning. Through the use of minor maintenance, the materiel condition of the plant has improved thereby allowing limited resources to be allotted to best meet the goals for nuclear safety and efficiency.

- Selection of Minor Maintenance and a dedicated FIN team to concentrate on trouble tickets has proven to be an effective method of maintaining a low backlog. FIN team participants are two electricians, two mechanical technicians, two I&C technicians, one health physics, one operator, one planner and a FIN Team Coordinator. The FIN Team functions as an independent department within Maintenance during both outage and non-outage periods.

Training

The Training Department maintains a close interface with the Operating Events group and other site organizations to ensure industry information is fed into the appropriate maintenance training programs.

Training Review Group (TRG)

Training plays a key role in the reinforcement of management expectations. The maintenance manager serves as the TRG Chairman for each maintenance discipline. This ensures consistent direction between each maintenance discipline and between the Maintenance and Training Departments. Additionally, members for each discipline TRG includes a technician dedicated to that TRG.

A Supervisors TRG to provide a forum for addressing issues and training not covered in routine crew training was implemented in February 1997. This TRG was formed to address the soft skill training aspect of improving human performance through the discipline supervisors.

Job Performance Measures (JPM)

Maintenance in conjunction with Training is developing and will implement JPMs emphasizing basics that:

- Force use of the "STAR" concept.
- Test the decision-making capabilities of the craft and supervisors - "When should I stop the job and get help?"

In addition, mock-ups in the Training Department will be used routinely to simulate actual plant conditions stressing adherence to actual plant work processes such as:

- Protective tagging
- Radiological practices
- Procedure Level of Use and Adherence
- FME (Foreign Material Exclusion)
- Spill prevention
- Attention to detail (practical application - my responsibility)
- Housekeeping
- Independent verification

Multi-Disciplined Training

Grand Gulf is in its third year of the Multi-Discipline Training program. The goals of the program are to instill in Maintenance a strong sense of teamwork, enhance the knowledge of the craft and to create a sense of ownership of the equipment. The training has been very effective in developing the interface between disciplines that allow them to function as an integrated work force to solve equipment problems. The Multi-Discipline Training has included System Engineers, Nuclear Plant Engineers, Operators and Maintenance Planners. The communications established through this training contributed to overall maintenance effectiveness and a better understanding of equipment operation by Operations and Engineering personnel.

Multi-discipline courses have included training on AOVs, reactor, recirculation system hydraulics, electrical basic/instrumentation training, and the Drywell chillers.

Multi-Skilled Technicians

In an effort to increase the skill level of Maintenance Technicians, Training added fourteen I&C performance measurers to the electrical certification program. The purpose of the additional training was to allow the Electrical Technicians to also perform tasks previously performed by I&C. Additionally, training on Limotorque actuators will be conducted for the Electrical group which will allow them to perform the preventive maintenance, refurbishment and testing of these actuators. Previously, the maintenance and rework was performed by Mechanical Technicians. Additionally, Mechanical Technicians participated in cross-training with the I&C and Electrical Technicians to further broaden their abilities toward maintaining AOV operators. This training included teardown and setup of control valve systems (Fisher Control Valves).

Other cross-training is taking place in the areas of measurement and test equipment calibration and security. Computer Technicians are being teamed with I&C Technicians to handle the work on the plant security system and in the Meteorology Lab to perform instrument calibrations.

Superintendents/Supervisor Assessment of Crew Performance Subject

This is part of an overall assessment program and is a tool to increase maintenance effectiveness. Supervisors perform at least one assessment of an activity for which they are responsible each week and complete a survey form. Superintendents assess the interaction between the first-line supervisors and their crews. The assessment results are conveyed to the Maintenance Manager.

The survey form is used to evaluate crew/worker performance in eight areas. Performance of the objectives in each area is rated using "A" for fully adequate, or "I" for inadequate. Inadequate findings must be addressed at the time they are observed for such issues as procedure adherence, FME (Foreign Material Exclusion), personnel safety and radiological practices.

In order to take full advantage of this program, Superintendents and Supervisors are encouraged to perform cross-discipline assessments. Assessments of other disciplines help to ensure that maintenance work practices are being consistently applied throughout the department.

Comments that require additional attention are entered into a tracking system and assigned to an individual for action and monitored to completion. This process has been effective in identifying low level issues prior to manifestation into larger process deficiencies.

Outage Performance

Resource Sharing

Key aspect of outage performance was resource sharing between Entergy Nuclear Units. Approximately 233 personnel from the other nuclear sites were loaned to Grand Gulf during RFO8. In return, Grand Gulf is supporting outages at

other Entergy sites. The use of Maintenance Technicians from other Entergy sites contributed to the overall success of the outage by providing additional trained and skilled personnel to complete the outage work scope. The additional benefit of sharing resources will be the ability to staff future outages with a greater number of experienced workers. Entergy sites will attempt to send 35% of their work force to the unit in future outages. The goal is to have at least 75% repeat workers for project activities and outages. Grand Gulf feels this leads to a more reliable unit, since Entergy craft, which generally have a higher level of ownership and competence, perform more of the corrective maintenance. This also allows for reduced reliance on contractor personnel. If contract personnel are required, they will be under the direct supervision of plant personnel.

Procedures

Maintenance has transferred responsibility for surveillance and preventative maintenance procedures to the applicable department. A coordinator is responsible for tracking the status of procedures to ensure that technical reviews and revisions are performed when necessary. This has already proven to be a very efficient move, producing high quality and user friendly procedures. Craft are used whenever possible to perform revisions and temporary changes (TCNs). Craft also perform applicability and technical reviews. Revised procedures, when possible, are proofed or field tested by craft personnel prior to issue as a means of ensuring ease of use and technical adequacy.

Maintenance Rule

During this SALP period, Grand Gulf continues to be proactive in the implementation of the Maintenance Rule. Working with the NRC, NEI and other industry representatives, Grand Gulf has remained involved in the development of the 93-01 guidance document. The Maintenance Rule program at Grand Gulf was fully implemented well ahead of the required due date. Operations, System Engineering and Maintenance have utilized the Maintenance Rule program to provide valuable insight into the effects of equipment failures. This has resulted in focusing resources on systems important to safety and efficient operation of the plant. Scheduling of maintenance outage windows includes the use of PRA tools developed as part of the Maintenance Rule program. System unavailability is limited based on the Plant PRA model and actual unavailability data is being used

as input to the model to make decisions on establishing allowable out of service time for important systems.

Work Control

The planning and scheduling of work continues to improve as a result of the close coordination between Operations, Maintenance, Health Physics, and Performance and System Engineering in the 0700 and 1300 planning meetings, with continued emphasis being placed on maintenance of systems which are important to safety. Trip critical/trip sensitive designation has been given to systems that are deemed important to plant reliability by operations. This has ensured that they receive maintenance on a priority basis.

Forced outage work control is coordinated and tracked between all organizations on site in a timely and expeditious manner. Forced outage work lists are maintained as items are identified. When a forced outage occurs, these lists are reviewed and assigned for work based on plant conditions and planned plant down time.

Areas of Improvement

Materiel Condition

Management expectation on materiel condition has been and continues to be emphasized to maintenance and plant staff. To coordinate management's expectations, the recently established Plant Materiel Condition Project Manager has been appointed. This position is responsible for maintaining the Plant Materiel Condition Indicator Program and coordinating the following activities:

- Plant materiel condition grading by managers
- Zone housekeeping team leaders
- Plant Materiel Condition Upgrade Project and INPO observation training lowered the threshold for problem reporting.

Additionally, the Site Vice President requested and received approval for a one million dollar a year budget increase for each of the next five years. This money is set aside for upgrading the materiel condition of the plant.

Fundamental Work Practices

- Attention to Detail

  This area is being addressed by reinforcing Maintenance supervision and craft attention to fundamental work practices by:

- Lowered threshold for deficiency reporting (CRs)
- Maintenance manager review and reinforcement of expectations with all maintenance staff (accountability)
- Re-emphasize "STAR"
- Peer monitoring by supervisor, superintendent, manager and encouraging cross-discipline monitoring.
- Develop and implement JPMs that emphasize basic work practices such as FME and spill prevention.
- Increased use of classroom mockups to enhance expectation under "real plant" conditions.

- Two significant areas that are receiving specific attention are FME (Foreign Material Exclusion - SOER 95-01) and spill prevention; i.e., oil spills that occur and affect other plant components such as condenser boot seals.

  - The Foreign Material Control Program is being better defined to provide clear expectations and guidance. The following action are in progress:

    ◊ FME procedural guidance at Grand Gulf was relocated to a single plant procedure. The procedure is based on process controls currently in place at Grand Gulf, as well as other plants benchmarked in the procedure development process, as well as feedback from users of the procedure.

    ◊ Industry events training is being provided on SOER 95-01 to mechanical, electrical, I&C, and engineering support personnel.

    ◊ New lesson plans have been developed to provide continuing training on the new foreign material exclusion procedure, including hands-on training for all electrical, mechanical, and I&C personnel.

  - The second area is spill prevention, in particular, oil spills during maintenance.

    An oil spill which occurred in RF06 resulted in a failure of the condenser boot seal. Actions already taken in RF06 consisted of improvements in the procedure which added signoffs for the pedestal closeout. These improvements were implemented in RF07, refined through RF08, and no major oil spills occurred. Other improvements that were implemented were:

    ◊ Discussion with the contract project manager about the incident.

    ◊ Individual discussions were held with the Technical Director for each project that was performing work that could result in an oil spill to ensure that they understand that no oil spills would be tolerated. Continuous reinforcement, coaching, and monitoring during RF08 increased contractor awareness of management expectations.

Outage Maintenance

- Attention to detail and preventing complacency is a challenge for any high performing organization. Two incidents during RF08 highlighted the need to take control of the switchyard and reinforce expectation of performing electrical work.

- Although maintenance performance throughout RF08 was excellent, a maintenance preventable failure occurred during startup (i.e., trip of CRD pumps). Maintenance management is challenged to heighten awareness of personnel at all times by raising the awareness level on adherence to procedures and attention to detail.

- Control of Contractors

  The following actions have been taken to reduce the use of contractors or when used, do so under plant maintenance personnel supervision.

  - Shared resources

    The ability to share internal resources from site to site is one of the ways Grand Gulf uses to control the use of contract personnel. Utilizing highly trained in-house personnel to work refueling outages, to help with recovery efforts during unplanned outages, and to assist with special projects, ensures safer operation and higher reliability.

  - Contractor Supervision

    In those areas where contract personnel were required, they were under the direct supervision of plant maintenance personnel or project coordinators.

Functional Area Regulatory Summary
ENGINEERING/TECHNICAL SUPPORT
(System Engineering, Engineering Support, Reactor Engineering, Design Engineering, Outage Scheduling)

Previous SALP Ratings:	**Previous SALP Recommendations:**
05/88 - 09/89: 2 10/89 - 02/91: 1 02/91 - 08/92: 2 08/92 - 02/94: 1 02/94 - 02/96: 1	None

Event/Enforcement Comparison:

	Previous SALP (24 Months) (02/27/94 - 02/24/96)		**Current SALP** (18 Months) (02/25/96 - Present)	
LERs	8		1	
Violations	**IV**	**NCV**	**IV**	**NCV**
	0	1	2	4

*Level IV/Non-Cited Violations

Inspection History (other than Resident Inspector):

Inspection	**Date**	**Notes***
96-02	4/11/96	NCV, S, W
96-03	3/19/96	NV, S, W
96-14	8/01/96	NV

* NV - no violations or deviations
NCV - non-cited violations
V - violation identified
S - strength identified
W - weakness identified

ENGINEERING PERFORMANCE ANALYSIS

SYSTEM ENGINEERING

System Engineering continues to focus on resolving long standing plant problems through dedication and proactiveness, with a strong emphasis on improving plant safety by enhancing system and component performance. System Engineers accomplish this task by observing and assessing individual component and system performance from an overall "plant" perspective, applying principles and practices through the insight afforded by their system knowledge. This perceptiveness combined with a "questioning attitude" resolved numerous plant issues and improved system and component operation. The end result has been an overall improvement in Plant Operation and Safety.

In all areas within System Engineering's responsibility, there is a strong commitment toward improving safety. System Engineers are expected to make conservative decisions and recommend the safest course of action. System Engineering focuses attention on system reliability and provides the tools, environment, administrative authority and controls to enhance system management, performance trending and problem resolution. System Engineering Management stresses the engineer's participation and involvement in plant operation and maintenance activities through routine plant and system walkdowns as well as system performance monitoring and reliability.

Strengths

System Performance Monitoring

Background:

The current System and Component Monitoring Program is being updated to provide additional guidance and process consistency. Improvements are being made to elevate the program to a level superior to other utility performance monitoring programs.

Overview:

System Engineering's goal is to be proactive in addressing and solving challenges to safe, continuous plant operation. As part of this on-going commitment, we are constantly looking for ways to continuously improve and provide added value to plant operations.

Recent challenges to continuous plant operation, and our quest to be recognized as the best in the industry, have led us to review and improve our plant monitoring and trending program.

A successful performance monitoring program:

- Monitors plant equipment important to safety and power generation.
- Detects component and system degradation in it's early stages.
- Provides ample time to implement corrective actions, minimizing plant challenges.
- Analyzes data for historical purposes

The benefits of a successful performance program include:

- Improved equipment reliability
- Improved maintenance planning
- Reduced preventive maintenance
- Reduced costs

System Engineering reviewed several system performance monitoring programs from other utilities and surveys prepared by industry oversight groups while developing the new Performance Monitoring Program. One System Engineering Supervisor participated in the EPRI Task Group developing the new guidelines for System Performance Monitoring by System Engineers. The new System Monitoring Program incorporates guidelines and process recommendations consistent with the forthcoming EPRI performance monitoring guidelines as well as the previously issued INPO Good Practice on Performance Monitoring. Additional elements were developed by System Engineering to further enhance the programs and recommendations from INPO and EPRI.

System Engineering Involvement

Background:

One of the most important services provided by System Engineering is the daily support for plant operations and maintenance activities. Strong support to operations and maintenance, through day to day involvement of System Engineer, continues to be one of System Engineering's greatest strengths. The System Engineer is generally recognized as the "System Expert" and adds value to plant operation by:

- Monitoring system performance
- Performing walkdowns
- Trending performance data
- Keeping abreast of industry events and technology improvements
- Resolving long standing issues

Through this involvement, the reliability of systems and plant safety level is greatly enhanced.

Overview:

Some examples where System Engineering involvement directly resolved problems or identified unsatisfactory conditions are as follows:

- Reactor Water Cleanup relief valves were found to be leaking using thermography and reworked during last refueling outage with minimal system/plant impact

- System Engineer walkdowns and in-field inspections produced recommended changes to mechanical vacuum pump maintenance procedures to improved the alignment process which improved overall vacuum pump operation.

- The Diesel Generator Trending Program trends all significant Diesel Generator parameters and periodically distributes reports for Management review and information.

- Static Diagnostic retest indicated potential valve degradation (guides) on P41F189. Valve was disassembled and inspected prior to RF08. The valve was replaced on-line.

- DP testing and static testing on P41F016A indicated potential valve degradation. The valve was reworked and repaired prior to impacting plant operation or SSW availability.

- A baseline LLRT identified an acceptable, but elevated leakage rate from E12F024B. A team consisting of the System Engineer, Operations, LLRT Engineer, and MOV Engineer recommended disassembly and inspection of the valve during RF08. Based on the team's recommendation, the valve was disassembled and worn disc guides were found. The wear was attributed to the orientation and use of the valve. The valve was repaired and restored to service without significant system impact.

- EHC fluid degradation led to formation of a team consisting of System Engineering, Grand Gulf Lubrication Engineer, Maintenance, Operations, and Lubricant Vendors. The team came up with an innovative method using a special ionic filter train to replace the standard Fuller's Earth and Fine Filters on the EHC fluid tank skid. Fluid condition was improved substantially, allowing fluid to remain in service for an extended period.

- Recirc. Pumps B33C001A&B Vibration Analysis indicated potential misalignment and pump instability. New alignment techniques were developed and applied during RF08 to Recirc. Pump "A". Current vibration trends on the "A" pump indicate improved running conditions. Similar activities for the "B" pump are scheduled for RF09.

- Prior to RF08, Circ. Water 'A' Pump Vibration analysis indicated instability developing on the inboard pump bearing. The pump bearing was inspected and replaced in RF08. Since RFO8, Circ Water Pump "A" Vibration has been substantially lower.

- Vibration retest following rebuild of the "A" Condensate Transfer Pump indicated high vibration levels. Pump was realigned utilizing a new laser alignment process, significantly reducing vibration.

- Weeping MSRVs have been previously identified at Grand Gulf. In the past, a manual actuation was performed on the MSRVs during power ascension sometimes causing some of the MSRVs to weep. Grand Gulf requested and was granted a licensing change that allowed us to perform an alternate test which eliminated the lift at power ascension and reduced the number of weeping MSRVs.

- Non-Intrusive testing has eliminated disassembly on certain valves to determine if the valves perform their safety function. This test method has permitted increased inspection frequency of certain valves, reducing valve out of service time and increasing valve reliability.

- The Thermal Performance Engineer trended and evaluated years of data in order to discern when minor venturi fouling began to affect feedwater flow measurement. An action team, consisting of Operations, System and Design engineering, and PM&C developed a course of action and implemented installation of an ultrasonic (LEFM) flowmeter system to correct for the venturi error, prior to it becoming a major unclassified thermal performance loss.

System Engineering Use of Trending Programs

Overview:

Utilization of trending programs and the Plant Data System (PDS) to detect adverse conditions or trends continues to be a strength. Numerous pre-defined trend reports are now available to each engineer through the use of the computer network. In addition, the PDS has greatly increased the amount of information available to the System Engineer for system performance review and evaluation. Historical and real time data is available to each engineer through his desk top computer, with the ability to trend multiple data points.

Examples of parameters and systems trended include such items as:

- Rosemount Transmitter drift
- Emergency Diesel Generator parameters
- Drywell temperature
- Drywell leakage rates
- Radial Well performance
- Radial Well flow monitoring for lateral cleaning
- ESF Room Cooler performance
- Control Rod performance
- Generator Rotor vibration
- Generator humidity
- Station Battery performance
- Airlock performance
- Generator H_2 usage
- Control Room HVAC performance
- SSW Pump performance

Some examples of System Engineering's proactive use of trending and monitoring of system and component parameters include:

- Standby Gas Treatment System 'A' controller problems which were previously unrecognized during system operation were diagnosed using flow trending. The degraded controller was replaced during RFO8 prior to encountering operational problems or unit failure.

- High Pressure Core Spray system suction strainer fouling was caught in the very early stages by trending pump suction pressure values, preventing significant operational impact.

- Hydrogen consumption monitoring revealed a three-fold increase in hydrogen usage since startup from the last refueling outage. Action plans were put in place to determine the cause and correct it.

- Steam Jet Air Ejector performance trending revealed degraded operation prior to plant impact. System Engineer recommended swapping SJAE trains to prevent nozzle erosion and other potential system/plant impact.

- Battery corrosion was identified by use of OE document review that described similar events at other units. Inspection revealed similar problems at Grand Gulf and permitted corrective action prior to encountering any operational problems.

- Trending/monitoring of system leak detection valves in the Drywell revealed elevated temperatures which indicated valve leakage. The condition was corrected by isolating the problem valve leakoff lines.

- Auxiliary Building Steam Tunnel temperature trends were used to help identify steam tunnel temperature problems and judge effectiveness of corrective actions.

- CRD trending identified CRDs that needed to be replaced using scram time test data and CRD hydraulic/flow pressure trends. CRDs needing rework or replacement were replaced in RF08.

- Instrument air compressor performance trending identified compressor degradation and excessive plant air usage. This information led to identification and resolution of system problems prior to any significant effect on plant operation.

- Radial well pump vibration was determined to be trending up at a rate that signaled the potential for significant degradation or failure with in six to eight weeks. This enabled Operations to take the pump out of service early, lengthening overall service availability life and allowing Maintenance to make detailed preparations for pump rework in a timely manner.

- RPS Motor Generator (MG) Set output voltage was noted to be drifting by the System Engineer, allowing adjusting of the voltage prior to development of an unsatisfactory condition.

- The ESF Room Cooler Trending Program provides valuable information regarding cooling water flow rates, and allows the System Engineer to predict the interval or date for header or cooler flushing.

- A potential failure of an SSW pump was averted when vibration levels on the P41C001A trended upward to above ALERT limits. This led to pump and motor inspections. Monitoring on this pump is required by IST quarterly, however due to more conservative trending by the Vibration Program, a potential failure was prevented.

Communications Practices

Background:

System Engineering provides timely and effective communication of issues related to plant operation to the System Engineering Staff. It supports daily plant operations through active participation in daily planning and scheduling meetings, routine priority/issue status meetings with Design Engineering, Operations and Maintenance and special "System of the Week" presentations to Plant Management.

Overview:

System Engineering uses a variety of methods to provide effective communications with plant departments. For example:

- System Engineering assigns senior Engineers, with SRO equivalent certification, to participate in daily plant status meetings as well as work planning and coordination meetings. These personnel coordinate Engineering support for maintenance and operations and provide independent insight during planning and scheduling of plant activities.

- System Engineering holds a morning status and update meeting to ensure Engineering support is provided to the areas important to Operations and Maintenance, and to effectively communicate plant status and expectations for the upcoming day's activities.

- System Engineering holds a bi-weekly meeting with Operations and Maintenance to ensure that appropriate resources are being provided to the areas or issues important to those departments. This meeting also allows Operations and Maintenance to provide feedback regarding System Engineering's support activities, allowing adjustment of priorities, as necessary.

- System Engineering holds a bi-weekly meeting with Nuclear Plant Engineering to discuss/approve priorities for Minor Modification Allocation Funding. This ensures that appropriate resources are being provided to projects or tasks that resolve or address concerns important to plant operation. This meeting also allows System Engineering and NPE to provide feedback regarding plant priorities activities, allowing adjustment of resources, as necessary.

- System Engineering holds periodic "System of the Week" presentations for Plant Management, allowing the System Engineer to assess specific system performance. This provides the System Engineer a forum for discussing events and issues from an Engineering perspective, as well as providing Management with an opportunity to ask specific questions or discuss issues related to the system's performance.

Initiatives

Standard for Communication with NRC inspectors

Established a standard for how a System Engineer is to communicate with resident and on-site NRC inspectors. This newly added section in the System Engineering Handbook clearly identifies to each System Engineer, Entergy Management's expectation that inspectors will be given accurate, timely, and courteous information to meet the needs of the inspector(s).

Development and Implementation of System Performance Monitoring Program

System Engineering initiated a new program to better measure and communicate the health and status of system performance. This program provides a tool for System Engineers to effectively measure the performance of their systems, based on performance criteria that they have developed and an annunciator system to provide better communication of system performance.

The advantages of this program are:

- Standard approach to performance monitoring using measurement against an identified criteria
- Improved method of communicating system performance to the site organizations
- Streamlined periodic reports, resulting in less time spent on generating and reviewing the reports

Increased System Engineering Role in Outage Planning

The involvement in system outages and refuel outages has increased tremendously for System Engineers during this reporting period. The System Engineer adds value to the system outage and refuel outage planning processes by providing technical and operational assistance through system ownership and system overview perspective - both unique to System Engineering.

Development of Desktop Procedures

System Engineering also developed the desktop procedure program during this period. This program was developed to:

- Aid the System Engineers in fully understanding and clarifying associated processes
- Make the System Engineer's Handbook more concise

Since the development of the desktop program in the fall of 1996, 3 desktop procedures have been initiated:

- Technical Special Test Instructions
- Shared Resource/Contractor Training
- System Performance Annunciator Program

Inter-Department Communication and Expectations

Several initiatives have been implemented to improve communication and working relationships with other departments:

- Added a new section in the SE Handbook regarding the expectation of a System Engineer to establish a good working relationship with System Engineering's customers.

- Development of System Engineering Home Page on Entergy's Internal Communications Network or Intranet (termed Entergy Net) to readily identify System Engineer System Assignments to better serve and communicate with our customers.

- Initiated a new program for combined System Engineer + Operations System Walkdowns, allowing the System Engineer and designated Operations personnel to simultaneously walk down a system. (Note: This program is new and should be fully implemented in 1997.)

- Added additional directions regarding System Engineering involvement in troubleshooting plant problems. A critical working relationship between Maintenance and System Engineering is in the area of maintenance troubleshooting. The System Engineer's handbook has been revised to provide additional direction regarding the method and depth of participation of the System Engineer in maintenance troubleshooting. The expectation is clear - the System Engineer should actively pursue involvement or as appropriate, take the lead in troubleshooting efforts, depending on problem complexity and impact to the plant. Additionally, the troubleshooting guideline now directs the development (in cooperation with Operations and Maintenance) of an action plan in the case of extended or complex troubleshooting, so that a coordinated success path to a solution can be planned and implemented.

Technical Process Enhancements

Computer-Aided Plant Monitoring and Trending

Background:

Computer aided monitoring provides real-time and historical data that allows the System Engineering Staff, as well as other plant departments, to monitor and trend system operating conditions. This provides a unique insight to total plant operation and enhanced ability to detect degrading or unusual trends.

Overview:

System Engineers routinely use PDS and desktop PCs to monitor and trend plant and system parameters. This provides timely and effective response to changes in the system performance. System Engineers, in general, monitor their systems closely and provide useful information to Operations and Maintenance to ensure

degrading performance is identified early and corrective actions are implemented prior to affecting plant operation.

As noted on page 46 under "System Engineering Use of Trending Programs", computer-aided monitoring has been used to trend and resolve problems with:

- Steam Tunnel Temperature
- Standby Service Water Pump performance
- Reactor Recirculating Pump performance
- CRD Trending
- Instrument Air Compressor
- Circulating Water Pump vibration
- Radial Well Pump vibration
- RPS Motor Generator (M-G) Set Output Voltage
- The ESF Room Coolers
- Additionally, the Diesel Generator Trending Program trends all significant Diesel Generator parameters and periodically distributes reports for Management review and information, and System Engineers attended Continuing Training focused on use and capabilities of PDS.

Electronic System Engineering Logbooks

Background:

Electronic logbooks are used by the System Engineers to record system events and evolutions. The electronic logbooks are accessible to all System Engineers and Supervisors at any time. Based on a recent review of utility programs this is a practice unique to Grand Gulf. The Electronic Logbook has met with tremendous success and acceptance and afforded System Engineering with a powerful new tool for documenting and reporting system and component information.

Overview:

The System Engineers record system operating observations, system walkdown information, event descriptions and other pertinent information for their assigned systems in an electronic logbook. This permits the information to be readily retrieved at any time for review by other personnel as required. This is especially

helpful when a System Engineer may not be available, and allows a seamless transfer of information.

The electronic logbook provides benefits such as searching by various parameters including dates, times, system or component numbers or even individual words. This allows rapid retrieval of information without time consuming page-by-page manual searching. Reports may also be generated to summarize and distribute system information to the plant's staff as necessary.

The electronic logbook is also very useful when gathering data and information for root cause evaluations, and for providing a direct link to system related databases such as Master Tracking System (MTS), Station Information Management System (SIMS) and the Maintenance Rule Database. This link enables the System Engineer to easily generate and retrieve reports on various system documents and work orders.

The electronic logbook concept proved very useful during RFO8, allowing System Engineers and System Engineering Supervisors to input detailed information regarding RFO8 activities. Some of the information provided in the RFO8 Section of the logbook was as follows:

- Significant Support Activities
- System Engineering Activities
- Unusual items noted during the outage
- Routine and special status updates
- Delays and known restraints
- Recommendations and Lessons Learned

This allowed rapid, accurate retrieval of RFO8 information without time consuming, less efficient compilation of handwritten notes, and permitted searching by various topics, projects, keywords, etc. Reports were also generated to summarize and distribute system information to the plant's staff as necessary.

Since RFO8, several options have been added to the Electronic Logbook's capabilities. ISI Programs, Vibration Information, Evening Shift Reports and other functions have improved and enhanced the logbook's usefulness to departments outside of System Engineering.

Control Rod Drive Performance Evaluation Program

Background:

The C11 System Engineer uses a method for optimizing CRD rebuilding and replacement frequency that employs numerical analysis methods and curve fitting based on operating parameters. This method has resulted in vastly improved Grand Gulf CRD Maintenance, providing substantial savings in O&M expenses and outage duration as well as preventing unnecessary personnel radiation exposure. In RFO8,

CRD maintenance was conducted according to the plan recommended by System Engineering's trending program, dramatically improving Control Rod movement. At a recent CRD User's Group Conference, hosted by Grand Gulf, this program was widely accepted by attendees as a unique and effective method to manage CRD Maintenance.

Overview:

The CRD Control Rod Drive Performance Evaluation Program is designed to predict CRD performance by:

- Gathering various operating parameters and information such as drive water and exhaust water flow rates during periodic CRD Exercises.
- Putting the data into a spreadsheet application.
- Performing a curve fit of the data using numerical analysis.
- Evaluating the final curve fit and interpreting CRD performance based on the trend provided by the curve fit.
- Determining the remaining CRD service life based on the performance trend .
- Scheduling CRD Maintenance or Replacement prior to experiencing operational problems.

This method has significantly reduced O&M costs associated with CRD replacement in two ways:

- Extending CRD Service Life to the maximum available, while preventing operational problems.
- Reducing Outage Duration by eliminating unnecessary CRD Replacement on a "rotating" replacement schedule.

In addition, personnel radiation exposure has been reduced due to the elimination of unnecessary CRD replacement, reinforcing the ALARA concept and saving costs associated with personnel exposure and HP monitoring.

Areas of Improvement

During this SALP period, as part of our goal to continually improve performance, System Engineering has developed and initiated program improvements explained in this report. These improvements, defined and explained in the System Engineer's Handbook, were designed to:

- Improve system performance
- Improve communications between System Engineering and other departments
- Increase System Engineer work efficiency
- Reduce System Engineer work load wherever possible.

The following is a review of the major improvements currently in place and those planned or under construction:

System Ownership and Accountability

Early in this reporting period, the System Engineer's Handbook was revised to better define and identify System Engineering Management's expectation of a proactive attitude, a sense of system responsibility and a questioning attitude that must exist for each System Engineer. This attitude is first reflected in the SE Handbook in the System Engineer Philosophy section. This section clearly states Management's expectation that, "The System Engineer has ownership and accountability for the performance of assigned systems and is expected to develop a proactive approach to continually improve the performance and reliability of assigned systems." This proactive approach and ownership philosophy is further promoted by the Management expectation that the System Engineer should be recognized as "the expert" on his or her assigned systems. "This achievement of expert status results through consistent dedicated effort."

In addition to the philosophy section of the handbook, the guideline section continues to stress a proactive attitude, system ownership, and a questioning attitude: Following are examples in the handbook:

- Weekly Walk Down: "...The System Engineer should continue to increase his knowledge level of the system, pursue resolution of problems in a proactive manner..."

- Review of Work Documents: "...What are the consequences of performing this work? The System Engineer must develop a questioning attitude toward outstanding work items...The System Engineer should also consider how this condition affects the operability of the system/component."

- System Performance Monitoring: This entire section promotes a proactive approach, questioning attitude, and system ownership.

- System Performance Monitoring: "...The System Engineer is expected to maintain an elevated overview approach to his system, with an eye on long-term improvement and goals."

- System Troubleshooting: "...A System Engineer should actively pursue becoming involved...."

- System Testing: Expectations regarding attendance during surveillance testing and observations expected during attendance.

System Engineering Workload Priorities

Background:

System Engineering Workload priorities are consistent with the System Engineering Handbook recommendations, i.e., maintenance and operations support. Additional focus needs to be placed in the area of controlling and managing overall workload priorities. This was recently emphasized as a site-wide issue in a recent System Engineering Self-Assessment as well as the recent INPO E&A visit. Presently, there is no single site priority project or task list to provide guidance on effective resource utilization.

Overview:

Workload placed on the System Engineers is substantial, which is not uncommon for the System Engineering function. The System Engineering Handbook provides guidance to the Engineers on responsibilities and priorities. The handbook also realistically notes that "the System Engineer's workload and priorities are constantly changing due to the responsiveness required by our customers." System Engineers clearly understand that their first priority is to support Operations and Maintenance. Also, the primary customer organizations receive support from System Engineering on a timely basis.

Besides the general expectations of supporting Operations and Maintenance and improving system performance, the System Engineers also spend considerable time completing miscellaneous action items such as MNCRs, QDRs, ERs, and CRs. Engineers also spend significant time supporting the modification process through reviews, evaluations, testing and other activities.

P&SE has a good system of monitoring action items and provides Engineers with information to help them manage their workload. Development of a process for resource loading for these tasks would aid in managing engineering resources.

A recent study monitored the time spent by the Engineering staff on various tasks. This indicates that P&SE Management is concerned with ensuring the appropriate deployment of Engineering resources to support priorities.

In response to this issue, Grand Gulf Management recently commenced aggressively pursuing a site priority list composed of priorities submitted by all organizations. The items on the Site Priority List will be judged and evaluated against each other to ensure that the problems or matters most important to safe, continuous plant operation are identified and addressed.

System Engineering Training

Background:

System Engineering is committed to providing a superior training program for System Engineers. This commitment emphasizes enhancing and developing the knowledge level of individual System Engineers. Initial training and qualification via the Engineering Support Personnel (ESP) training program is effective, but lacks additional, system specific training for the Engineers. Presently, System Engineers are attending system specific training during scheduled SRO-level advanced system classes. This training provides valuable insight into system operation from the SRO viewpoint and allows the System Engineer to view systems and components from an Operations' perspective.

Overview:

The ESP training program provides a comprehensive and detailed overview of power plant fundamentals and includes a basic systems course with simulator instruction. The majority of the System Engineering Staff is certified to the ESP program. Engineers also receive quarterly continuing training as required by the ESP program.

Several members of the System Engineering staff have also attended or completed a SRO Level Certification Program, reinforcing the staff's plant and component knowledge level.

System Engineering has developed and will be implementing a System Engineering Certification Program, designed to significantly enhance our overall training and certification programs. For example:

- Creating a method to certify a System Engineer as a "System Expert" by subjecting the candidate to a series of written and oral examinations to assess their knowledge level.

- Implementing a certification program for temporary personnel serving the department during outage periods through the "Shared Resources" concept.

ENGINEERING PERFORMANCE ANALYSIS

ENGINEERING SUPPORT

Strengths

Thermal Performance Monitoring Program

Major improvements made since the last SALP that have further strengthened the Grand Gulf thermal performance monitoring program considerably are:

Thermal Performance Improvement Group (TPIG) - A special group named TPIG consisting of representatives from various departments was formed in July 1993 with the objectives of prioritizing maintenance activities and design modification projects for improvement of the plant thermal performance and bringing important thermal performance issues to the management's attention. The group has met four times a year since its formation and duly performed its intended functions.

Electronic Data Transfer Trending - Hardware installation and software development have been made to allow electronic transfer of plant operating data, collected via the Plant Data System (PDS) either routinely or on demand, to the engineering PC network for inputting directly to the thermal performance evaluation program STEER (Station Thermal Efficiency Evaluation Routine). To supplement the current trending capability of the PDS which can readily access historical data up to about nine months earlier, new software has been developed to allow long-term trending of all snap-shot operating data routinely collected and stored for evaluation by STEER. This allows rapid and easy identification of plant parameter changes.

The above improvements resulted in the following:

- Cost-effective prioritization of thermal performance improvement activities.
- Timely execution of corrective actions to recover plant efficiency losses.
- Savings on time spent in carrying out thermal performance monitoring activities thus allowing more time for problem solving.

Ultrasonic Feedflow Measurement (LEFM) Monitoring System

A major strength of the Thermal Performance Monitoring process was the implementation of an Ultrasonic Feedflow Measurement Correction.

Long-term trending coupled with daily monitoring and evaluation are considered key ingredients for a strong Thermal Performance Monitoring Program. This is evidenced by the methodical investigation that determined approximately a 10 MWE

loss existed due to the measurement inaccuracy and associated fouling of the Feedwater Flow Venturis. Multiple data trends were required over long time periods to assess and justify corrective action for this loss.

A very aggressive schedule was implemented (~45 days), installing a Leading Edge Flow Measurement (LEFM) system to correct for the identified venturi error. LEFM systems have been installed in dozens of nuclear units around the world, and thus the system itself is not that uncommon. However, the Grand Gulf installation is unique due to the direct and continuous analog tie to the core power calculation, with continuous signal health and system monitoring. Continuous monitoring also offers the option to "turn off" the LEFM correction should signal quality or trend indicate a questionable condition.

With the capability to perform long-term comparisons of LEFM to venturi signals in the Plant Data System (PDS), it has become apparent to Grand Gulf that application of manual correction factors from an LEFM system without continuous monitoring must be done in a cautious and conservative fashion. Plant transients, such as rapid downpower or feedwater temperature swings may affect a previous error correction in a non-conservative direction. Grand Gulf implementation negates this concern as the system coefficients are updated continuously ensuring no "de-fouling" results in potential over power conditions.

On-Site/Off-Site Access to Plant Data

Plant engineering and Design Engineering at Grand Gulf have access via their desktop computers to the Plant Data System. This enables them to monitor plant parameters in real time as well as to evaluate plant system performance with historical trends. This can also be accomplished from off site during off hours.

During Cycle 8, Grand Gulf experienced an oscillation on several of the A recirculation pump parameters. Vibration levels and wear of the seals became a concern and every effort was made to minimize the effects on the system. Plant engineering closely monitored the parameters for changes during this period, especially during down power events when flow restrictions on the pump made these conditions worsen. A notebook computer was configured during this time so that the Plant Data System displays and trends could be used offsite. This allowed the engineers most familiar with these problems to evaluate the data and make timely decisions. Plant operations did not have to wait for someone to drive down and evaluate the data as the decisions could be made effectively from a remote location. This capability was made available to other engineers on their home computers and has been applied to other problems with great success. The Plant has better response and the decisions are being made by the appropriate engineering staff.

Mainsteam Safety Relief Valve Program

Grand Gulf is currently required to test Mainsteam Safety Relief Valves each outage in accordance with the applicable Code/Technical Specification requirements. Prior to RF08, Grand Gulf replaced all twenty relief valves with re-certified spares and shipped the twenty valves removed from the plant to an off-site testing facility for testing prior to start-up. The reason for this was to ensure that the requirement could be met without impacting outage duration. Even though only ten valves require testing each outage, an additional number would have to be tested if any failed. Due to an extremely tight acceptance criteria (1% of set pressure), some of the Grand Gulf valves would fail.

Removal of all twenty valves was time consuming and costly. Cost was due to the manpower it takes to remove the valves, the cost of re-certifying the removed valves, and the cost of the parts needed to replace the valves, specifically the costs of the replacement studs.

Another problem that existed relative to these valves was a requirement to actuate the valves during start-up. This potentially caused some of the valves to leak.

Prior to RF08, Grand Gulf submitted and was granted a licensing change that changed the acceptance criteria to 3% and the number of valves requiring testing each outage. This change enabled us to schedule testing/replacement of only six or eight valves per cycle. Additionally, Grand Gulf established an on-site nitrogen testing program which would enable us to test the required two additional valves for each failure without impacting outage duration. This prevented Grand Gulf from having to default to testing/replacing all twenty valves due to turnaround time involved in off-site testing.

During RF08, Grand Gulf implemented a design change to the valve bolting arrangement that enabled us to change the fastening devices to an arrangement called "super bolts". "Super bolts" provided stud tensioning by the use of eight jacking bolts per stud, thus eliminating the need to utilize stud tensioning machines. The "super bolts" have been utilized at Clinton Power Station and have proven to minimize the potential of having to cut studs. Grand Gulf took advantage of this industry knowledge.

During start-up following RF08, Grand Gulf did not actuate the valves. Instead, we requested and were granted a licensing change that allowed us to perform an uncoupled test of the actuator following the valve replacement. This test ensured that the actuator would perform it function, therefore, eliminating the need to actuate the valve at power, thus preventing lifting the disc off the seat and potentially causing the valve to leak. No plant in the United States has taken this approach to help eliminate leakage. The idea came from our sister plant in Switzerland.

Vibration Monitoring Program

The vibration monitoring program at Grand Gulf continues to lead the way for plant predictive maintenance. Most major equipment is permanently monitored providing both, a visual readout of vibration amplitudes and a control room audible alarm should vibration amplitudes exceed a preset value. Equipment vibration amplitudes are also input to the Plant Data System Computer (PDS) allowing process parameters to be trended along with vibration parameters to help identify causes of changing vibration levels and more easily evaluate equipment condition.

Along with the permanently monitored program, Grand Gulf also has a Portable Vibration Monitoring Program which tracks and trends vibration of other rotating equipment important to plant operation, as well as, providing a means of developing long term trends of the non-permanently monitored equipment.

Both programs compliment each other by providing the means to non-intrusively monitor equipment condition, identify and trend equipment problems before failure occurs, and schedule proper equipment maintenance by identifying the most likely causes of the equipment problem.

Technical/Process Enhancements

Repetitive Task Change Process

Grand Gulf has developed and delivered an on-line customer oriented repetitive task change process. Improvements in the process for changing repetitive tasks were identified by customers in maintenance and engineering. An on-line process to initiate, approve, and implement task changes was developed and implemented. This system will let anyone initiate a task change to add, change or delete a repetitive task. The system sends a e:mail notification to the required approvers to notify them that an on-line task change exists which requires their review and approval or rejection. For task changes, the reviewer may view the changes as well as the current task. All tasks are approved on a parallel path versus in series. The task coordinator monitors the changes and assists in any required resolutions. Status and progress are shown through reports generated on a bi-weekly basis which indicates backlogs and durations.

The average time to initiate, review, approve and implement a task change has greatly improved. This includes required maintenance, engineering, health physics, and operations reviews. All task changes have been addressed within 45 days. Accountability and ownership have improved.

Maintenance Rule Program

The Maintenance Rule program development has been a high priority at Grand Gulf since participation in the V&V of NUMARC 93-01 in 1992. Since that time, Grand Gulf has had consistent support along with use of good existing processes to become an industry leader in this program development. Grand Gulf was an industry leader, implementing the program two years prior to rule implementation date, July 10, 1996.

The Maintenance Rule Program at Grand Gulf has continually followed a "Check and Adjust" philosophy ensuring that self-assessment issues and evolving industry issues were addressed.

The individual response for the maintenance rule program has been involved since the beginning and has followed industry changes and set industry expectations. The approach at Grand Gulf utilizes a lead Maintenance Rule Coordinator who is responsible for administering the process including system evaluation and functional failure determinations. System Engineering concurrence is made on all maintenance preventable functional failure determinations. This approach ensures consistent and dedicated resources for evaluating system failures and classifications.

Reliability Centered Maintenance

The Reliability Centered Maintenance Program (RCM) was completed in 1996. Grand Gulf's strength in performing and implementing recommendations for 69 systems from 1991 to 1996 included strong engineering and maintenance involvement, management support, and automatic implementation when the analysis was approved. The project was completed prior to the maintenance rule going into effect. The Reliability Centered Maintenance Project at Grand Gulf provided a thorough assessment of the plant's maintenance program.

Grand Gulf's RCM program has analyzed all trip critical and trip sensitive systems. The RCM process was modified early in 1993 to utilize P&SE's system engineers to perform the most detailed portion of the analysis of component failure modes and effects to gain their knowledge and experience with the system and expedite analysis and review. Other process improvements applied are the Instrument Matrix, which standardizes and expedites review and maintenance of instrumentation, and the use of the fault trees from the IPE Probabilistic Risk Assessment. These improvements have improved the quality and expedited completion of RCM analysis. The Implementation status of analysis recommendations is 99% complete.

The RCM project has produced two results. The basic mission of organizing the system's maintenance program, improving reliability and documenting the

maintenance program is the first result. Trending indicates that across the majority of the systems analyzed, corrective maintenance has decreased. For systems analyzed, RCM has reduced PM maintenance, improved corrective maintenance trends, and aided in delivering high reliability and availability in plant systems as measured by the maintenance rule program. To clearly depict the positive impact on the corrective maintenance at Grand Gulf, the systems with completed RCM analysis were aligned with their completion dates. The before and after RCM analysis shows a clear decrease in corrective maintenance. The second result of the project is cost reduction, estimated annual PM cost reduction for the systems analyzed is $391,485

Optimization of Inspection and Testing Requirements

Grand Gulf continuously pursues actions to optimize inspection and testing requirements to eliminate ineffective requirements, thus allowing resources to be utilized implementing new requirements and other growing areas of concern. The optimization of requirements inherently leads to a reduction of total inspections and tests performed on systems. This reduction decreases system down time and allows resources to be spent on inspections and tests in areas of high risk and on components with bad performance, resulting in a reduction of the overall risk of operating the plant.

Grand Gulf continuously reviews program requirements, performs self assessments and is actively involved in outside industry groups, such as, ASME Section XI Committees, O&M Code Committees, NIC, BWROGs, NEI Working Groups, etc. This involvement optimizes inspection and testing requirements for Grand Gulf and the industry by evaluating current requirements, past history, and current failures and pursuing the appropriate changes through Rule and Code changes. The following provides examples of changes made or changes being pursued to optimize the inspection and testing programs:

- ASME Section XI Code Cases N-498-1 and N-416 to alternatively perform Class 1, 2 and 3 ten year hydrostatic pressure testing and repair/replacement hydrostatic pressure testing at nominal operating pressure

- Performance Based Appendix J Exemption and Rule change which allows testing of components based on their performance at 2, 5 and 10 year intervals

- Evaluation of balance of plant reliefs and assigned testing intervals based on valve function and performance history

- Risk based Motor Operated Valve Testing Program which assigned periodic testing frequencies for MOV's based on the risk significance of the component

- Development of Air Operated Valve testing program

- Pursuing the development of a Risk Based ISI/IST inspection program

Initiatives

AOV Program

Proactive approach was undertaken to review, evaluate and take appropriate actions to improve the long-term performance of important air operated valves (AOV). Based on industry surveys, this program is one of only several of its kind in the U.S.

Aggressive actions have been instituted to review all aspects of AOV performance. Utilizing "lessons learned" and knowledge gained from the site MOV program, the lead engineer has proceduralized program specifics, developed risk based scoping methodology, developed detailed maintenance instructions patterned after EPRI-NMAC procedures for MOVs, procured diagnostic test equipment, initiated plans patterned after EPRI-NMAC procedures for MOVs, procured diagnostic test equipment, initiated plans for hardware upgrade in upcoming outages. Additionally, several engineering evaluations are on-going with design engineering. Other processes that are considered to establish appropriate AOV work priorities are Reliability Centered Maintenance program, NPRDS failure reporting system, site PRA, site maintenance data bases, and recently instituted trip critical/sensitive concepts. PRA results were obtained by requesting a review of the Level 1 and 2 PRA for implicitly and explicitly modeled AOVs. Grand Gulf has completed conducting full program efforts (design reviews, enhanced maintenance, diagnostic testing) on the high and medium worth PRA AOVs thereby emphasizing risk significance. Each reviewed AOV has been ranked using a weighing system considering: risk significance and the safety assembly's physical environment. Use of the ranking system ensures optimum allocation of resources by concentrating on the plants most important AOVs. Benefits:

- Improved definition of all AOV design, operating and performance specifications though the review of vendor supplied records. Data obtained will be used to improve the Component Data Base of the System Information Management System.

- Facilitate recognition of AOV problems and their causes. AOV Program engineer provides for in-depth focus on AOVs. Many problems have been masked in the past because no central body took ownership.

- Improve maintenance through consistency via the use of detailed maintenance instructions.

- Increase electrical generation by solving problems on steam cycle dumps, drains and bypasses.

- Optimize resources by emphasizing those assemblies that are of the most importance. This is accomplished by applying a ranking system which highlights the bad performers and employs risk significance concepts (PRA).

- Highlight root cause determinations through the use of diagnostics. Diagnostics will also allow measurement of the effectiveness of maintenance actions.

ENGINEERING PERFORMANCE ANALYSIS

REACTOR ENGINEERING

Strengths

Core Management

Conservative core management and in-house pattern development has resulted in zero thermal limit violations and only one minor preconditioning overpower during the past two years. Adherence to the thermal limits prevents serious damage to the fuel in the event of a design basis accident or transient. Preconditioning limits are an administrative means of preventing fuel failure during normal power maneuvers.

- None of the minor fuel leaks at Grand Gulf, including the one just removed in RFO8, have been attributed to thermal limit violations or PCI overpowers.
- No fuel operating penalties have resulted from excessive overpowers.
- No Technical Specification action statements have been entered due to thermal limits violations.
- Although not required by the vendor, Grand Gulf is applying conservative preconditioning limits to the GE11 fuel due to ongoing industry problems with fuel reliability.
- Major downpowers are carefully planned and implemented to minimize any chance thermal limits violations.

New Fuel Receipt

The coordination and control of the new fuel receipt and inspection (performed 8/21/96 - 8/29/96) for Cycle 9 fuel was outstanding. Receipt and full inspection of all 272 new fuel bundles was performed in less time (8 days) than ever before with no errors or incidents, despite the fact that a new fuel vendor was involved.

- Processes for safe and more efficient handling of the fuel were improved while there were no corners cut in the inspection process.
- No fuel handling incidents occurred.
- Reactor Engineering has overall responsibility for this process which has evolved into a consistent approach using a stable team of workers, all of whom participate in process improvement from year to year. This team received an award as Entergy Peak Performers for 1996.

Process Ownership

Fuel Shuffle

Direct participation by reactor engineers (RE) during fuel movement is a strength. This practice gives the reactor engineers process ownership of the fuel shuffle and provides an extra verification of the fuel movement.

- REs can also make certain types of pre-approved changes to the movement plan on the spot to address minor changes needed to expedite the shuffle.

- An RE supervising fuel moves also allows the SRO on the fuel bridge to maintain an oversight function of the shuffle and other plant evolutions that could affect or be affected by fuel movement operations.

- Improvements to the format of the fuel movement sheets suggested in the critique of RFO6 and RFO7 made them easier to understand.. Immediately following the fuel shuffle and before startup, the movement supervisors meet to discuss and analyze the fuel movement program used at Grand Gulf.

- Representatives from Reactor Engineering also meet with the contract fuel movers before they depart to discuss the program and compare what they think are strengths and weaknesses. The shuffle is reviewed while it is still fresh in everyone's mind. Reactor Engineering forwarded the critique to Outage Scheduling for formal documentation.

Improvement Needed

Following completion of RFO8 fuel shuffle, a core verification was performed. This revealed that two new fuel assemblies had been inadvertently placed in exchanged positions in the same core control cell. These assemblies were of the exact same type so that no nuclear subcriticality concern existed. The assemblies were promptly moved to their proper locations and an investigation initiated. While it can be considered a strength that the in-depth verification process caught the problem, this is not an acceptable occurrence. A Root Cause determination revealed that the problem was a result of changes forced on the original movement plan by equipment problems. The expected method of dealing with these changes had not been sufficiently communicated to shared resource personnel involved, resulting in an error in the input to the fuel shuffle program. Procedure changes requiring better control and verification are planned. Other minor problems with the use of shared resource personnel on the refuel bridge pointed out that more training in Grand Gulf processes and expectations are necessary.

LPRM Calibration

LPRM calibration is an important, albeit routine, procedure supervised by Reactor Engineering.

- Experience is a very important factor in ensuring no mistakes are made. Wholesale mistakes could jeopardize the accuracy of the process computer thermal limits calculations leading to possible TS or PCIOMR violations.

- Close communication between an experienced RE and I&C Tech during this somewhat tedious process is crucial to avoid mistakes. This process is normally completed in minimal time with no mistakes due to personnel being knowledgeable and thorough.

New Core Monitoring System Installation

At Grand Gulf, Reactor Engineering is directly responsible for the maintenance of the core monitoring computer system. This gives the Reactor Engineers a direct involvement with problem resolution. For Cycle 9, a completely new system was successfully installed, tested, and placed in operation as a result of a new reload fuel agreement with General Electric. This was an extremely complex evolution requiring dedicated resources from Reactor Engineering (with assistance from Computer Services Engineering) to accomplish.

- Reactor Engineering worked with GE to ensure that the system was designed and tested in accordance with Grand Gulf' unique needs. An in-house test program was conducted during the latter part of Cycle 8 to verify correct operation.

- Reactor Engineering converted computer programs used by the plant operators to the new platform so that the transition was virtually transparent to them. This included the CYCLOPS monitoring system, which is somewhat unique in the industry, to assist the RE and STA in continuous monitoring activities.

- Reactor Engineers were trained in the use of the new system, allowing quick response to problems. This also gives Reactor Engineering the ability to develop software tools specific to Reactor Engineering's and Operations' needs.

- Off-line core monitoring capability exists if it is needed.

- A special portion of the project required development of separate software by the RE section to continue monitoring of remaining Siemens fuel for preconditioning requirements.

- The RE section worked closely with the Training Department to ensure that shift STAs were trained in the new system's use.

Fuel Reliability

Reactor Engineering is committed to ensuring that Grand Gulf maintains high fuel reliability per the corporate goal of zero defects. The root cause analysis of Grand Gulf's previous fuel failure was proactively promoted, coordinated, and supported to determine its failure mechanism. A known leaker identified early in Cycle 8 was successfully located and discharged in RFO8. Reactor Engineering aggressively took control of the program to ensure the leaker did not impact plant operation during Cycle 8 and was removed prior to Cycle 9 restart.

- The suspect fuel cell was located by flux tilt testing. Several such tests were done to obtain confirmation of results. The number of leaker pins, size of the leak, age of the fuel assemblies, and probable cause (debris fretting) were identified via close coordination with the Chemistry Dept. and corporate Nuclear Fuels experts. The fuel vendor's analysis and recommendations were also obtained.

- Plans were made to ensure that the leaker assembly was discharged during RFO8. Confidence was high in the RE analysis so no fuel sipping was performed.

- A detailed monitoring program was put in place to ensure any sign of degradation was promptly detected.

- The suspect assemblies were examined visually, with no signs of abnormal degradation indicating the need for further in depth examination. Cycle 9 operation to date indicates the core is defect free.

Technical/Process Enhancements

Reactor Engineering Peer Group

Reactor Engineering is an active participant in the Entergy Operations Reactor Engineering Peer Group. This group encourages:

- Communications and cooperation between plants in the system. Sharing of events at each site related to Reactor Engineering. This includes common issues to all plants (e.g., Boraflex testing, corporate reactivity management policy, role of the Reactor Engineer at Entergy, INPO concerns, NRC issues, and organizational problems)

- BWR issues shared with River Bend (e.g., possible use of the in-core sipping system purchased by RBS, joint training, consolidation of procedures, and possible shared resources during outages).

- The Peer Group issued a corporate Reactivity Management procedure in 1996 and is taking the lead in resolving INPO SOER 96-02 within Entergy.

Core Performance Trending

Reactor Engineering trends key reactor operating parameters such as core monitoring code Keff, load line, core flow, and thermal limits. Adverse or unexpected trends are identified early and addressed as required.

- Trends are posted for all personnel to review. Near immediate response to operational concerns is provided to plant operating staff without the delays necessary if such reviews were generated offsite.

- Potential problems are detected, addressed, and corrected before they escalate into major problems that compromise fuel integrity or station availability. For example, in August 1995, a disparity in calculated reactivity lead to discovery of a problem with feedwater flow indication.

Reactivity Event Tracking

Reactor Engineering separately tracks plant events and near misses associated with reactivity management. These events are classified according to severity and a system is used to ensure that various types of events or unacceptable trends are brought to management's attention promptly.

Initiatives

Control Blade Replacement

Reactor Engineering is responsible for making arrangements for replacement of control rods in the reactor core as they reach end of life. This is a large project involving many facets.

- Blade lifetime is estimated using predictive computer codes. Blades nearing end of life are then scheduled for replacement. New control blades originally procured for Unit 2 are being used. RE must first arrange for these to be refurbished by General Electric to replace the stellite pins and rollers.

- RE worked closely with outage management and System Engineering to schedule and coordinate blade replacement during RFO8 with control rod drive changeout and fuel shuffle.

- The first 8 blades were successfully replaced during RF08 without mishap even though this was the first such evolution. Approximately 70 blades will be replaced in the next two outages.

- Grand Gulf tritium effluent amounts, currently among the highest in the country, are expected to begin to decrease significantly after the next outage.

- A major effort to clean up portions of the spent fuel pool to allow access to all blade storage locations is planned for 1997 to be directed by RE. Preparations will also be made to ship pool waste and the initial 8 blades to a radwaste facility.

Area for Improvement

Reactivity Management Program Enhancement

The Grand Gulf Reactivity Management Program is currently contained in a general Management Standard document. Reactor Engineering plans to prepare a site procedure detailing the features and control of the Reactivity Management Program in 1997. Items to be addressed include interface with Operations, work control, and control of heat balance inputs. One item already accomplished is the inclusion of screening in the design change process to ensure reactivity management items are addressed. Also, significant training of engineering and maintenance personnel was conducted in 1995 and 1996 regarding reactivity management.

Management Oversight

Reactor Engineering Coverage

At Grand Gulf, Reactor Engineering provides coverage for all planned, significant reactivity manipulations that are not routine. (Routine maneuvers include weekly control rod exercises and power maneuvers with flow only.) This ensures that knowledgeable members of the plant staff are in the Control Room to give immediate guidance and recommendations and to respond to challenges concerning reactivity manipulations.

- No short period scrams have occurred due to reaching criticality too quickly.

- All major power maneuvers are planned and evaluated using computer predictions beforehand.

- A Reactor Engineer is always on-call and can monitor core operation from off-site via modem, if necessary.

Safety Culture

Transition to GE Fuel

The change to a new fuel vendor involved many offsite groups; however, Reactor Engineering had primary responsibility for ensuring that the mixed core was operating as predicted.

- RE provided input into the detailed safety evaluation for the reload.
- RE performed numerous procedure changes to ensure that the differences in operational requirements were captured.
- A new core monitoring system was installed.
- A thorough startup test program was conducted. To date no anomalies or safety issues have been identified. Core operation is as predicted within the uncertainties of the methods involved. Core reactivity was slightly less than expected, but the difference was far below any levels of concern regarding safety or licensing basis.

ENGINEERING PERFORMANCE ANALYSIS

DESIGN ENGINEERING

Strengths

Flow Accelerated Corrosion Program

Grand Gulf is committed to a long-term program to maintain the integrity of single phase and two phase carbon steel and low alloy steel, high energy piping systems against degradation by FAC. Program plan document GGNS-MS-41 is the central focus for all Erosion/Corrosion activities at Grand Gulf. This Program plan details the requirements of the FAC inspection program, including program responsibilities, component selection, program expansion criteria, inspection requirements and ensures that adequate consideration is given to mitigate pipe wall loss due to FAC. The long-term strategy of FAC monitoring program is to focus inspections on the most highly susceptible locations and to concentrate on reducing FAC wear rates, number of inspections, and probability of failure. This program is applicable to both safety related and non-safety related systems.

The FAC program consists of several elements to ensure that components susceptible to FAC are identified and properly evaluated for wall thinning. At Grand Gulf, the FAC program is handled in Design Engineering by the piping group. As a result, the individual involved in key tasks is aware of piping stress analysis, thermosciences (e.g., fluid flow, heat transfer, thermodynamics), has knowledge and experience in plant systems, industry experience, trained in FAC, and received training supported by CHUG and provided by EPRI. NPE's participation in the peer group provides a cost-effective unified approach to enhance program effectiveness, coordinate implementation of new technologies, and evaluate industry and individual plant experience. The following elements are the type of evaluations performed.

- Administrative Procedure NPEAP 903 - Ensures that FAC and other corrosion mechanisms such as cavitation, flashing, and Microbiologically Influenced Corrosion (MIC) damages are considered in all modifications to plant systems.

- System Susceptibility Analysis - Identify systems or portion of systems most susceptible to wall thinning.

- Thermal Performance. P&SE - The Thermal Performance Monitoring Program includes a large number of thermocouples to monitor for valve and steam trap leak-by. This information is provided to the FAC coordinator on a periodic basis for evaluation of potential changes needed under the FAC Program.

- Formal Communication With Other Departments - FAC coordinator conducts periodic meetings with on shift SRO's to compare actual plant operations with as designed conditions. Chemistry, Maintenance, Operations, P&SE, and PM&C departments are review and concur with FAC program.

The FAC program has been successful in maintaining Grand Gulf free of major component failures. Pro-active steps in identifying and preventing future problems has resulted in replacement of 1256 feet of small-bore piping and 28 feet of large-bore Piping in RFO7 and RFO8.

ECCS Suction Strainers

In response to NRC Bulletin, Grand Gulf, in conjunction with Perry Nuclear Station and River Bend Station, contracted an independent contractor to develop and test a conceptual strainer design for the BWR 6 plants. The basis for this design was to utilize existing BWROG information to develop a low approach velocity strainer which would minimize the dependence on NRC approval of BWROG submittals. This strainer would be required to fully meet the intent of NRC Bulletin 96-03.

The current focus of the GGNS Perry suction strainer team is the development of a large low approach velocity strainer. This development has utilized and will continue, to the maximum extent possible, to utilize data and information obtained by the BWROG. Both sites involved with this project are currently and will remain active members of the BWROG.

The low approach velocity strainer (i.e., ring header design) currently being pursued is based on data gathered during previous BWROG strainer tests. The proposed design for this strainer involves use of a large passive strainer that incorporates a low approach velocity for the flow stream to the strainer. The need for the low approach velocity stems from the desire to minimize compaction of the debris mixture on the strainer surface which will allow flow to continue to pass through the debris to the strainer.

Based on BWROG testing, the approach velocity has been determined to be a function of the circumscribed area of strainer and not the total surface area of the strainer. A low volume large surface area (stacked-disk style) strainer that would provide the required low approach velocity was considered. This type of strainer design may feature equivalent total surface area compared to other passive designs; however, the circumscribed surface area is low and the resultant approach velocity would be significantly higher, as would be ability to attract and retain debris. The strainer head loss consequences of long term suction, suppression pool pH increases, and effects of other LOCA generated debris would be amplified at higher strainer approach velocities, as attested to by BWROG strainer testing. Therefore, closure of the NRC bulletin using this strainer is highly dependent on the successful resolution of the open BWROG issues such as the calculated zone of destruction,

debris transportation and the utility resolution guidance document. These factors detract from the compact strainer geometry concept as a final solution to this issue.

The ring header design utilizes a large circumscribed area which will maintain acceptable NPSH even with the postulated debris loadings. Therefore the acceptability of this strainer, to the maximum extent possible, is independent of most of the open issues within the BWROG. The current approach is believed to be the best technical approach to close the NRC bulletin after installation in RF08.

SRV Low-Low Set Modification

On June 6, at 11:26 a.m., Grand Gulf was manually scrammed based on increasing suppression pool temperatures. It was noted that six Safety Relief Valves (S/RV) were open. These S/RVs were identified as the low-low set valves: Based on the Sequence of Events (SOE) Log from the Plant Data System (PDS), all twenty S/RVs received a signal to open. After a short duration of time of approximately 200 ms, the open signal was removed from the fourteen non low-low set SRVs. The low-low set S/RVs remained open until after the manual scram was inserted. The duration of time which the low-low set S/RVs remained open was between 2.5 to 3 minutes.

The automatic safety/relief system consists of redundant reactor pressure instrument channels arranged in separate trip systems that control separate solenoid-operated air pilots on each valve. The S/RVs are initiated by reactor vessel pressure and are divided into three pressure groups.

The cause for the transient was determined to be the failure of a capacitor in a trip unit which monitors first stage turbine pressure and is not functionally related to the trip units that provide S/RV or low-low set relief logic input. The failure of this capacitor created a short circuit which resulted in the opening of fuse 1E12-F38 as desired. The effects of this short circuit (i.e. power supply variation), resulted in the initiation of the S/RV trip logic. Laboratory simulation indicated this disturbance influenced the S/RV trip units via response of the transmitters to the voltage fluctuation. It was determined that the use of a separate supply per channel would eliminate the response of both transmitters to a single power supply fault.

The existing power supply combinations were replaced with two 125 VDC/24 VDC power supplies per panel and were given the same equipment designations as the existing inverters and power supplies.

The replacement of the existing power source combinations was performed to provide a separate power source for each channel of Rosemount trip units which performs the initiation logic. This separation resulted in other Rosemount trip units being rearranged within panels 1H13-P618 and 1H13-P629. This rearrangement resulted in each trip channel of the S/RV trip logic housed in a separate Rosemount trip unit card file. These card files were then each powered from a separate power supply. The rearrangement of the S/RV trip units

also required the relocation of trip units associated with other systems. These systems are ADS (B21), Leak Detection System (E31), and RCIC (E51).

The rearrangement of the trip units and the provision for separate power sources also required modification of the supervisory circuits associated with the systems affected (i.e. card out of file, loss of power, trip unit in calibration, trip unit signal gross failure, and system out of service). The systems that were affected were ADS (B21), RHR (E12), LPCS (E21), Leak Detection (E31) and RCIC (E51).

Feedwater Digital Control Modification

Grand Gulf has taken a proactive approach to ensuring the reliability and operability of the condensate / feedwater delivery system by upgrading various interfacing control systems with digital technology.

The Condensate / Feedwater Upgrade initiative was composed of three major phases:

- Digital upgrade of the Reactor Feedpump Turbine electro-hydraulic control system
- Digital upgrade and integration of various condensate single loop controllers
- Digital upgrade of the Reactor Feedwater Control system

Each of these systems was placed in service without a plant scram or transient, and without impact to their respective outage schedules.

Team work was key to the successful design and implementation of these large and complex modifications. The Condensate / Feedwater Task force, formed to address scram frequency reduction concerns, provided a forum for inter-departmental focus and input for the design and implementation of each phase of the project. This task force was composed of members from Design Engineering, I&C Maintenance, Plant Modifications and Construction, Operations, System Engineering and Training. Each department exhibited a clear sense of ownership in the final product.

Extensive site acceptance testing was another factor in Grand Gulf's success. Personnel from Design Engineering, I&C Maintenance and System Engineering identified numerous plant specific software enhancements during this phase of development of each new system. The extensive site acceptance test programs identified potential 'infant mortality' problems with some components which were resolved prior to installation. During the development and pre-operational testing of the Reactor Feedwater Control system, Plant Maintenance and Construction fabricated a mock-up of the control room panel which would house the new system. This mock-up was used to essentially eliminate construction interferences and allowed pre-fabrication to be maximized. The extended site acceptance test periods also allowed the Technical Special Test Instructions (startup tests) to be developed and fine tuned to facilitate startup testing and minimize outage impact.

Implementation practices were also very important to the successful installation of the new systems. Plant Modifications and Operations worked to identify and implement pre-outage scope to minimize outage impact. Plant Modifications dedicated both field engineering and craft personnel to each phase of the project to facilitate shift turnover and promote ownership in the modification. Design Engineering, I&C Maintenance and System Engineering worked to consolidate minor software changes to limit the number of Change Notices issued and processed.

Training ensured that the impact of the new equipment to plant personnel was minimized. Grand Gulf Training, working with Task Force members involved in the detailed system designs, ensured simulator fidelity was maintained and operator training was provided well in advance of plant startup following each upgrade. Specialized operator training was provided on potential problems that might occur during startup testing.

The Condensate / Feedwater Digital Upgrades at Grand Gulf provide a highly fault tolerant feedwater delivery system. The new digital systems will facilitate future design changes and operational enhancements due to the relative ease of modifying the control software as compared to modifying analog-type control systems. By employing user-configurable multi-function processors supplied by a common manufacturer, Grand Gulf will be able maintain each of the new systems with low warehouse spares inventory.

Scram Frequency Reduction

The Scram Frequency Reduction Committee's (SFRC) primary purpose is to address scram reduction recommendations for near miss or potential scrams and to monitor corrective actions from existing scrams. The committee consists of representatives from Plant and Design Engineering, Maintenance, Operations, Outage Management and Work Control, Nuclear Safety and Regulatory Affairs (NS&RA), and Quality Programs.

The committee meets a minimum of four times a year to discuss existing items, near misses, and potential scrams. Outstanding open issues are prioritized on a top ten list. A site wide "Scram Saver" initiative was implemented in 1996. Seventeen scram saver suggestions have been submitted with four accepted for implementation by the committee.

Pressure Locking/Thermal Binding of Power Operated Gate Valves

Generic Letter 95-07 requested that all power-operated safety-related gate valves be evaluated for pressure locking and thermal binding. Grand Gulf evaluated 82 power-operated safety-related gate valves with a safety function to open. The evaluation encompassed all system modes of operation within the plant's design

basis. The evaluations were conducted by reviewing our operating and emergency operating procedures, system design basis documents, piping and instrumentation drawings and surveillance testing procedures. Each valve was categorized under hydraulic locking or thermal binding as either not susceptible or susceptible. A total of 18 valves were identified as potentially susceptible to binding or locking. These valves have either been modified, are being modified or are being administratively controlled to avoid pressure locking and thermal binding.

Safe handling of Loose Items Inside the Plant

Criteria has been developed to identify and prevent the storage of loose items in the plant in a configuration that could create a Seismic II/I hazard. The criteria was developed by design engineering and issued in Standard GGNS-CS-017, Rev. 2, titled "Grand Gulf Nuclear Station Civil Standard Criteria for Prevention of Potentially Hazardous Seismic II/I Situations Due to Loose Items". Plant Staff developed Administrative Procedure 01-S-07-43, Rev. 1 titled "Safe Handling of Loose Items Inside the Plant" which implements the criteria identified in Standard GGNS-CS-017.

Reactor Vessel Internals Management Program

A Vessel Internals Management Program was established in 1995. This continuing program was instituted to consolidate all the non-ASME Section XI inspection criteria for Reactor Pressure Vessel Internals into a single document. This program includes inspection requirements resulting from the industry experience documented in General Electric technical information, Institute of Nuclear Power Operations Significant Event Notices, NRC Information Notices, Bulletins, Generic Letters and BWR Vessel Internals Project recommendations. Inclusion of all these requirements into a single document assists in ensuring that a focused approach to the integrity of reactor internals is maintained.

Thermo-Lag Issue Resolution

Thermo-Lag materials are used at Grand Gulf to provide fire barriers for compliance with 10CFR50 Appendix R requirements. An extensive reevaluation of the use of this material has been completed. Plant modifications and corrective actions necessary to address all concerns associated with the use of Thermo-Lag fire barrier materials were completed during RF08 in the fall of 1996.

Design Engineering Personnel SRO Training

In an effort to provide additional plant operational knowledge, engineers, supervisors and managers in the Design Engineering organization have attended a Grand Gulf Senior Reactor Operators Management Certification course. Presently, ten management personnel have attended the course or previously held a SRO license including the Director of Design Engineering. In addition, seven other

engineers from the Design engineering organization have attended either this or a General Electric certification course. This has led to an increased understanding of plant operations within the Design Engineering organization.

Design Engineering Professional Engineers

Grand Gulf management actively encourages personnel within the organization to obtain advanced degrees and professional registration in their area of expertise. Presently, there are 39 engineers and supervisory personnel within the Design Engineering organization that are registered as professional engineers.

Shutdown Risk Evaluations

Grand Gulf currently uses the ORAM software to provide risk guidance for refueling outage scheduling and evaluation. For RF08, the ORAM model was improved to better evaluate and handle the risk of RPV draindown events, thus providing better insights into outage risk profiles. These insights led to a better understanding of risks during RHR realignment evolutions that helped Grand Gulf achieve the goal of no shutdown cooling losses during RF08.

Efforts are also underway to develop a more rigorous and detailed shutdown risk model. This new model uses the same software [the EPRI EOOS (Equipment Out Of Service) software] as used in the at-power risk monitor. It is intended that this software and model will be used for future refueling outages after satisfactorily completing the following:

- Demonstrating the benefits of moving to more risk rigorous models,
- Revising relevant outage procedures for risk guidance, and
- Preparing and providing training on the new software and model to refueling outage schedulers.

Use of these quantitative shutdown risk analysis tools enable Grand Gulf to conduct refueling outages in a safe and effective manner.

Resource Sharing

In 1996 a decision was made to adopt a mind-set of operating the Entergy nuclear organization as if it consisted of one central nuclear station with five units. Central to the success of that approach was the ability to share resources among the five Entergy nuclear units. As a result of this approach, in 1996 more than 750 Nuclear employees worked outside their areas at their own plants, or they traveled to other Entergy plants to support the refueling outages at Grand Gulf, Arkansas Nuclear One and River Bend. Each refueling outage was completed in record time for that plant. Entergy benefited from the quantity and quality of the work performed, and the employees benefited by acquiring new skills, sharing best practices with their peers at other plants, and bringing the best practices back to their home plants.

Approximately twenty (20) Grand Gulf Design Engineering personnel participated in Resource Sharing in 1996.

Process Improvements

Welding Program Improvement

Grand Gulf implemented the Central Welding Program by revising GGNS-M-183.1 to incorporate Design Engineering Administrative Manual (DEAM) Appendix 2. DEAM Appendix 2 is the consolidated program for Welding, Heat Treatment and Nondestructive Examination.

DEAM Appendix 2 was created for use as the common document between all 4 EOI sites. DEAM Appendix 2 is controlled and maintained by Central Design Engineering. Input from all 4 EOI sites into DEAM Appendix 2 is accomplished through Site Design Engineering Peer and Task Groups.

The implementation of DEAM Appendix 2 allows all 4 EOI sites to use the same Welding Procedure Specifications, Standards, Welders, and associated requirements.

Minor Modification Team

Design Engineering established a 'Modifications' Team dedicated to the development of Engineering Request (ER) responses to effect minor plant modifications, which although small in scope, have day to day impact on safe and efficient plant operations.

Through Total Quality efforts, it was determined that Design Engineering customers were not satisfied with the turnaround time for smaller scope design modification packages. This was primarily due to the fact that designs relating to smaller maintenance and operations issues were competing with larger scale projects for Design Engineering resources. It was recognized that it was counterproductive to continuously divert attention from these larger projects to work on smaller scope designs. Additionally, due to the Design Engineering discipline oriented structure, numerous hand-offs were often required to work these smaller scope designs, further complicating the ability to effectively schedule and complete design work.

The Modifications Team reports to the Director, Design Engineering through the Manager, Electrical/I&C and prioritization of ER work activities are directed by the Managers within the Design Engineering organization. The team's objective is to prepare timely, cost effective and quality ER responses by utilizing a cross disciplined team approach to development of a response. Design Engineering is focusing primary responsibility of these minor plant modifications on this team to maintain effective communications between plant organizations and eliminate hand-

offs previously recognized as inefficient. Examples of targeted minor plant modifications for this effort are Operation Work Around Items, Emergent Nonconformance Items, Procurement related issues, Scram Frequency Reduction Items and Maintenance Priority Items.

The benefits from the establishment of this team include increased Operations and Maintenance support, reduced cycle time for ER responses, reduced priority conflict between scheduled and emergent work, and the provision of cross training for engineers.

Engineering Request Process

The ER Process implemented by Engineering provides a means for initiating and responding to formal requests for engineering services in support of plant operation. The ER process provides a single process governing preparation, review, approval and processing of requests for engineering services including requests for changes to plant structures, systems or components. The ER process provides the mechanism to:

- Initiate a request for engineering services.
- Suggest a solution which satisfies the request.
- Develop the supporting documentation package appropriate for the response type.
- Record the required reviews and approvals for the response.

The ER process provides screening criteria for selecting the appropriate level of technical response and associated review and approval for any Engineering Request - a large, complex, safety significant change, a non-safety related change, or an editorial documentation change with no impact on safety. A graded response development approach is utilized with the following response types:

- Engineering Reply
- Administrative Change
- Engineering Evaluation
- Commercial Change
- Nuclear Change

This process replaced several different procedures used to document changes to the plant.

The process implemented by Grand Gulf is based on the Entergy Operations Design Engineering Administrative Manual Guide ES-G-002-00 which was developed by a Design Engineering Peer Group. The guide incorporates input from EPRI guidelines for optimization of the Engineering Change Process and process improvements at other utilities which were benchmarked. Engineering screening criteria provide for a disciplined and consistent approach for determining the interfaces associated with a

change and in identifying applicable design inputs or other pertinent discipline design considerations, and critical characteristics for design.

The basis for the new process is to increase focus on Plant Safety and Performance by optimizing the use of engineering resources, improve human performance in the engineering change process, reduce costs while maintaining high safety standards, and to standardize engineering processes.

Design Review Committee

In the spring of 1995, Design Engineering issued a Design Review Committee Charter in an effort to improve the quality of design changes. The review of design changes occur after a proposed plant design change has been verified but prior to the design being issued for construction. A Design Review Committee is composed of senior level engineers from each of the engineering disciplines. Invitations are extended to other departments that are affected by the design, such as, Operations, Performance and System Engineering and Maintenance. The engineer responsible for the design change and his manager conduct the meeting with the intent of the participants providing a review focusing on:

- Safety significance
- Understanding and addressing common mode failures
- Potential adverse system interactions
- Operational/procedural Interface
- Testing
- Integrated design basis consideration
- Critical characteristics
- Risks associated with design change implementation

Design Change Kickoff Meeting

In June 1994, Design Engineering instituted a program to conduct design kickoff meetings and provided guidelines for conducting these meetings. These kickoff meetings are conducted to improve the quality of designs issued. Kickoff meeting announcements are issued to Plant Modifications & Construction, Performance & System Engineering, Operations, Maintenance, Materials, Daily Planning & Scheduling, Training, etc. Kickoff meetings provide an opportunity for all departments affected by proposed design changes to provide input during the initial stages of development of the design. These meetings also provide a method of communicating proposed design changes to all departments and to identify potential impact on other departments procedures, such as, System Operating Instructions, Preventative Maintenance Procedures, and Training Courses.

Initiatives

PRA Certification

Grand Gulf is currently participating in a BWROG effort to certify plant PRAs. The purpose of PRA certification is to demonstrate the quality of industry PRAs using a formal and uniform review method. It will result in a tool with controlled quality acceptable for regulatory and other applications. Grand Gulf is a member of the BWROG committee conducting this effort.

At-Power Implementation of the Risk Monitor

Grand Gulf uses its probabilistic risk assessment (PRA) model to evaluate configuration-specific plant risk levels. This "risk monitor":

- Uses a quick quantifying PRA model
- Uses the EPRI EOOS (Equipment Out Of Service) software
- Allows users to get a quick risk perspective of equipment out of service
- Provides a risk indicator (Plant Safety Index, or PSI) in about 5 to 15 minutes for a particular plant configuration.

The risk monitor is being used in the daily scheduling activities to provide an awareness of plant risk levels to schedulers and operators and to assist in enhanced decision making with regard to scheduling options. Efforts are currently underway to update the risk monitor models and prepare training on its formal use in the Operations department.

In summary, the Grand Gulf at-power risk monitor:

- Provides greater awareness of plant risk levels
- Facilitates optimization of plant safety and resource utilization.

Self-Assessments

Self Assessments were performed in the following areas:

- Engineering Request (ER) process
- Microbiologically Induced Corrosion (MIC) program
- Post Modification Configuration Management
- Customer satisfaction with Design Modification process

Several recommendations from these self-assessments will be implemented during the upcoming year. These improvement initiatives are described under the Areas of Improvement section.

Technical Information Enhancements

Turbine Issue List

Design Engineering in conjunction with System Engineering, Mechanical Maintenance and Siemens Power Corporation has developed an open turbine issues list. The list was developed using the Process Failure Mode Effect Analysis method. This method ranks a problem based on 1) the severity of consequences if the problem is not resolved, 2) the likelihood that the problem will occur and 3) the ability to detect the problem. A cost factor is then applied with correcting the problem. Although this is technically an informal list, it does provide a good method to prioritize the turbine/generator issues and assist in ensuring that appropriate resources are directed to resolve significant issues.

Penetration Program

Civil Guideline C-CS-002-00, "Opening and Closing of Plant Boundaries" was developed as a result of a recommendation from a Quality Action Team on penetration design. The purpose of this guideline is to assist the Responsible Engineer in determining if any physical work which is required per a design change document affects a specific plant boundary and to give guidance on the Updated Final Safety Analysis Report (UFSAR) requirements, operational considerations, Quality Assurance (QA) requirements, and other miscellaneous requirements of any boundary affected.

Component Data Base Enhancements

Grand Gulf is currently combining the Environmental Qualification, Seismic Qualification and Instrument Q-List databases into the plant's CDB. The enhanced CDB has verification fields to indicate levels of verification for design data. Since the CDB is available and used by the majority of plant personnel, the design data becomes more readily accessible to those personnel. Design Engineering controls the process of revising the design data fields with the objective of having the highest level of verification for all CDB design data fields.

Areas of Improvement

Relational Database

A relational database will be developed to improve the links between key design and licensing basis documents, such as, calculations, plant procedures and the FSAR. This was identified during the preparation of the Grand Gulf response to the 10CFR50.54 (f) request for information regarding adequacy and availability of Design Basis information.

Microbiologically Induced Corrosion (MIC) Program

A comprehensive Microbiologically Induced Corrosion (MIC) program document will be developed to implement a recommendation from a MIC self-assessment.

Engineering Request (ER) Process

A stream lined process for implementation and closeout of ERs will be developed to implement a recommendation from a Engineering Request (ER) process self-assessment.

ENGINEERING PERFORMANCE ANALYSIS

OUTAGE SCHEDULING

Strengths

Communication and Review of Safety Issues

- Review of the outage schedule for shutdown risk and communication of the results by the Shutdown Operation Protection Plan (SOPP) is considered a strength. The initial schedule is developed by individuals familiar with shut down issues.

- The schedule development is lead by Senior Reactor Operators. An independent risk assessment of the outage is performed by the Nuclear Safety and Regulatory Affairs Department. In addition the independent assessment, a computerized risk assessment is performed using the Outage Risk Assessment and Management (ORAM) software. ORAM provides a graphical representation of the outage showing comparative risk. The Outage schedule information is directly linked to ORAM and provides an immediate look at risk changes that may result from schedule changes.

- The SOPP communicates the result of the assessment of the refueling outage schedule and other relevant evaluation and procedural guidance for the conduct of refueling outages. The SOPP is a guideline to maximize the Defense of "Risk" Depth concept and maintain the outage philosophy. Contingency plans for the key safety functions are listed with specific High Risk conditions. Also individuals knowledgeable in shutdown risk considerations review emergent work during the outage for its impacts on defense-in-dept.

Effective Integrated Schedule

The integrated outage schedule controls and directs the outage activities. Integration process begins approximately six months prior to the outage start date. Early involvement of area coordinators, department coordinators, health physics, project managers, and outage management personnel enable timely identification and correction of schedule logic, work durations and work prerequisites. The team approach to schedule integration increases work group ownership and improves understanding of the sequence of activities.

Schedule Buy-in

Because the first line supervisors are responsible for the assignment of the actual work to the craft, it is important that they understand and support the outage schedule. The schedule "buy-in" was attained by the involvement in the planning of the outage schedule and the integration phase by the first line supervisor. Also,

customized schedules were generated upon request to meet the needs of the customers.

Scope Review

A team consisting of appropriate key plant staff was created to identify all known scope for the outage. The outage work scope was then submitted to the Outage Scheduling Department for incorporation into the site schedule. The team periodically reviewed the corrective maintenance items for inclusion or removal from the outage. The outage scope was identified much earlier than in the past cycle due to the "Outage Scope Review Team" process. Scope additions after the freeze date required senior management's approval by signature before adding to the outage scope The team was relatively effective in controlling scope growth of corrective and repetitive related work.

Technical/Process Enhancement

One Stop Shop

Movement of the Shift Supervisor and the Red Tag group to the OSS reduced the traffic, noise level and distractions to the Control Room. Also, it was more convenient for most of the Maintenance shops to get their work packages ATS'd. The Control Room is a very busy area especially during the first several days of the outage. The proximity to the War Room made schedule information more readily available and made decision making more timely. The proximity to Planning's resources facilitated the resolution of various problems. The experienced operations personnel greatly facilitated determining priorities for the shift.

On-line Red Tag Program

The philosophy of a global system tagout was reviewed by a Quality Action Team (QAT) and changed to better reflect the needs of our maintenance department. As in previous outages, several Reactor Operators were dedicated to reviewing the outage schedule and preparing the tags before the outage started. This outage "Red Tags" were electronically available for sign on and sign off and was tied into the actual schedule.

Communication Tools

- Paper Close-out

  Paper close-out milestones were entered in SIMs and MTS and the Red tag Program which allowed everyone access to the information. In the past, this information was captured only in Prestige and not readily obtainable by everyone. A paper close-out milestone was assigned to an activity in

accordance with the paper close-out philosophy written by the outage SRO. There are two types of milestone ESF/PCO availability and BOP/PCO milestones.

- Emergent Work

Using the SIMs scheduling screen to identify outage scope and emergent work was an improvement. Each Work Order approved for the outage was coded in SIMs. This improvement made the information available to all organizations. The review of emergent work twice daily eliminated any unnecessary items to be worked and also helped control the maintenance backlog.

FIN Team

The use of the "Fix It Now" (FIN) team members as verifiers allowed for more efficient use of non-licensed operators. The FIN team was able to eliminate a numerous amount of minor maintenance items which allowed each discipline to stay focused on outage related work.

Schedule Viewing

GRANView provided the entire site with on-line connection to the schedule. Selected schedule updates were done daily in GRANView. Users were able to print a copy of the schedule of their choice at anytime. The software is very user friendly and requires minimum, if any, training. This was another tool used to provide accurate and timely information to personnel through electronic automation around the clock.

RFO8 Outage Home Page

The RFO8 Home Page was another great communication tool. Information such as RFO8 Goals and Milestones, Site Contact list, Outage Critique forms and other information was located on the Home page. Information was readily available to the site and sister plants through Netscape. The Home Page was updated by shift on plant and project status along with departmental information at Grand Gulf.

Outage Implementation

Some major scopes performed during the outage were:

- Recirculation Pump Rotating Element.
- A shaft impeller replacement was performed on Recirc 'A' pump to eliminate vibration.

- Feed Water Upgrade - The C34 feed water upgrade was performed to improve the reliability of the plant feed water controls.

- Low Pressure Turbine - replaced the low pressure turbine number one rotor, lower inner casing, and blade rings as an efficiency upgrade consisting of a new blade design. This change has yielded about 22 megawatts electric additional generator output. This was the second phase of upgrades scheduled for implementation. The low pressure turbines two and three are scheduled for upgrade in RFO9 and RFO10.

- Refuel - replaced 24 Jet Pump Beams and 8 Control Rod Blades. Replaced 26 Control Rod Drive Mechanisms and 42 LPRMs

- Drywell Insulation - removed insulation from accumulators in the Drywell to eliminate a potential source of emergency core cooling pump strainer clogging.

Outage Performance

Outage performance was enhanced by resource sharing between Entergy Nuclear Units. Approximately 233 personnel from other nuclear sites were loaned to Grand Gulf during RFO8. Personnel from other plants brought with them skills, knowledge, and spirit to get the job done. Records were set with one the shortest and safest Refueling Outages in Grand Gulf's history.

Areas for Improvement

Resource Loading

In the future outages, we will load resources for operations activities which we have not done in the past. This will allow us to use operator resources more efficiently. It will also help us plan restoration type activities more effectively.

Functional Area Regulatory Summary
PLANT SUPPORT

(Radiological Controls, Security & Fitness For Duty, Emergency Preparedness, Fire Protection, Nuclear Safety & Regulatory Affairs, Quality Programs and Plant Safety)

Previous SALP Ratings:	**Previous SALP Recommendations:**
05/88 - 09/89: 1.25 10/89 - 02/91: 1.25 02/91 - 08/92: 1 08/92 - 02/94: 1 02/94 - 02/96: 1	None.

Event/Enforcement Comparison:

	Previous SALP (24 Months) (02/27/94 - 02/24/96)		**Current SALP** (18 Months) (02/25/96 - Present)	
LERs	1		0	
Violations	**IV**	**NCV**	**IV**	**NCV**
	4	5	0	1

*Level IV/Non-Cited Violations

Inspection History (other than Resident Inspector):

Inspection	**Date**	**Notes***
96-09	04/24/96	NV, S
96-14	08/01/96	NV
96-16	10/24/96	NV, S
96-19	11/26/96	NV, S

* NV - no violations or deviations
V - violation identified
S - strength identified
W - weakness identified

PLANT SUPPORT PERFORMANCE ANALYSIS

RADIOLOGICAL CONTROLS - CHEMISTRY

Liquid Radwaste Effluent

	1995	1996
Whole Body (mrem)	4.89E-2	7.14E-2
Organ (mrem)	3.85E-1	1.81E-1
Discharge Volume (gal)	6.00E6	5.14E6

Liquid effluent doses remain well below the applicable quarterly and annual limits. Radwaste discharge volume is down significantly from previous years and the 1997 goal is <2.5 million. Whole body dose increased due to a fuel leaker during last cycle.

Gaseous Radioactive Effluent

	1995	1996
Gamma Air Dose (mrad)	2.66E-2	4.06E-2
Beta Air Dose (mrad)	2.75E-2	4.52E-2
Organ (mrem)	6.13E-2	1.35E-1

Gaseous effluent doses remain well below the applicable quarterly and annual limits. Increases are due to fuel leaker during last cycle, which was removed during RFO8.

Reactor Water Chemistry

	1995	1996
Average Conductivity (mS/cm)	0.129	0.123
Average Sulfate (ppb)	2.53	2.42
Average Chloride (ppb)	0.35	0.37

Average values for 1996 reactor coolant chemistry improved slightly over 1995. Work continues on reduction of resin fines from the condensate demineralizers by use of Advanced Resin Cleaner (ARC) and installation of new cup strainers.

Strengths

Optimum Water Chemistry (OWC) Initiatives

The OWC team continues as the focus for activities related to long term dose reduction and improved chemistry control. Specific activities underway include:

- HWC Implementation
- The decision has been made to implement depleted Zinc injection first quarter 1998 and hydrogen injection after RFO9.

- Iron Reduction

  - An in-line feedwater iron monitor has been installed that gives real time data associated with plant transients and planned plant evolutions such as condensate demineralizer moves.

  - Use of the Advanced Resin Cleaning (ARC) System improves resin cleaning with less water [10,000 gallons vs 50,000 for Ultrasonic Resin Cleaning (URC)]. Also, more iron and resin fines are removed.

- Reduction of resin intrusion

  Installation in early 1997 of smaller pore size cup strainers in the condensate demineralizers will reduce the amount of resin fines.

Laboratory Monitoring

The chemistry laboratory continues to perform well in the area of cross check analyses. The matrix includes analyses required by radiological effluent specifications and cold chemistry sampling programs. 1995 and 1996 results for interlaboratory monitoring have been 98 percent acceptable for cold chemistry and 100 percent acceptable for radiochemistry.

Service and Cooling Water Chemistry Control

- Plant Service Water (PSW) fouling potential continues to be mitigated by proactive efforts in the area of chemical feed optimization. Ongoing research has given us more "environmentally friendly" non-oxidizing biocides which have been implemented during outages and during periods of higher fouling potential. Supplemental surfactant injection has been implemented to improve the performance of routine hypochlorite addition to PSW.

- Circulating Water System (CWS) cooling tower fill fouling has been effectively stopped by sodium hypochlorite/surfactant treatment. Measurement of fill weights in test sections in RFO8 revealed evidence that the fill is actually being cleaned up by the treatment program. Without the treatment program in place, high-efficiency fill installation would last about 5 years versus with the treatment program, the service life of the fill is extended beyond 10 years.

Auxiliary Systems Chemistry Control

- Since August 1994, Grand Gulf has been using a non-borated corrosion inhibitor in its closed loop cooling water systems. The exclusion of boron is beneficial due to the need to minimize boron concentrations in waters being re-processed by Radwaste for use in the steam cycle. Corrosion rates for closed loops remain at or below minimum detection levels.

- Generator stator cooling water pH, conductivity, and oxygen were chronically difficult to maintain in control in the early 90's. In 1995, we worked closely with System Engineering to aggressively seek solutions to these problems. Trending of on-line oxygen measurements revealed oxygen spikes were occurring whenever the system was manually made up with demineralized water. A simple change to operating procedures during manual make-up virtually eliminated oxygen excursions. pH measurement methodology was changed from grab samples to on-line measurement. This revealed pH control to be actually better than we had been led to believe from grab samples. Conductivity control problems were solved by putting demineralizer resin change-out on a six month preventative maintenance frequency as opposed to waiting until the resin was exhausted.

- Chronic leakage from closed loops is a problem because with corrosion inhibitors, this water places a very high ionic loading on Radwaste's demineralizers. A Radwaste Inleakage Reduction Task Force routinely tracks and works on ways to minimize closed loop leakage as well as all other sources of Inleakage to Radwaste.

Use Of Plant Data System (PDS) for Monitoring and Troubleshooting Plant Systems

- Reactor Water and Condensate sampling has been reduced significantly by using the PDS to trend, troubleshoot, and alarm for changing plant conditions.

- Critical plant parameters are displayed at all times with alarms for areas that could impact plant performance. The alarming feature allows better reaction to changing conditions.

Technical/Process Enhancements

Service Water Systems Chemistry Control

The Plant Service Water (PSW) Task Force is investigating ways to reduce PSW fouling potential in the plant as well as better, more cost-effective ways to mitigate fouling potential. In the area of reducing fouling potential, the Task Force has evaluated ways to filter the water as it is pumped from the wells. It is also looking at ways to disinfect the wells at the well heads. In the area of improving reliability, the Task Force is studying replacing old well pumps with more efficient, less maintenance-intensive designs.

The Standby Service Water (SSW) Task Force continues to investigate ways to remove and control suspended solids from our SSW basins. The benefits of suspended solids control are in reducing MIC potential, reducing potential for

occluding pipes in low-flow areas, extending time between SSW basin drainings, and extending time between SSW pump runs. We have successfully used divers in

vacuuming solids, and have performed preliminary evaluations on the use of side-stream filtration in cleaning up the water. The Task Force is also investigating methods for coating inspection and repair of submerged pipes and supports in the SSW basins. Underwater coating inspection and repair shows real benefits for Grand Gulf because of the large volumes of water (7.7 million gallons per basin) that must be discharged to perform these tasks by conventional means.

Chemical storage in the vicinity of the SSW basins has been improved by incorporating seismic evaluated spill containment devices. Chemical feed methods have been improved to minimize the potential for personnel exposure to hazardous chemicals.

Chemistry Data Management System

A new data management system is being implemented that will allow Radiochemists to see trends as they enter data, provide comments, and to enter quality control information.

Effluents Data Management System

A new data management system for gas and liquid effluents is being implemented. This will allow data from plant effluent monitors to be input directly into the computer.

Areas For Improvement

Liquid Effluent Tritium

The station's liquid tritium release is an industry outlier. We have identified a direct correlation between reactor coolant boron and tritium levels and the effluent tritium increase. This increase is due aging control blades. Initial control blade replacement began in RFO8 and will continue in future refueling outages. Monitoring for boron and tritium in reactor coolant continues.

Liquid Effluent Volume

- Grand Gulf liquid discharge volume has been identified as an outlier. This has led to a site commitment to reducing inleakage. Noticeable changes were observed coming out of RFO8 because of finding and repairing water and steam leaks prior to start-up and power operation.

- Also, other liquid waste treatment options are being evaluated and implemented. Options such as ability to bypass funda filter and demin for low activity waters, treating chemical waste drains with only radioactive specific media, evaluating drying systems, routing the Reactor Water Sample Station to the Equipment Drain System, and reducing TOC by use of charcoal treatment.

- Chemistry improvements include use of PostUV testing for measuring TOC impact to Reactor Water, use of recovery drums and segregation of high purity/low purity waste.

PLANT SUPPORT PERFORMANCE ANALYSIS

RADIOLOGICAL CONTROLS - HEALTH PHYSICS

Strengths

The goal of the Grand Gulf Nuclear Station Health Physics department is to be best in class. Because of this, the Health Physics (HP) department has gone through a number of industry and self-assessments during this SALP period.

- A Corporate audit on the Health Physics Instrumentation Calibration Facility
- A self-assessment on Health Physics Operations
- An INPO evaluation - radiological protection technicians and supervisors displayed a high level of knowledge and professionalism
- A Health Physics Program audit
- An NAG assessment
- A Process Control Program (PCP) audit

Several programmatic, process, design, and human factors improvements have been made through aggressive problem identification and resolution. Many of these improvements are ongoing, while others have already reached completion. It is important to note that resources were needed when changes were implemented. While these changes received a high priority, our customer service was not sacrificed. The changes were communicated through a series of stand-down and all-hands meetings with all departments. This communicated the changes and also served to help deter complacency. Some of the more outstanding improvements are listed below:

- Contamination and Engineering Controls

  The amount of contaminated floor space was maintained at a minimum by the aggressive action of the Health Physics and Plant Services staff. These areas were maintained low due to continued management attention, more aggressive decontamination efforts, and contamination area tracking.

2/91	3.4% of CAA	(17,000 sq. ft.)
4/92	4.3% of CAA	(21,938 sq. ft.)
8/93	3.0% of CAA	(15,137 sq. ft.)
12/93	3.7% of CAA	(18,765 sq. ft.)
4/94	3.7% of CAA	(18,765 sq. ft.)
9/94	3.3% of CAA	(16,735 sq. ft.)
2/95	3.0% of CAA	(15,155 sq. ft.)
8/95	3.3% of CAA	(16,995 sq. ft.)
3/96	3.9% of CAA	(19,761 sq. ft.)
9/96	3.0% of CAA	(15,081 sq. ft.)
2/97	2.8% of CAA	(14,281 sq. ft.)

- Although the number of respirators used increased from 0 to 9, this action reflects the forward direction of our respiratory protection program. This small number of respirators used was achieved through aggressive engineering controls and adept HP practices.

1992	Non-Outage	2069 Filters
	Outage	7283 Filters
1993	Non-Outage	551 Filters
	Outage	2258 Filters
1994	Non-Outage	49 Filters
1995 - to date	Non-Outage	0 Filters
1996	Non-Outage	0 Filters
	Outage	9 Filters
1997 - to date	Non-Outage	0 Filters

- Flush taps were installed in specific sections of piping in general access areas of the Auxiliary building. Piping sections were hydrolanced prior to the last refueling outage, and the posted areas released. This has proven to be an inexpensive and reliable method of radiation field reduction.

Process Improvements

- WIN (Work Improvement Now) process improvements were developed to standardize HP practices across the system. This process determined baseline functions and resources required for the Health Physics groups at all Entergy sites, and helped to optimize processes and improve consistency between sites. This helps maintain high quality radiation worker practices, and increases the usefulness, effectiveness, and value of shared resources personnel (persons used during outages and peak work loads from other Entergy plants). Some of the actions of the WIN Team include:

  . The optimization of survey frequencies

  . The complete restructuring of radiological postings, which included

    ◊ The establishment of a system-wide posting standard
    ◊ The implementation of human factor improvements to prevent past problems included human factor improvements to prevent past problems

  . The reduction of backshift and weekend staffing.

  . The centralization of the instrument calibration facility and TLD reads facility.

  . The standardization of components of the RP program.

- The Implementation of self monitoring.

- Updating technology with improved equipment for measuring radiological data.

- The Implementation of company-wide contracts or services: laundry, consumables, MSA/SCBA procurement.

- Using shared resources personnel (persons from other Entergy plants) for outage work provided increased ownership and standard of work.

- The implementation of the Rad monitoring program also provided increased ownership and standard of work, both in-house and contractor persons were trained.

- The establishment of a Non-HP Qualification Program (CAA exit monitoring qualification card) extended the ownership of material controls and provided advanced training to non-HP personnel.

- Grand Gulf Health Physics maintains and manages the EMT (Emergency Medical Technician) program. All of our EMTs are nationally registered and state certified. We are also working on an affiliation with the city of Vicksburg to be able to use the defibrillator.

- The use of benchmarking trips helped develop our course of action for the WIN process improvements. Plants visited include Limerick, Hatch, Comanche Peak, Waterford III, ANO and River Bend.

- Health Physics participated in the FIN ("Fix It Now") team formation. This team was formed from good practices observed at other sites, and also in an effort to maximize the materiel condition of the plant. Health Physics has supplied a full-time member to this team, who is responsible for all Health Physics related work activities and support of this team.

- PM7 gamma sensitive portal monitors were installed at all Controlled Access Area (CAA) exits.

- A Passive Monitoring program was implemented, which screens workers for internal contamination each time they exit the protected area in lieu of annual body counts. This also improved the efficiency of personnel processing.

- Industry Events were used in pre-job planning and briefing.

- The deficiency document process was improved by centralizing the function as a "Condition Report", which all groups use. This allowed for tracking and trending

of common or similar occurrences. This in turn allowed for early problem discovery and subsequent corrective actions.

- Several Health Physics personnel have performed cross-functional duties with other sections in Health Physics. This rotation of personnel allows for a well-rounded staff, capable of meeting a variety of needs.

Source Term Reduction, Hydrogen Water Chemistry and Optimum Water Chemistry

As part of the Strategic Exposure Reduction Quality Action Team headed by Health Physics, several initiatives were launched:

- The Chemistry section evaluated several different deep bed resins in an effort to reduce feedwater iron levels and radwaste. Although none proved entirely successful, this has prompted and enlightened the resin/filtration industry towards their development.

- An ARCS (Advanced Resin Cleaning System) was installed for iron reduction and waste minimization as a tailored collaboration project with EPRI.

- The RWCU (Reactor Water cleanup) demineralizers received new septum tubes. This reduced filter material leakage, allowed for better coating of the filter material, and has increased filter material run times from approximately 40 days to 65 days.

- The feedwater check valves (B21F010 A & B) have been modified for LLRT, design, and source term concerns. The internals hardfacing was removed and replaced in the field with NOREM. While one valve was completed in RFO7, the second valve was completed in RFO8.

- Several control blades were replaced with new ones that had been modified for source term reduction by having the pins and rollers replaced with a cobalt free alloy. Since Grand Gulf had a complete set from the abandoned Unit 2, this modification was the most cost effective.

- Zinc injection taps were installed in RFO8 in preparation for Hydrogen Water Chemistry, which will begin after RFO9. This is a proactive measure to maintain control of our radiation fields after the vessel chemistry changes from hydrogen injection. Depleted zinc will be used.

- The new turbines installed by the Turbine Upgrade Project are cobalt-free. Although the old ones were cobalt-free as well, ensuring the new ones were cobalt-free prevented a major setback to the Source Term Reduction program.

- Modified a Unit 2 spare RHR check valve (E12F050) by removing the stellite hardfacing and applying NOREM hardfacing. Although this valve was not needed as anticipated, it provides a valuable spare and shows a high degree of culture awareness for Source Term Reduction.

- A Unit 2 spare RHR check valve (E12F050) was modified by removing the stellite hardfacing and applying NOREM hardfacing. Although this valve was not needed as anticipated, it provides a valuable spare and shows a high degree of awareness for source Term Reduction.

Grand Gulf has formed an Optimum Water Chemistry / Hydrogen Water Chemistry implementation team, and Health Physics has a dedicated person to this team for radiological concerns.

Radioactive Waste

- Radwaste inventory was decreased to reduce dose rates, and the radwaste liner storage area was decontaminated to allow access without protective clothing.

- Contracts were acquired with different radwaste processors to allow for the most economical waste processing method.

- Dry Active Waste (DAW) was reduced by 73% over the last two years.

- Grand Gulf reduced the backlog of high dose rate DAW by approximately 90%.

- New regulatory changes of 49CFR for international standards for shipping radioactive material and waste were implemented without any adverse effects.

- Cost savings were achieved by reducing the radwaste inventory before the 1997 price increase.

- The use of an on-site laundry facility allowed for a smaller inventory and better quality controls of protective clothing.

Work Planning and Control

- Up to date information on major jobs and dose summaries was communicated to all sections by a network "home page" developed by ALARA section personnel.

- A project was initiated on the use of self-supporting shielding that can be installed during power operations.

- An activity based RWP system was implemented for improved dose tracking, trending, and identification of common or recurrent problems and outliers.

- A deficiency code was implemented for work orders that require a specific RWP which has not yet been developed. This deficiency code allows these work orders to be sorted out for easy identification and RWP Request submittals.

- As shielding was planned for one high dose job, all outstanding work in that area was identified by ALARA section personnel and rescheduled to be worked while shielding was in place.

- The use of subject matter experts in continuing training gave insight and detailed information on their area of expertise.

Technical/Process Enhancements

Radioactive Waste

- Health Physics' radwaste group implemented a new process of working with the job coverage Health Physicist and work team to package the material at the site of the work. For example:

  - Suppression Pool filter socks were packaged and transported with Radwaste Health Physics involvement at the job site.

  - CRD filters were packaged and transported with radwaste at the job site.

  - CRD high dose rate trash was packaged and transported with radwaste personnel at the job site.

    This allowed the packaging to be correct from the start and reduced multiple handling and exposure.

- Radwaste container tracking and control has been added to the site MTS (Master Tracking System). This improvement:

  - Allowed all job supervisors to have instant access to the container system.

  - Facilitated ownership of the process to the job supervisor.

  - Streamlined a previously complicated process.

  - Went from a paper heavy to a paperless system.

  - Used to track and control special tools and other items in contaminated storage to help ensure against loss or disposal.

- Health Physics' radwaste group purchased remote controlled radwaste container handling equipment for dose reduction and work enhancement.

  - Wireless HIC (High Integrity Container) handling & lifting equipment

  - Wireless drum handling and lifting equipment

- Health Physics' radwaste group purchased a radio headset unit for crane operations. This saved dose and allowed for more controlled access into high dose rate areas where cameras weren't available.

- A new plastic covering is now used that is fire retardant and degrades into small particle size elements. This addressed the foreign material concerns raised by the use of the old material (string-like fibers left behind upon degradation).

Work Planning and Control

- The use of Integrated Scheduling improves planning, dose reduction and control efforts.

- The use of cameras was increased by installing new color cameras in the radwaste building for radioactive waste storage and handling.

Dosimetry

- The electronic dosimetry hardware was upgraded with a new interface, server, cabling, and drive units, making the system more reliable with reduced maintenance. Barcode readers and RWP barcodes were added to EAD stations for improved plant access and egress.

Areas For Improvement

Process Improvements

- As part of the consolidation and centralization effort within Entergy, the TLD reads were performed by one facility. As problems emerged, the sites responded, and have changed facilities as part of problem resolutions.

- Implementing WIN process improvements without sacrificing standard of service to customers, including ourselves, is an on-going task that is difficult to balance with other plant and company priorities. While outstanding performance has been achieved implementing this program to date, many challenges remain.

- Eating and chewing in the CAA remains a concern to Grand Gulf, even though its occurrence is rarely evidenced today. A strong follow through to prevent complacency on this issue continues.

- The reduction of staffing levels has been a concern for its impact on work controls and program impacts. The WIN process improvements, teambuilding sessions, and Natural Work Team process improvements have been instrumental in overcoming this problem.

Hydrogen Water Chemistry and Optimum Water Chemistry

- Although Grand Gulf has not yet installed Hydrogen Injection equipment, it is scheduled for the next refueling outage (RFO9). Projected dose rate increases range from 3 to 5 times above current normal dose rates from steam affected areas. Concerns from this have included:

  - The operational concerns associated with Hydrogen Water Chemistry (power entries and on-line maintenance in steam affected areas).

  - The migrating crud from vessel internals, which gives the potential for higher radwaste curie concentrations, new hot spots, and increased dose rates in out of vessel piping.

- The job specific or work area specific dose rates in steam affected areas will not be known in detail for the different reactor power levels once hydrogen injection is started. Currently, we can use job history and accurately predict most dose rates at various power levels.

- We are currently evaluating the RADS system in use at ANO. This may allow for remote measurement of changing dose rates in areas where the detectors are placed.

- The perimeter dose rates when Hydrogen Injection begins may increase significantly, along with the Protected Area dose rates. This may cause all persons in the Protected Area to wear a TLD.

Radioactive Waste

- Radwaste processing is still in need of other methods to minimize costs.

- Methane and wet waste continue to be a concern. This increases costs due to increased processing costs and 25% less useable volume of the container, increasing the number of shipments.

  - A biocide was selected to effectively destroy the gas causing agents.

- This biocide was prevented from entering the floor drains, which could allow the bacteria to mutate, as it has done in the past.

- Other methods of prevention and destruction of bacteria were evaluated.

- All Aux and Turbine building floor drain piping was hydrolanced.

- All Aux and Turbine buildings sumps were cleaned out.

- Reverse Osmosis, a process design that greatly reduces radwaste costs, was implemented in 1996. Specific problems were encountered with the design used at Grand Gulf:
  - The number of contamination areas and high radiation areas increased.

  - The general area dose rates in the area of radwaste shipments and handling increased.

  - The equipment caused numerous leaks, some large. Much of this was due to the use of hoses or poor hose quality.

  - The amount of floor space available for radwaste shipments and movement was compromised.

  - Poor contractor radworker practices led to decreased trust among other radwaste partners and team members.

  The Reverse Osmosis system was removed due to escalating concerns and costs. This has left an appreciable area for improvement, as the costs savings and benefits of a properly implemented Reverse Osmosis system were shown to be significant through benchmarking of other plants currently using this type system.

Work Planning and Control

- The ability to effectively track work and its progress has improved, and further changes have been forthcoming.

  - ALARA has assigned a specific person from their section to track system outages.

  - ALARA section personnel performs more frequent dose assessments on the work and the RWP while the job is in progress, instead of after it is finished.

  - ALARA section personnel improved the Daily Dose Report to include an analysis of the previous days exposure, using expected dose and actual dose for the daily activities. These are further sorted by department, RWP, and person.

- The ability to do accurate dose estimates, while most always difficult, has also received improvements.

  - ALARA follows work in progress more closely, and provides better documentation for RWP and job planning as the job evolves, as well as after it has completed.

  - ALARA is keeping RWP revisions and estimates current while in use.

Dosimetry

- There were problems during in-processing for the outage with people not having their records. This - along with a large number of dose extensions - may be a bigger problem with fall outages than with spring outages.

- The performance of EADs is excellent except in the area of failures in the field. While the number of failures is not high, our goal is to minimize these failures and operate the most reliable dosimetry system achievable.

- Grand Gulf may be changing the software for Health Physics (HIS20 to ERIMS) to a standardized version used at our other sites. Proactive measures to prevent identified potential problems before they occur have included:

  - Taking ownership of all aspects of software sections (RWP, Instrumentation, Dosimetry, Respiratory, etc.) early.

  - Taking advantage of the opportunity to install any programmatic changes, such as the RWP generation and numbering moving into existing or planned plant work controls program (WMS).

- Electronic dosimeters have begun to age and need replacing.

  We are currently evaluating a new system called RADS (Radiation Acquisition and Data System) that integrates wireless dosimetry, cameras, and dose rate equipment.

Plant Materiel Condition

- Plant materiel condition in certain areas of Grand Gulf has become a priority. The challenge in this area is to prevent high dose during upgrade and maintain the downward trend of the site three year rolling average (and the 1997 dose). The plant materiel condition project is scheduled to be worked over the next five years.

- The project has received a detailed scope, long range plan, and ownership (PM&C).

- Specific exposure and other resources have been allocated to this project.

Challenges

Preparations for Hydrogen Water Chemistry

- Formation of a Hydrogen Water Chemistry implementation team
- The establishment of a dedicated Health Physics person to lead our effort

Implementation of system standardizations

- The centralization of the Health Physics instrument calibration facility
- The centralization of the Health Physics TLD reading facility
- The standardization of the Radiation Protection Programs
- The implementation of company wide contracts for laundry, consumables, MSA/SCBA procurement

Identification, evaluation, and implementation of new technologies, methods, and practices included:

- The benchmarking of several plants for new and different techniques.
- The installation of Advanced Resin Cleaner System (ARCS) as an EPRI tailored collaboration project with Radwaste Operations.
- The addition of barcode readers to the electronic dosimetry stations for quick and easy access.
- The establishment of a "Fix It Now " Team (FIN Team) for improved prioritization and repair of equipment.
- Upgrading to a new Surrogate Tour for Windows.
- Developing a new Radwaste Container Tracking and Control process, incorporated into the site's Master Tracking System

- The purchase of remote controlled radwaste handling equipment.

Reduction of Radwaste Costs included:

- The Shipment of radwaste inventory before 1997 price increases.
- Obtaining contracts with multiple contractors to allow for selection of most economical method (tailored processing).
- The installation of a new RWCU septum tube design, which has increased their run time from 40 days to 90 days, resulting in less filter material and improved performance.
- The installation of an Advanced Resin Cleaning System (ARCS), which improves the quality of the resin removes more iron from deep bed filter resins. This extends resin life while using less water.

PLANT SUPPORT PERFORMANCE ANALYSIS

SECURITY

Strengths

- The security organization successfully coped with a protracted labor strike over a four and one-half month period. Preconceived strike contingency plans were effectively implemented under watchful regulatory eyes. Integrated, system contingency forces were employed to maintain effective security operations while replacement workers were trained and qualified. Aggressive management oversight and extended training programs ensured site operations continued with minimal disruption throughout the dispute.

- The Security Superintendent attended an FBI sponsored meeting with state and federal law enforcement officials to discuss the recent emergence of violent domestic terrorism. Additionally, FBI representatives from the Jackson Office visited Grand Gulf for a briefing and plant orientation tour. The representatives were impressed with the security level afforded the plant.

- The Security Superintendent from River Bend Station performed an evaluation of the training program used to train replacements for striking guards. There were no noted deficiencies in the program. During the exit briefing, he concluded that the replacement guards received satisfactory classroom and on-the-job training.

- Provided familiarization training to off-site law enforcement agencies as part of the annual Emergency Preparedness orientation.

- Received a SALP #1 rating for the eighth consecutive time.

- The regulatory effectiveness of Grand Gulf has been supported through two regional inspections and a local quality programs audit. Each of the reviews found sound security program performance. Management support, well written procedures, and security records are documented areas of quality.

- Security Superintendent participated in a Due Diligence Review of two northern facilities. While reviewing, lessons learned from observations and interviews served as a benchmarking tool allowing for local improvements.

- Security Coordinator, Special Projects and Compliance, participated in an assessment at Entergy's Waterford-3 facility. The self-assessment provided for a reflective evaluation of our own organization while promoting continuity of operations at each of the Entergy facilities.

- Self-help programs utilizing the skills, abilities and expertise of security personnel (i.e., carpentry, iron working, locksmithing, machinist, etc.) have proven invaluable to the security section. Evidence of these programs are readily recognizable and take the form of refurbished buildings, competition targets, painting, etc. The immediate realization of the work efforts of these employees may appear to be cost savings; however, the pride in the work is evident of their personal dedication to the Grand Gulf Security Section.

- Following national incidents involving letter and package bombs, security management contacted local officials with the US Postal Service and FBI to obtain training aids for package recognition. FBI representatives provided informational warning posters that provide specific letter and parcel bomb recognition indicators/points. These informative postings have been positioned in plain sight at GGNS locations that routinely receive mail or packages from off-site locations.

- During an emergency evacuation drill conducted in early March, security support and computer accountability features were tested. The results were excellent. All non-essential personnel were evacuated from the protected area and all others accounted for within nineteen minutes of the evacuation announcement.

Technical/Process Enhancements

Process Improvements Initiated and Results

- Physical Security and Safeguards Contingency Plan revisions implemented and signaled the complete installation of the Grand Gulf Land Vehicle barrier System. Completion of the vehicle barrier system provided a higher level of security and protection for employees and the public from the revised design basis threat described in federal regulations. The vehicle barrier system was inspected in March 1997 and received high marks from the Region IV Inspector. All design and construction specifications met required NRC criteria.

- The security section obtained fourteen new personal computers resulting in the networking of security work areas. This achievement improved and automated our administration and related documentation efforts; created on-line security forms for usage and the conveyance of standing orders and special instructions. Security employees also gain personal benefit through hands-on experience using the latest in informational technology equipment.

- The security computer system underwent a software upgrade in which suggestions and recommendations of alarm station personnel were also incorporated. The upgrade included increased processor speed, additional memory, and report generators used for system summaries.

- Another notable software addition was that of electronic key card verifications. This feature abolishes regulatory insider threat concerns identified industry wide as associated with unescorted access.

- Following industry cross-feed, security personnel learned of an explosives detector modification which would prevent screening bypass. Grand Gulf procured the devices and installed them in each of its explosive detectors. This improvement automates a protection feature formerly monitored visually by posted security personnel.

- In July, alarm stations were equipped with new closed-circuit television monitor to improve image clarity. The payoffs for the work were dramatic. Image clarity was greatly improved particularly during periods of darkness.

- An internal tracking and trending program has been improved. This program allows for an ongoing assessment of security program performance and early detection and response to adverse tendencies. Multiple program aspects, to include, assessment, detection and search devices are monitored.

- A system wide work improvement initiative was finished in April 1996. This year-long effort was designed to improve operations via system benchmarking, sharing expertise, working together to achieve cost efficiencies. The effort produced eighty-two (82) recommendations for improvement and significant cost savings. System wide security and training & qualification plans were developed during the process and are pending implementation.

- Upgrade renovations remain underway at the Security Firing Range. Nearly seventy percent complete, a tactical firing range complete with knock-down targets, plant passageway mock-ups and elevated firing positions will be realized.

Initiatives

- **OSRE:** Preparations for the OSRE continue. Completion of the tactical firing range and revised training agendas mark continued advancements. A recent security training review group identified our next undertaking of concentrating on team responses.

- **Safeguards Information:** A continuing effort to eliminate our safeguards information holdings is underway. Downgrading of security directives is a current focal point and promises to be a challenging endeavor.

Areas for improvement

- **Unsecured Doors:** A root cause analysis on unsecured doors was completed in October 1996. The Site Lead Team also directed the formation of a Quality Action Team to evaluate and reduce the number of unsecured door reportable events. This group, comprised of various site representatives, has convened and provided improvement recommendations to management.

- **Labor Relations:** While unionized security officers have returned to work following a lengthy strike, many issues remain unresolved. The security contractor continues to move aggressively towards an amicable resolution of all topics. However, maintaining an effective level of security at Grand Gulf remains a firm constant for each group.

PLANT SUPPORT PERFORMANCE ANALYSIS

EMERGENCY PREPAREDNESS

Strengths

- **Site Drills** - Site Training Drills are conducted to activate and demonstrate all on-site emergency response capabilities.

- **Table Top Drills** - Meetings are conducted in each Emergency Response Facility before each site drill. These meetings are conducted to better prepare the ERO personnel to perform their duties and discuss their concerns.

- **Controller and Evaluators Functions** - The controller and evaluators functions were separated to enhance the critique process. This allows the controllers to focus on conducting the drill/exercise and the evaluators to focus on critiquing the drill/exercise.

- **State and Local Working Relationship** - GGNS has developed and maintained an excellent working relationship and adequate interface with the state and local agencies to support an effective response to an emergency at the site.

- **Emergency Response Facilities Hotline** - Installed new Emergency Response Facility Hotline with headsets in each facility. This improved the communications and decision making regarding the emergency situation between facilities.

- **Toll Free Public Information Number** - A toll free 800 number was installed for the Emergency Information Center (EIC). This allows the public to call the EIC toll free during a declared emergency to receive emergency information.

- **Plant Data System (PDS)** - Installed PDS computer workstation in the EOF, TSC, OSC, and Backup TSC to improve plant assessment capabilities in each facility.

- **ERO Staffing Enhancements** - Added dedicated OSC communicator to improve the communications between the TSC and OSC and created a TSC Coordinator Assistant position to facilitate interfacility communications and allow the TSC Coordinator to focus on accident mitigation.

Technical/Process Enhancements

- **Procedural Upgrade** - Flow charted the Emergency Action Levels in the Emergency Plan Procedures. This allows users to follow a new path rather than referring back to the procedure each time conditions change.

- **Self Assessment** - Conducted a self assessment of the Emergency Preparedness Program. The assessment team was made up personnel from other nuclear programs within Entergy and a Crisis Communication Consultant. An evaluation of the results from the self assessment is in process.

- **EOF Upgrade** - Installed carpet in the EOF Command Center to reduce the noise level during drills, exercise, or actual events.

- **Annual Drill Participation** - Each ERO member is required to participate in a drill or exercise on an annual basis. This allows the ERO to become more proficient in performing their ERO responsibilities.

- **Facility Process Owner** - Facility Process Owners were assigned to each Emergency Response Facility. The Facility Process Owners were selected from the senior site management team to increase management's ownership of the Emergency Preparedness Program. Facility Process Owners are responsible for the operations, staffing and assigning position leads in their facility.

- **Position Leads** - Position Leads were assigned to key Emergency Response Positions. The positions leads were selected based on their knowledge and experience in the position. The position leads are responsible for reviewing the qualifications and the training lesson plans for their position.

- **Offsite Communications Upgrade** - Includes identifying and controlling the work on critical communications circuits, installation of satellite communications equipment in the Control Room, EOF, ENMC, and TSC, and installation of additional radios for offsite use. This will ensure that the offsite communications system is resistant to common mode failure.

- **Qualification Cards** - Implemented qual cards for the major positions in the ERO. Each qual card was developed by the position incumbents. The qual cards ensure personnel filling the position are proficient prior to being assigned to the ERO and that they maintain their proficiency.

Areas for Improvement

- **ENMC Operation** - Evaluate the role of Corporate Communications in disseminating emergency information from the ENMC.

- **Backup Emergency Response Facilities** - Evaluate the effectiveness of the locations and operations of the backup ERF's.

PLANT SUPPORT PERFORMANCE ANALYSIS

FIRE PROTECTION

Challenge

- Correct damper problems at III Switch Gear room/Clear LCO and eliminate continuous firewatch.

PLANT SUPPORT PERFORMANCE ANALYSIS

NUCLEAR SAFETY AND REGULATORY AFFAIRS

Proactive management, comprehensive planning and sound technical justifications are the attributes that continue to make Grand Gulf a pacesetter in the regulatory arena. The combination of these has led to proactive handling of several generic issues this period. The willingness of our management to push for a co-operative relationship with the NRC has led to mutually agreeable solutions to some very difficult regulatory issues. This co-operative relationship along with frank and honest feedback has been beneficial to both parties during this SALP period.

Strengths

Strong Safety Culture

- Continued emphasis placed on assessing current performance and planning for enhancement of existing processes.

- Strong creative and innovative ISEG Group, which functions to advise the Vice President Nuclear Operations, of performance indicators before nuclear safety is jeopardized. Emphasis is placed on issues important to safety, such as, shutdown risk management, suppression pool debris control and losses of shutdown cooling.

- Exceptional Operating Experience Group, which is focused on enhancing safety performance through in-depth reviews of operating events and follow up on assigned corrective actions. Strong Emphasis has been focused on improving EOI-wide process and enhancing internal information exchange.

- Well thought out and managed safety evaluation program (50.59s) which is focused on maintaining the licensing basis of the plant.

- Internal self assessment program focused on maintaining our strong safety culture. Self-assessments were conducted in the following areas:

  - Comprehensive assessments of the 50.59 program using both in-house and external experts from both a licensing and quality assurance background.

  - Two assessments of the Operating Experience Program which were conducted by large diverse teams from internal and external sources.

- External Safety Assessments by the Nuclear Safety and Regulatory Affairs Safety Assessment group were performed on the pre-outage schedule to identify "high risk" periods in the outage so contingency plans could be developed prior to the start of RFO8. During the outage, the group regularly assessed outage schedule changes and plant lineups for impact on plant safety. The group also monitored plant activities throughout the outage. Following RFO8, the group provided a post-assessment critique of the outage schedule. The critique discussed items that worked well and problem areas that were identified during the outage. The post-assessment was used as input to the Grand Gulf RFO8 Outage Critique.

Emergent Issue Control

Technically sound comprehensive reviews and justifications for Grand Gulf's position on emergent issues is a trademark of our regulatory relationship. Our continuing efforts to stay on top of these type issues are illustrated below:

- Licensing Basis Maintenance

  On March 18, 1996, the USNRC issued Information Notice 96-17 to alert licensees of instances of reactor operation that may not conform to the licensing basis. This concern was raised as a result of alleged violations of licensed activities related to spent fuel pool cooling operation and refueling operations at Millstone Unit 1. The staff also initiated various industry inspection activities related to Millstone design/license basis issues. On May 21, 1996, the NRC staff briefed the Commission about the staff's activities and findings regarding these issues.

  In response to these issues, EOI initiated an action plan to assess the adequacy and effectiveness of programmatic controls for maintaining the license basis at all EOI sites. Through the creation of a special task team, EOI developed a self assessment plan that employed a three-tiered approach. The first tier involved a sampling of existing programmatic elements to determine if they were effective. The next two sampling tiers searched for missing or incorrectly applied programmatic elements by identifying actual differences or the potential for differences between operating practices and the FSAR. The advantage of this approach was that it focused on a vertical slice of programs and practices to more quickly determine the general state of the licensing basis, the overall significance of inconsistencies, and programmatic weaknesses and good practices. The assessments were conducted at each of the EOI sites between June and August, 1996. Several enhancements to EOIs licensing basis maintenance programs were recommended and implementation plans are underway.

In July 1996, NEI adopted EOIs assessment approach as an industry guideline for assessing programs for maintaining the licensing basis. EOI assisted two other industry sites in conducting similar assessments.

- Design Basis Adequacy and Availability

Planning for and preparation of the 10CFR50.54(f) response was coordinated by an EOI team of knowledgeable representatives from each EOI facility and the corporate office. As directed by management, the team developed a response approach involving a critical review of site process completeness and effectiveness. The intent was to go beyond process description, and develop an approach capable of identifying new insight into the adequacy of design basis and configuration management processes.

Each site assembled a separate team to implement the resulting assessment. The site team was responsible for investigating site processes, evaluating the resultant information and identifying and documenting any deficiencies or process enhancements. The site team also complied sufficient records of their review to substantiate the accuracy of the findings.

One advantage of a system-wide team approach is that throughout the response development period, site-specific findings and insights were shared amongst the EOI team. Common problems were addressed, and, where appropriate, consistency in evaluation and approach was facilitated.

Draft information was shared with nuclear facilities outside of EOI in order to benefit from external insights. Knowledgeable external and legal personnel also provided valuable feedback.

The response was reviewed by a broad range of site personnel including engineering, licensing and management personnel. In addition, the on-site review committee performed site-specific reviews.

- Pressure Locking/Thermal Binding

Generic Letter 95-07 (August 1995), Pressure Locking and Thermal Binding (PL/TB) of Safety-Related Power-Operated Gate Valves, requested licensees perform, or confirm that they had previously performed, 1) evaluations of operational configurations of safety-related, power-operated gate valves for susceptibility to PL/TB and 2) further analyses, and any needed corrective actions, to ensure that those valves susceptible to PL/TB are capable of performing the safety functions within the current licensing bases of the facility prior to GL 95-07, it was determined that Grand Gulf had 18 valves with a safety function to open and susceptible to TB. Procedure changes were made for two of the valves to remove the pressure locking susceptibility; nonconformance documentation was initiated for seven valves; and calculations determined that the pressure locking phenomena would not affect valve operation or result in

exceeding any motor, valve or actuator limitation for the remaining nine valves. Grand Gulf plans to continue to monitor industry information related to this issue and to reevaluate its position as necessary.

- Periodic Verification

  Generic Letter 96-05 (September 1996), Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves, requested licensees to establish a program, or to ensure the effectiveness of its current program, to verity on a periodic basis that safety-related motor operated valves continue to be capable of performing their safety functions within the current licensing basis of the facility. The program should ensure that changes in the required performance resulting from degradation (such as those caused by age) can be properly identified and accounted for. Entergy Operations will pursue a common risk-based approach as to periodic static testing of all program MOVs and undertake a combined approach to Valve Factor Degradation (VFD) testing to verify the potential for increased thrust requirements for gate valves. The combined results from the site specific VFD testing will be used to establish a generic Entergy position on the subject matter to be applied uniformly at the individual sites.

- Boraflex Testing Program

  NRC GL 96-04, as well as several Information Notices , identified generic concerns with the degradation of the neutron absorber material, BORAFLEX in fuel storage racks. Grand Gulf has played an active role in industry to resolve this issue.

  Grand Gulf's aggressive testing program has been in place since the mid-80's and is among the industry leaders as far as the maturity and effectiveness of the testing program. Currently, data that is being collected from the Grand Gulf racks are being compared to theoretical projections made by EPRI. Although, the latest test results showed gaps which were beyond the assumptions in the existing analysis, a more recent evaluation confirmed that the condition did not present a safety concern.

Area For Improvement

- Integrated Risk Management Program

  Grand Gulf needs to continue development of an integrated approach to risk management. This includes implementing an online risk monitor and updated PRA.

PLANT SUPPORT PERFORMANCE ANALYSIS

QUALITY PROGRAMS

Strengths

The Quality Programs (QP) Department is staffed with a technically knowledgeable and diverse cross section of personnel. This diverse experience includes: Mechanical, Electrical and I&C Maintenance, Health Physics, Chemistry, Operations, Civil, Welding, Quality Assurance (QA), Quality Control (QC) and Nondestructive Testing

- Audit Group obtains technical specialist from Region IV members, Entergy Operations plants, and from other outside sources. We also support requests from other utility members by providing personnel with expertise in the area requested. Plant management is supportive of this exchange and has provided participants in several exchanges. Examples of audits where Region IV technical specialist have been used during this SALP period are:

  - Fire Protection
  - Emergency Preparedness
  - Design implementation
  - Health Physics
  - Pump and Valve Program
  - Security
    Fitness for Duty
    Regulatory Guide 4.15
  - Radwaste
  - Training

Current plans are to continue to use this valuable resource to supplement auditor resources.

- Safety assessments and quality verification continue to be exceptional in identifying areas of improvement and assuring management's expectations are consistently met. Audits continue to be thorough and detailed with both positive and negative findings. The content and wide range of findings and recommendations are noted by third party assessment personnel to be substantive and beneficial to the improving performance of station personnel. The audit process is considered a program strength by third parties, demonstrating high quality, depth and broad scope.

- QP has developed a Performance Data System which provides for the compilation and analysis of human performance data via expert panel. This provides better focus of oversight resources toward groups and activities with

- declining performance or areas unsubstantiated by data. The performance Data System also provides management with a measure of compliance, strengths, weaknesses and program effectiveness. Performance data is collected from audits, inspections, monitoring activities, procedure reviews, self assessments, NRC inspections, license event reports, INPO inspections, CRs, etc. This system was noted as a strength by the recent INPO evaluation.

- QP continues to perform activity monitoring in addition to QC witness/hold points. Activity monitoring includes potential problem areas and areas where Quality performance is not indicated by other means. This process has been expanded to identify exceptional performance as well as compliance and deficiencies. This information is compiled in the Performance Data System and integrated into the overall analysis of various processes. Each monitoring report is electronically distributed to all Grand Gulf management staff as they are issued. All monitoring reports are then posted within the Entergy Internet to be shared with all Entergy sites and personnel. This practice provides timely notification to all members of the management team from Supervisor to Site VP.

- QP maintains an Intranet Web Site to share information with all Entergy sites. The Web Site contains Trend reports, Monitoring reports, Audit reports, QP assessments and departmental contract information. Current issues and specialized information is also provided.

- The high level of technical expertise in Non-Destructive Examination within the Inspection/NDE group contributes to the very strong flow accelerated corrosion and ISI programs.

- The trend reporting process includes a "real time" trend detection method. Each time a corrective action document is initiated, the data base is searched for a similar recurring problem. This information is combined with plant work/status documents to provide an indication of actual plant conditions. Data is analyzed to determine if the condition has a pattern of recurrence. Adverse results are promptly reported to management so that attention can be directed to potentially weak areas. Also, data is compiled and reports issued weekly and monthly. Negative trend information, reported promptly, gives management the opportunity to be proactive and deal with trend indicators. The following are examples of some trends noted and actions taken:

- An adverse trend indication noted that the number of deficiencies related to Configuration was trending up. Operations formed a Quality Action Team to define the problem and develop an action plan. Portions of the plan have been implemented and the number of Configuration Control deficiencies are trending downward.

- An adverse trend indication was noted relative to Radiation Worker practices. A root cause evaluation was performed and aggressive corrective action was implemented to improve radiation worker practices.

- Program violations are trended to provide management with indicators of the effectiveness and weakness of the various programs. Each program is governed by a procedure. During the weekly review/evaluation of deficiency documents, correlation and sorting is performed on various parameters, this includes procedure violations. Any trend indication found is indicative of potential problems with that procedure (program). This provides a measure of the effectiveness or weakness of various programs.

- The annunciator window concept continues to be used for CRs. This concept emphasizes timely disposition and completion of corrective actions. An annunciator window has been initiated for the top ten repetitive quality issues. These top ten repetitive issues are identified by monitoring the Performance Data System and Real Time Trending. This provides management with an indication of the effectiveness of corrective actions.

- Inspection equipment continues to be shared between Entergy facilities. This practice provides a wider range of state-of-the-art equipment while reducing overall costs.

- Specialized NDE/Inspection resources continue to be shared between Entergy facilities. This reduces contract costs and keeps Entergy personnel more proficient in performing specialized tasks.

Management Oversight

- Routine audit exit meetings are held with the Vice President, Operations and his management staff. These meeting are intended to cover audit finding results which include auditor observations of performance and recommendations for improvement.

- To support the continuing emphasis on resolving significant deficiencies in a thorough and timely manner, management meets to review the root cause and corrective actions developed. Priorities are adjusted and coordinated to provide for timely resolution of a significant deficiency.

- Station management meets frequently to review new condition reports so as to ensure proper significance is assigned and the correct group is assigned responsibility.

Technical/Process Enhancements

Process Improvements Initiated and Results

- QP is a participating member of the Entergy Operations Corrective Action/Root Cause Analysis Key Process Team. This teams charter is to review corrective action processes used at Entergy's nuclear sites. The team has identified several strengths and process improvements that are being shared among sites.

- QP is also a member of the Trending Natural Work Team which reports to the Corrective Action/Root Cause Key Process Team. The Trending team is chartered to review trending processes used at Entergy's nuclear sites. The goal is to identify strengths and areas or process improvements that may be shared between sites. The team has developed guidelines so that trend information compiled and stored electronically at each site may be shared between sites. Implementation is still in the development stage.

- QP's Inspection/NDE contractor screening process has been standardized between Entergy facilities. This provides more consistency in contractor certifications and expedites the movement of contract support between facilities during outage years.

- The Auditor/Lead Auditor certification process is continuing in its development between Entergy facilities. When implemented, this will provided more consistency in certification and expedite the movement of auditors between facilities.

- The Corrective Action Process has been re-engineered, including electronic initiation, enabling more timely initiation and reduced up front cycle time, making it an easier processes for an initiator to use. In developing this new process, the following improvements were accomplished:

- Six processes were combined into one, eliminating the fragmentation of the corrective action process. There is only one database or tracking program to search for status of an item.

- Redefined definitions to make them more applicable to today's activities and other plant processes.

- Flow chart were developed to aide personnel in being able to understand the process.

- Prioritization system was initiated for CRs by classifying them into three categories. The highest category requires the most action for cause determination, while lowest category requires less cause determination action

and allows for a longer time to perform this function. In the old processes, all had the same priority and same cause determination.

- Cycle time for initiation by plant personnel has been reduced to a few minutes, where hours could have been needed before.

- Eliminated the arbitrary assignment of corrective action completion in 120 days. Now corrective action completion is based on complexity, importance and timeliness.

- Eliminated the need for conditional releases for items being worked on under an approved engineering disposition. This requirement was a process burden to Grand Gulf personnel and was determined to not be needed. This now allows the work process to be implemented easier.

- Thresholds were clarified to provide consistency at Grand Gulf.

- Computer programs were developed.

- Procedures were revised to implement the new process. This included a phased in approach, allowing plant personnel to learn the new process, while still having the old process available.

By making the process easier to use for the initiator, more personnel are inclined to document lower level occurrences. This allows the trending of these lower level occurrences to be accomplished and identification of growing negative trends identified earlier than in the past. This also allows Grand Gulf to take corrective action to minimize the impact of the trend prior to it becoming a major event.

Grand Gulf has developed and implemented a Corrective Action Review Board process, with a makeup of Supervisors, Superintendents and Managers, with input from line personnel. When convened the Board functions to:

- Ensure the deficiency has a champion to see resolution through to completion.

- Approve or assign due dates for evaluations and corrective actions, basing the due date on severity, importance to safety and the likelihood for the deficiency to reoccur.

- Review the root cause evaluations performed to ensure that the evaluation was in depth enough for the deficiency.

- Review the corrective actions to ensure they are proper and adequately cover the identified caused.

- Ensures that the right groups or persons are assigned the responsibility of carrying out the corrective actions determined to be needed.

This assures that actions coming from a root cause evaluation are more accepted (Group assigned responsibility shows and accepts ownership). Having more varied

perspectives reviewing the evaluation performed, ensures that the right questions were asked and the answers are satisfactory. This multi-disciplined review of evaluations and corrective actions made the corrective action process stronger because the organizations at the station participate in the process.

Assessments Conducted

- Safety System Function Assessments were performed each Operating cycle. The Service Water Operational Performance Inspection was the last performed in 1995. This was a vertical slice system evaluation similar to NRC Safety System Functional Inspections.

- Several internal assessments were conducted by Quality. These assessments were conducted along INPO guidelines and were performance based:

  - Engineering & Problem Resolution
  - Operations
  - Security Training & Contingency Plan
  - INPO Findings
  - Maintenance Supervisor Training Program
  - Engineering Requests

- Joint Utility Management Audits are performed annually on QP's activities. These audits are purely performance based and staffed by highly experienced Quality Assurance management personnel from other utilities.

- Internal Echelon Quality Assurance audits are performed annually on Quality Programs activities. These audits evaluate programmatic compliance and effective implementation of procedures and instructions.

Initiatives

- The QP NDE and Quality Control Inspection groups were combined under one supervisor which provided a more efficient and diverse work group.

- QP is participating in the development of a paperless condition reporting system within Entergy Operations. The first phase of paperless initiation at Grand Gulf is now complete. Second phase preparations at Grand Gulf are in progress to extend the electronic process to include disposition, corrective action assignment and closure.

- The Entergy Operations QA Peer Group consisting of quality managers from each nuclear site has implemented a coordinated effort to study company-wide process improvements. The goal is to increase regulatory and operating performance while lowering O&M cost. Reporting to this group are specialized

- subcommittees, with specialist in Inspections, NDE, Trending and Audits. These groups supplement the Peer group with technical data as needed.

Areas for Improvement

- Continue to work with the Trending Natural Work Team to improve and standardize company wide trending methods to facilitate sharing of trending information.

- Continue to conduct on-the-job training and diversify personnel to strengthen the technical knowledge base of the QP staff.

- Enhance management involvement in, and oversight of, the corrective action program.

- Perform a more detailed cause analysis for each Condition Report.

PLANT SUPPORT PERFORMANCE ANALYSIS

PLANT SAFETY REVIEW COMMITTEE (PSRC)

Summary of Results of Inspection Reports this period:

Satisfactory

- The inspectors considered the PSRC meeting that discussed a potential emergency TS change for a SSW Pump A overhaul good because of the in-depth and detailed discussions among the PSRC members related to compensatory measurers and risks associated with the activity.

- Self-assessment activities performed by the Plant Safety Review Committee (PSRC) were effective.

Unsatisfactory

None at this time

Organization and Administration Assessment (August 26-29, 1996)

- The PSRC are knowledgeable interdisciplinary groups that contribute to achievement of a high degree of nuclear safety.

- The PSRC is effective in its review of station activities that could potentially impact plant safety.

Recommendations

- Revise procedure 01-S-01-3 to reflect current station organization and PSRC membership.

- Review PSRC overdue actions to determine there is no safety significance and implement a method to change due dates.

- Consider having SRC members observe and evaluate PSRC meetings to further assess the PSRC's effectiveness.

PLANT SUPPORT PERFORMANCE ANALYSIS

PROJECT MANAGEMENT

Strengths

Project Management Process

This process is used at GGNS to ensure integrated implementation of design changes and other significant plant evolutions, significantly increasing the probability of successful implementation.

The project manager is responsible for assembling the cross discipline team required, establishing and maintaining project direction, and ensuring vital lines of communication between departments are functioning. GGNS has implemented many important projects in this manner including:

- Security Boundary Upgrades
- GL 89-10 MOV Program
- Reactor Recirc Pump and Valves Root Cause Work, Repair and Replacement
- Feedwater Control System Replacement and Check Valve Modifications
- Technical Specification Improvement Program
- ECCS Suction Strainer Replacement
- Jet Pump Beam Failure Investigation and Replacement
- LPCS Pump Inspection
- Recirc Pump "A" Project
- Jet Pump Recovery Project
- RF08 B21F010A Check Valve Project
- Graded QA for Procurement Project
- RFP Feedwater Check Valve Project
- IDEAS Project
- Station Maintenance Applying Re-engineering and Technology (SMART)
- Component Database (CDB) Project
- Site Master Tracking System (MTS)
- Training Information Management System (TIMS)
- Core Stability Project
- Month Fuel Cycles Project
- Plant Power Uprate Project
- Plant Chiller Replacement Project
- Hydrogen Water Chemistry Project
- Advanced Resin Cleaning System Project
- C34 Feedwater Upgrade Project
- Feedwater Flow Element Fouling Issues

- Zinc Injection System Project
- ECCS Suction Strainer Issues Project
- Inadvertent SRV Actuation Resolution Project
- Plant Service Water (PSW) Project
- Flow Accelerated Corrosion

This approach ensures that the best efforts of many individuals are properly coordinated to optimize project quality, effectiveness, and plant safety.

SIGNIFICANT NRC INSPECTION REPORT COMMENTS

The NRC inspection reports were reviewed looking for comments that were considered strengths or weaknesses. The following summary is provided to give a feel for overall inspection results. Comments using words such as adequate or satisfactory were not listed as strengths. The use of good or very good is summarized for the three most common areas. Weaknesses noted in violations (cited and non-cited) are not included in the summary. The comments contained in this section are paraphrased for the purpose of brevity.

Note: Grand Gulf uses the issue date of the inspection report when categorizing violations

Inspection Reports No.50-416

Strengths

96-02, Engineering Assessment, Dated 4/11/96

- System reliability for the reactor core isolation cooling system and the residual heat removal system considerably exceeded the licensee's goals.
- System engineers were found to be knowledgeable of their systems and of the open items related to their systems.
- The self-assessment team was very effective in conducting the assessment.

96-03, Safety-Related Motor-Operated Valve (MOV) Testing, Dated 3/19/96

- A large integrated staff directly involved in the MOV program, which should provide long-term stability to the program, was considered a strength.

96-06, Routine Six Week Inspection, Dated 3/21/96

- The response by the control room operators to a seal steam system malfunction, during a down power to remove Condensate Booster Pump A from service, demonstrated quick response and good command and control.
- Good communications were noted among control room operators during the control rod sequence exchange evolution.
- Work associated with troubleshooting solder contamination in the control rod drive air system was considered to be well controlled and effective.

96-07, Routine Six Week Inspection, Dated 5/02/96

- Improvement was noted in the appearance of several plant areas due to painting.

96-09, A Special Announced Inspection of the strike contingency plans, Dated 5/02/96

- A comprehensive strike contingency plan was developed and contract security personnel were prepared to implement the plan prior to the strike occurring.

96-10, Routine Six Week Inspection, Dated 6/21/96

- A Plant Safety Review Committee (PSRC) meeting that discussed a potential emergency TS change for a SSW Pump A overhaul was good because of the in-depth and detailed discussions among the PSRC members related to compensatory measures and risks associated with the activity.

- The SSW Pump A overhaul was conducted expeditiously which minimized component downtime and safety risk.

- Engineering and technical support was considered good during the SSW Pump A overhaul and replacement. Engineering personnel were noted at each of the job sites throughout the evolution and quickly addressed any issues that arose.

96-11, Routine Six Week Inspection, Dated 8/12/96

- Operator response to a manually inserted reactor scram, when six SRVs inadvertently opened, was good.

- Engineering provided excellent support for the post trip analysis performed following a reactor scram on June 6.

- Conduct of security personnel during a loss of power to security equipment was good.

96-13, Routine Six Week Inspection, Dated 8/28/96

- Control room communications were concise and clear utilizing repeat backs. Operator response to alarm conditions were prompt and effective

- Operators and emergency personnel responded promptly and effectively to a Notice of Unusual Event.

- Maintenance and testing activities were completed thoroughly and competently.

- Good engineering support was evident during troubleshooting efforts on an emergency diesel generator.

- An assessment of the Notice of Unusual Event was critical, thorough, and included the appropriate recommendations for improvements.

96-15, Routine Six Week Inspection, Dated 10/11/96

- Control room personnel were knowledgeable of the conditions associated with the plant and all continuously illuminated control board annunciators. Excellent communications were demonstrated by licensed operators, in that the operators used 3-way communications and announced control panel equipment manipulations and alarming annunciators.

- Operations personnel used proper self-checking techniques and demonstrated good command and control. Technicians were knowledgeable and qualified.

- Security officers demonstrated detailed knowledge related to vehicle control inside the protected area.

96-16, Inspection of the Access Authorization Program, Dated 10/24/96

- Implementation of the access authorization program was excellent. Management support for the program was excellent.

- An excellent psychological evaluation program had been established.

- Implementation of the behavioral observation program was very good.

- An excellent program for denying or revoking unescorted access was in place.

- An excellent program was in place to protect personal information from unauthorized disclosure.

- Audits of the access authorization program were excellent.

- Excellent records retention system and supporting procedures were in place to insure the specified records were retained for the required period of time.

96-17, Routine Six Week Inspection, Dated 11/25/96

- During a shutdown, operators performed well during the mode change and demonstrated quick response to unexpected events. Operations supervision

demonstrated excellent focus and good command and control of the ongoing control room activities.

- Good foreign material control practices and good communication on the refueling bridge were noted during the jet pump beam replacement work activities.

- System engineering provided good support during the troubleshooting activities for the Division 2 Standby Diesel Generator.

- Radiological controls were fundamentally sound as demonstrated by proper radiological postings, safe radiological work practices, and knowledgeable health physics staff.

96-18, Maintenance Inspection, Dated 11/29/96

- Except for loose fasteners on a limit switch compartment cover, the material condition of toured plant was good.

- Erosion/corrosion examinations were properly performed by knowledgeable personnel.

96-19, Radiation Protection Inspection, Dated 11/26/96

- Workers were knowledgeable regarding the settings of the electronic dosimeters and the required response to dosimeter alarms.

- Licensee had a good program for maintaining radiation protection instruments.

- Cumulative personnel exposure has been maintained below the industry level average for boiling water reactors.

- The self-assessment of the radiation protection program was very good.

- Training provided to radiation workers was good.

96-20, Routine Six Week Inspection, Dated 01/08/97

- Observed activities were conducted professionally and safely. Operators were observant, cognizant of plant and equipment conditions and took appropriate actions.

- The material condition of the RHR System C components was good and housekeeping in the RHR Pump C room was good.

- Corrective Action Review Board (CARB) members provided in-depth questions concerning generic implications, events leading to the problems identified and

proposed corrective actions during the observed CARB meeting. The board members were aggressively pursuing the resolution to the issues presented.

- Operations, maintenance, and engineering personnel performing the reactor vessel inservice leak test were knowledgeable of all requirements associated with the test and demonstrated proficiency in test performance and effective communication.

- Engineering personnel were technically knowledgeable of component and containment leakage acceptance criteria and knowledgeable of the status and condition of components required to be Type B and C leak tested.

- Radiological areas were properly posted, personnel were following radiation work permit requirements and displayed good radiation worker practices. Health physics technicians were knowledgeable of current plant radiological conditions.

96-21, Routine Six Week Inspection, Dated 2/25/97

- Control room personnel were knowledgeable of the conditions associated with the plant and alarming control board annunciators. Conduct in the control room was professional and access control and housekeeping were excellent.

- Housekeeping in the plant was good and items were properly stored and secured.

- Incident Review Board members were assertive and provided in-depth detailed questions to the maintenance personnel involved with the inadvertent Halon discharge in the control room.

Weaknesses

96-02, Engineering Assessment, Dated 4/11/96

- Revision to the surveillance test procedure for venting the residual heat removal system was not timely.

- While the corrective action process for identifying, resolving, and preventing problems provided timely identification, cause determination and corrective actions, the process did not appear to be effective in identifying problems that were precursors to new problems.

  While the root cause analysis program was effective, there were instances where root-cause analyses were either too narrow or too board. In addition, there was evidence of a growing backlog.

96-03, Safety-Related Motor-Operated Valve (MOV) Testing, Dated 3/19/96

- Inspectors were concerned that Siemens (a contractor) had developed a grouping study that had not been demonstrated to be capable of predicting major valve damage.

- A design margin to account for stem lubrication degradation (i.e., aging) had not been defined.

- Inspectors identified a fundamental error in the calculation of the open valve factor.

- The use of a design margin of 5 percent to account for load sensitive behavior (i.e., rate of loading) was not supported by test data.

- A questionable methodology to evaluate the capabilities of two valves had been used and several opportunities over approximately four years had been missed to eliminate the marginal status of these valves. The inspectors considered the long-term marginal status of the valves to be indicative of a program weakness.

- Although extensive self-assessments of the MOV program had been performed, inspectors found several instances where corrective actions were not performed for what appeared to be valid findings.

96-06, Routine Six Week Inspection, Dated 3/21/96

- Inconsistent control of personnel within the control room was noted. During the control rod sequence exchange, the shift supervisor maintained rigid controls over the noise and traffic in the control room; however, there was high personnel traffic and noise during response by operations personnel to the seal steam system malfunction.

96-07, Routine Six Week Inspection, Dated 5/02/96

- Plant housekeeping was considered poor in the reactor core isolation cooling pump room and in several contaminated areas.

- The storage of material following roof repair work was poor and resulted in the blockage of a residual heat removal heat exchanger blowout panel.

96-08, A Special, Announced Inspection to review corrective actions associated with the apparent degradation of both trains of the control room air conditioning units, Dated 5/02/96

- A material nonconformance report (MNCR) was not initiated upon discovery of the fact that the control room air conditioning Unit B Pressure indicator had a

history of repetitive failure and historically, even after the gauge was recalibrated, it was not reading accurately.

96-10, Routine Six Week Inspection, Dated 6/21/96

- Operator performance was considered poor because six operating shifts failed to identify the improper RCIC system lineup for three days during shift turnovers and periodic board walkdowns.

- Verbal communications between the reactor operator and his supervisor during the spurious SSW Pump B start were considered to be poor.

- The senior reactor operators responding to the spurious SSW Pump B start and the control panel alarm also failed to detect the mispositioned control panel alignment.

- Inspectors identified numerous material condition deficiencies during plant tours that had not been previously identified by plant personnel.

96-11, Routine Six Week Inspection, Dated 8/12/96

- The definition of minor work requiring retest was considered too broad and as a result, may not result in proper retest of plant equipment.

96-13, Routine Six Week Inspection, Dated 8/28/96

- Inspectors observed low oil level in the reactor core isolation and cooling gland seal air compressor sightglass and shoddy housekeeping in the pump room, which indicated inappropriate attention to plant material conditions.

96-15, Routine Six Week Inspection, Dated 10/11/96

- Inspectors identified a weakness in the licensee's process that provided the potential to have clearance order implementation errors.

96-18, Maintenance Inspection, Dated 11/29/96

- Work order instructions issued to perform the scheduled work on a discharge check valve were inadequate and incorrect for work performed in a high dose radiation area by offsite personnel not familiar with the valve.

96-19, Radiation Protection Inspection, Dated 11/26/96

- Examples of improperly stored respirators in emergency lockers were noted.

96-20, Routine Six Week Inspection, Dated 01/08/97

- Operator response for an inaccurate condensate storage tank (CST) level indication was poor since unreliable indications were known before CST level transmitter drift contributed to losing control rod drive (CRD) pumps on low suction pressure which precipitated a manual reactor scram.

- Poor process controls governing painting practices were identified.

  Survey maps displaying current radiological conditions were not properly updated for several radiation areas.

96-21, Routine Six Week Inspection, Dated 2/25/97

- Inspectors found discrepancies with component labeling during the observed maintenance activities. Component noun descriptions listed in the component database, which were used to generate work orders and component tagout clearances differed from the control room component labels, actual components in the field and system operating procedures and provided the potential for clearance errors and maintenance work errors.

LERs BY FUNCTIONAL AREA

FUNCTIONAL AREA	PREVIOUS SALP - 24 MONTHS (02/27/94 - 2/24/96)	PRESENT SALP - 18 MONTHS (02/25/96 - PRESENT)
OPERATIONS	4	0.5
MAINTENANCE	9	5.5
ENGINEERING	9	2
PLANT SUPPORT	2	0
TOTAL	24	8

LERs BY CAUSE CODE

CAUSE CODE	PREVIOUS SALP - 24 MONTHS (02/72/94 - 02/24/96)	PRESENT SALP - 18 MONTHS (02/25/96 - PRESENT)
PERSONNEL ERROR	4	2
MAINTENANCE PROBLEM	0	0
DESIGN	4	1
CONSTRUCTION/ INSTALLATION	2	0
EQUIPMENT FAILURES	7	3
INADEQUATE PROCEDURES	5	1
OTHERS	2	1
TOTAL	24	8

VIOLATIONS BY FUNCTIONAL AREA

FUNCTIONAL AREA	PREVIOUS SALP - 24 MONTHS (02-27/94 - 02/24/96)	PRESENT SALP - 18 MONTHS 02/25/96 - PRESENT
OPERATIONS	6.5	2
MAINTENANCE	2.5	6
ENGINEERING	0	2
PLANT SUPPORT	4	0
TOTAL	13	10