Entergy Operations, Inc.

Grand Gulf Nuclear Station

Self Assessment

SALP Period
2/27/94 - 2/24/96

Please Note:

Information contained in the report is through mid November, 1995.

Grand Gulf's previous SALP periods were approximately 16 months, but due to excellent performance, this SALP period was extended to 24 months.

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INTRODUCTION

This report is a review of the strengths and weaknesses we have noted in our performance for the SALP period beginning February 27, 1994 and extending through February 24, 1996. The report covers the following areas:

The initial section of the report provides an overview of major themes and activities during the SALP period.

The next section discusses activities and issues which apply to multiple departments and SALP functional areas (e.g., outage performance).

The following section summarizes our activities in response to challenges identified by the previous SALP Board. While the previous SALP report for Grand Gulf contained no recommendations, the NRC outlined several areas of challenge during the SALP exit meeting which we have aggressively pursued.

The bulk of the report consists of a detailed performance review by SALP functional area: Operations, Maintenance, Engineering and Plant Support.

Finally, we have summarized Inspection Report findings, and provided information on LERs and violations by functional areas.

GRAND GULF SALP PERIOD OVERVIEW

Grand Gulf began the current SALP period challenged to improve upon the previous SALP cycle (which was the most successful period in our history) while dealing effectively with the pressures associated with an increasingly competitive environment.

Recognizing the reality of decreasing resources and the difficulty of sustaining strong performance over an extended period of time, Grand Gulf management primarily placed its attention this SALP period on the concept of focusing on what's important. Key areas of focus included:

- Safety: increasing our understanding of what is important to safety, and using that knowledge to reallocate our resources to activities most important to safety

- Complacency: motivating personnel to continuous improvement through challenging goals and openness to innovation

- Personnel error rate: reducing error rate and safety significance associated with personnel errors (which was an area of concern from the previous SALP cycle)

With one 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 to this area has resulted in extremely low personnel error rates compared to the industry as a whole.

- By all measures, the last refueling outage (RFO7) was the safest in Grand Gulf history. We achieved significant reductions in reportable and non-reportable events and core damage frequency risk.

- Grand Gulf has taken the lead industry position in innovative regulatory reform leading to major opportunities for licensees and the regulator to reallocate resources to more safety significant activities. These initiatives include Appendix J exemptions/ rulemaking, 10CFR50.55a rulemaking, improved technical specifications implementation, graded QA, advanced reactor source terms and many others.

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

- A fourth consecutive INPO '1' rating.

- A capacity factor in the top quartile of the industry - approximately 84.75% on a three year average basis.

The increased scram rate stands out as the only major blemish during this period of consistent strong performance. In retrospect, scram performance is an area of deep disappointment to Grand Gulf management because it was not chosen as an explicit area of focus this SALP period. Had we continued to apply the same level of attention to trip critical components and evolutions as was done in the previous SALP period, our scram performance this period would likely be different.

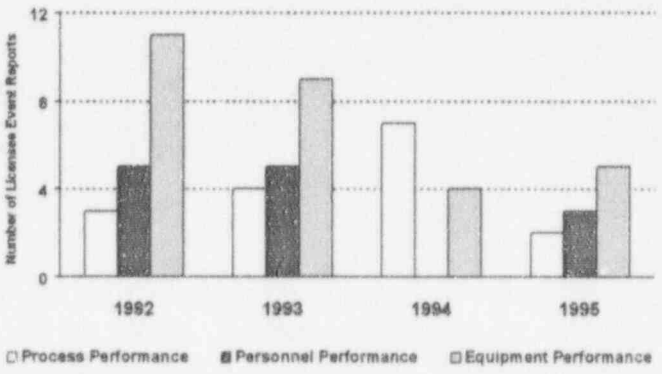
We also recognize that this period's scram performance tends, by its uniqueness, to assume an importance in excess of its significance. (And, Grand Gulf actions taken to investigate and address the issue are likewise somewhat exaggerated due to our eagerness to resolve the problem.) However, the important performance question is not whether problems occur, but how well the organization minimizes their safety effect and corrects the problem. We discuss our thought process in investigating and correcting scram performance following this overview.

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.

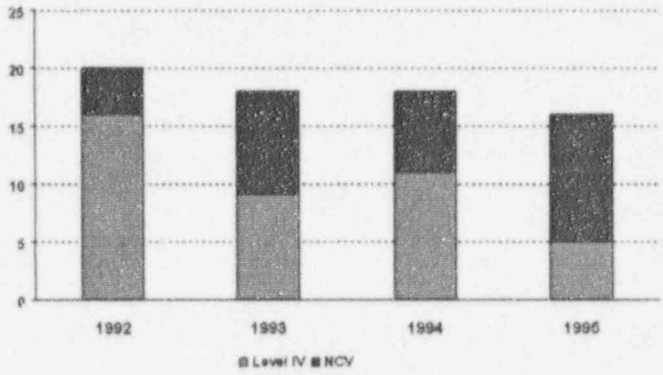
LERs are a good measure of the occurrence of safety significant events. Although not all LERs are safety significant, the reporting requirements do ensure that any safety significant events that do occur are reported as LERs. For some time, the total number of LERs has been on a declining trend at Grand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

Yearly LERs
by Performance Group



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 and continues on a slow downtrend. The number of non-cited violations constitutes an increasingly large fraction of the total.

GGNS Violations



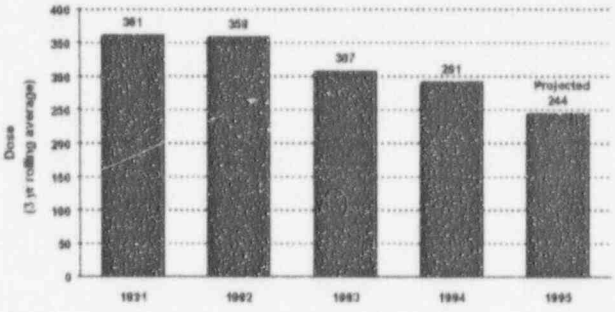
Escalated enforcement actions are also an indication of the level of safety significance of a violation. The last level III violation for Grand Gulf occurred in November, 1988. The last civil penalty was issued in March, 1985.

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.

However, Grand Gulf employs a threshold somewhat lower than the NRC's for determining "significant events". The only event of this nature during the current SALP period began in the previous SALP period - the common mode failure concern associated with slow scram solenoid valves. This event is a good example of a difficult corrective action problem that was only solved through persistence and unwillingness to accept an easy answer. It is discussed in more detail later in this report.

ALARA

Personnel dose trends are a good indication of sensitivity to the crux of nuclear plant safety. Grand Gulf dose measures show a steady downtrend over an extended period of time indicating the success of numerous completed and ongoing programs to reduce the plant source term.



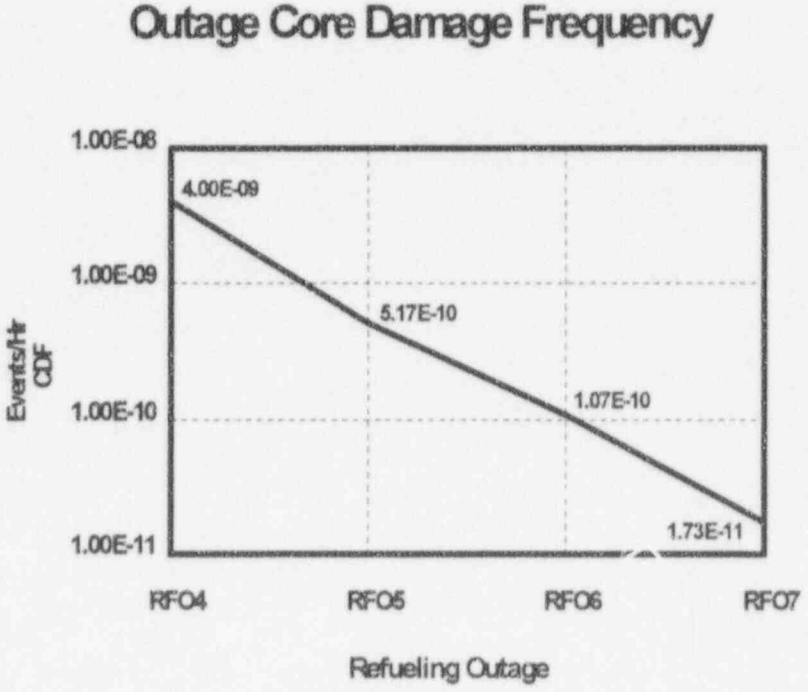
Outage IR/LER Chart

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

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

The chart to the right compares the number of IR's (Incident Reports - the lower level document preceding an LER) and LER's normalized to outage length. The IR's and LER's (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 an ongoing focus on safety as the outage progresses.

Utilizing our shutdown 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 RFO5. 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.



Conclusion

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

Overall, performance meets or exceeds that of the previous SALP period. As in the previous SALP period, one area of performance merits additional management attention (scram rate - current SALP period; human performance - previous SALP period) and is being addressed through detailed assessments and appropriate corrective action.

NOTABLE SITE-WIDE ACTIVITIES

The following discussions address issues and activities that cut across multiple organizational departments at Grand Gulf and cannot be confined to a single SALP functional area.

Scram Rate

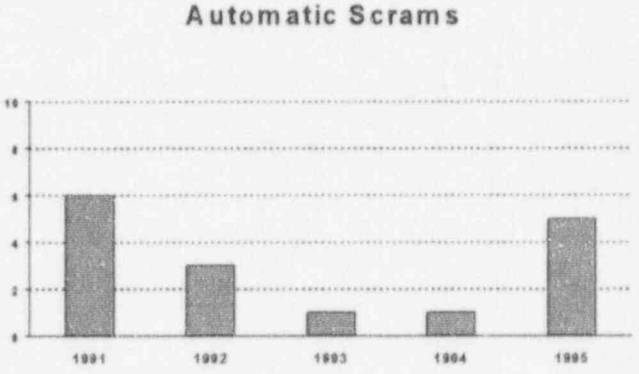
After extensive review of scram root causes and their underlying commonalities, a simple lesson learned emerged:

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

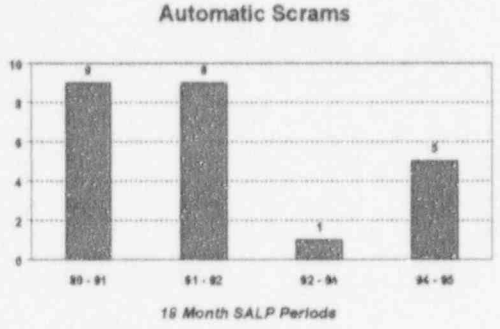
While we would have preferred to avoid the events that led us to this insight, the learning experience has been valuable and has provided us with a means to effect a fundamental improvement in the already high level of Grand Gulf performance.

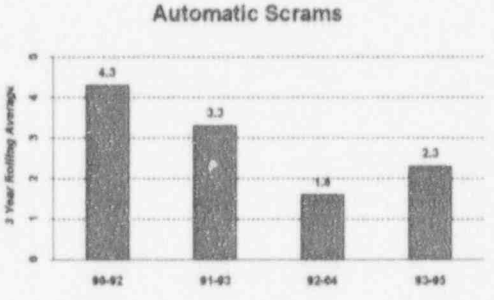
First, some background.

Historical scram performance shows a steady downtrend followed by an increase in the number of scrams in 1995.



We can also look at scram statistics on an 18 month SALP period basis and the more usual three year rolling average. Each shows a similar behavior.





Specifically, the following automatic scrams occurred during the current SALP period:

DATE	DESCRIPTION	ROOT CAUSE
11/1/94	A pinched wire on C11-F110A and a ground inserted with implementation of MCP on DC ground detection circuit coupled with a 1/2 scram I&C surveillance resulted in a backup scram valve actuation and a full reactor scram.	A modification to the ground fault detection circuitry on 125 VDC Bus 11DA resulted in an increased sensitivity to ground faults for causing inadvertent actuations.
3/16/95	A ground existed on the C11-F110A solenoid due to water intrusion. An additional ground existed on a RCIC valve motor due to a pinched wire. When I&C inserted a half scram during performance of a surveillance a full scram resulted due to the actuation of the backup scram valves.	1. Previous corrective actions (unrelated to 11/1/94 scram) had not addressed the potential for creating grounds during maintenance on DC equipment. 2. The 11R conductor for 1E51F019 was inadvertently pinched during reinstallation of the limit switch cover, creating what should have been a detectable ground fault. 3. Water, from an external source entered the conduit for the 1C11F110A valve creating a ground between the conduit and the solenoid coil.
7/3/95	Blown fuses and a burned out light bulb in the reactor water level 8 trip circuit for the main turbine and RFPT led operators to believe the trip circuit was reset when in fact it was not. This trip coupled with an I&C surveillance resulted in a trip of the main turbine and feed pumps resulting in a full scram.	1. Equipment failure / degradation - unidentifiable reason. 2. Design less than adequate - Failure detection of indication circuit less than adequate.
7/12/95	Loss of condenser vacuum due to a rupture of the A condenser neck expansion joint seal. Premature seal rupture was due to seal degradation from oil intrusion.	1. The work process (oversight and implementation) for performing the lube oil system flush in RFO6 did not ensure adequate administrative control of the bearing pedestal drain covers was maintained. 2. Equipment Design - A solid rubber drain cover was utilized for gross foreign material exclusion in the #2 bearing pedestal oil deflector cavity. The manner in which they were used prevented proper drainage of the lube oil used in the system flush.
7/30/95	Main turbine trip due to the failure of the "A" phase current transformer for the Unit Differential relay on the J5228 breaker. The failed current transformer gave an erroneous trip signal to the main turbine resulting in a full reactor scram.	Unpredictable infant mortality failure.
9/17/95	Low reactor water level scram caused by the trip of the "B" feedwater pump during surveillance testing. A failure of the "B" feedpump discharge check valve caused a reduction in feed flow to the RPV resulting in a low level scram.	Two separate root cause evaluations are in progress: 1. Failure of the pressure regulating valve, PRV-4, in the RFPT testing circuit caused a trip of the B RFPT. *(Failure to identify trip critical component and/or inadequacy in preventive maintenance program.)* 2. Failure of the B feedpump discharge valve to close. *(Design inadequacy and/or design application inadequacy)*

The first scram in the SALP period was also the first scram in more than a year of operation. The next two scrams occurred four months apart, with an intervening refueling outage. Although Grand Gulf conducted normal evaluations and investigations for the first three scrams, their commonalities were hidden and far from evident. Other than the obvious commonality of the DC ground detection circuitry design (which was addressed in RFO7), the first three scrams appeared unrelated.

Even after five scrams it was difficult to identify similarities that would lend themselves to corrective action. On the surface, a common thread amongst the scrams points to hardware problems rather than personnel errors. Digging a little more deeply into the root

causes of the scrams, however, reveals little similarity amongst them - some go back to original design problems. Others point to work practices. Another involves infant mortality.

Given the lack of similarity amongst the scrams, it was not readily apparent that an adverse trend existed until the closely grouped set of scrams in July, 1995. Even at that time, there was no obvious similarity - i.e., the 7/3 scram was associated with original electrical design and electrical equipment failure, the 7/12 scram was associated with original mechanical design and mechanical equipment failure, and the 7/30 scram was due to the infant mortality failure of a current transformer whose impending failure could not have been identified by any known means.

Although there was no apparent and substantive common thread underlying the recent scrams, on July 31, Grand Gulf management directed that an internal scram task force and an external scram assessment team be chartered to determine if such commonalities existed and, if so, to make recommendations to prevent further occurrences.

The internal task force reported its results on August 7. By delving further into the root cause investigations, the task force noted additional similarities amongst the scrams (the 9/17 scram was incorporated in the task force results at a later time):

	Scrams					
	11/1/94	3/16/95	7/3/95	7/12/95	7/30/95	9/17/95
Work practice problems (e.g., crimped wire)	X	X	X	X		
Design not optimum	X	X		X		X
Untimely corrective action	X	X	X			X
Trip-critical attention not applied		X				X

This information was discussed site-wide as a short-term measure to emphasize increased employee and management attention to those process activities tied to recent scrams. The information compiled by the internal task force was also supplied to the external scram assessment team.

The external scram assessment team (which included members from Callaway, Houston Lighting & Power, an SRC outside member, a management consultant cultural expert and various EOI members) met on August 14-18. Shortly thereafter, the team reported its findings to Grand Gulf management.

The external assessment team found that several key threads underlied the process issues identified by the internal task force:

- Management allowed organizational intensity and focus to shift from trip-critical activities. Expectations in such areas must be continually reinforced through effective communication.

- Organizational effectiveness and teamwork was strong in crisis but compartmentalization was decreasing effectiveness during routine activities.

- Although not deficient, the corrective action process did not meet the needs of a high performing organization in anticipating and minimizing the effects of developing problems. It should be modernized.

While management formulated an action plan to address the findings of the internal and external assessments, a number of interim actions were implemented, beginning in September, to re-focus site-wide attention on trip-critical activities and personal accountability. For instance, pre-authorization of work activities was suspended for two weeks and all plant work was required to be scheduled to gain personnel attention and additional scrutiny to identify hidden potential trip-critical and other problems. Pending modifications and forced outage work was reviewed to determine what trip-critical changes should be expedited. Management meetings with plant groups were conducted to reinforce accountability and personal responsibility, to sharpen focus on details, and restore a general "back to basics" atmosphere.

By early October, the major elements of a Grand Gulf Performance Improvement Program were identified, and then finalized near the end of the month. The major emphasis of the improvement program lies in the following areas:

- Increased effectiveness in managing site focus and minimizing external distractions,

- Enhanced site management team effectiveness, and

- Upgrade/modernization of the corrective action program.

In retrospect, it is clear that the increase in scram rate this SALP period was due to one primary factor - management of site focus. There is no individual SALP functional area that caused or excessively contributed to the scrams (although Operations is prominent by its lack of contribution), nor is there a unique process problem (i.e., the scram root causes are spread across largely unrelated processes such as design and work practices). Rather, having conducted a quite successful campaign several years ago to lower the scram rate, site attention was re-directed to more pressing problem areas such as human performance. While the successful actions of our scram reduction period remained in place, management emphasis was reduced.

With the benefit of hindsight, the lessons learned are apparent. There are certain performance areas such as personnel error and trip-critical activities which must receive continuous reinforcement - we can't declare victory.

No Grand Gulf problem area has failed to yield to focused attention. With restoration of trip-critical sensitivity and our recognition of the necessity to maintain that focus, we have every expectation that the Grand Gulf scram rate will be quickly restored to a low level.

Scram Solenoid Problems

In 1994, Grand Gulf was faced with one of its more challenging technical problems: slow scram times. Resolution of this problem provides a typical example of teamwork and commitment to safety.

On March 26, 1994, during routine testing of 26 control rod scram times several rods were slow from position 48 to position 43, although all rods were fast to full insertion. While the Technical Specification limit for slow rods had not been reached, the decision was made to shutdown the reactor. A manual scram was inserted. Following the shutdown, a root cause was performed and the cause of the slow scram times was attributed to contamination by thread sealant. All 193 scram solenoids were washed or replaced and Teflon tape was substituted for thread sealant.

Prior to restart, the Plant Safety Review Committee directed that scram time testing be performed at a reduced interval to ensure proper resolution of the problem. On May 28, 1994, scram time testing was performed again. This time only two scram times were slow to position 43. While this was an acceptable value per Technical Specifications, the Plant Safety Review Committee directed that additional control rods be tested. This required a testing plan be developed. Reactor Engineering, Operations and Scheduling as well as I&C developed and executed the plan without error.

Because of the repeated problem, a root cause group covering all major areas of Engineering was formed to pursue the root cause. Vendors were consulted and they conducted independent testing to determine the root cause of the event. During this process all 193 control rods were tested. Maintenance replaced almost all the scram solenoids. In the end, Grand Gulf determined that the root cause was material changes in the vendors' supplied solenoid seat material. Initially, the vendors stated that this was not the problem. Because of the detailed root cause and confirmation with testing data, Grand Gulf concluded that the vendors were mistaken but as a caution did continue to schedule control rod scram time testing at a reduced interval. The next scram time testing found no indication of the problem. Eventually, the vendors involved confirmed the root cause determination made by Grand Gulf.

The resolution of this problem required the participation of the majority of the groups on site. Rather than accepting the consensus position of the vendors and some NRC inspectors that the slow scram times were due to contamination, this group persisted over a period of six months in determining the actual root cause and solving a problem which could have continued for an extended period of time.

Training Review Groups

Training is essential to every group on site. To improve the quality and scope of training, the structure of the Training Review Groups (TRGs) was changed in December 1994. Formerly, all TRGs were chaired by the same individual for the 11 accredited training programs. This approach established a consistent working format for all TRGs. Station management directed that each TRG be chaired by the applicable department manager. Participants in each TRG include the Manager, Nuclear Training; the department manager, superintendent and training coordinator; the applicable training supervisor; training program instructors; selected department supervisors and a job incumbent. The following benefits resulted from changing TRG leadership:

- Direct department manager approval of training program schedules, materials, tasks, and future training changes.

- Direct interface with training manager, training supervisors, students, and training instructors for training program feedback, and enhanced departmental ownership of training.

- Direct input to training regarding plant job performance deficiencies.

- Timely resolution of training program deficiencies by department managers, including first line supervisors.

- Reinforcement of management expectations.

Improved Technical Specification Project

The Improved Technical Specifications were implemented at Grand Gulf in March 1995 through a dedicated project team including Operations, Maintenance, System Engineering, Training, Chemistry, Design Engineering, Nuclear Safety & Regulatory Affairs and Plant Projects & Support. Major items which were accomplished as part of the implementation included:

- Revision of approximately 600 procedures.

- Upgrade of the Logic System Functional Testing implementing procedures.

- Development of documentation of how procedures implemented the Logic System Functional Testing requirements.

- Incorporation of approximately 200 procedure revision requests into the affected procedures.

- Extensive operator training on Technical Specification usage.

- Development of operator aids to assist in Technical Specification compliance.

- Reviewing adequacy of procedural implementation of the Technical Specifications.

The implementation of the Improved Technical Specifications went smoothly throughout RFO7 and the subsequent startup. No reportable events have been identified as being caused by the implementation of the Improved Technical Specifications. A post-implementation audit confirmed that high quality standards were applied throughout the project.

OUTAGE (RFO7)

Grand Gulf outages involve all departments from preplanning to completion.

Outage Preparation

The outage schedule is planned well in advance. In addition to normal outage planning activities, Numerous meetings to review the schedule, plan work, develop contingency plans and evaluate outage safety are held well before the start of the outage. The following items are examples of outage preparation activities that contributed to a safe and successful RFO7:

- Scope additions after the scope freeze date milestone required senior management's approval by signature before adding to the outage scope.

- Accountability to pre-outage milestones by each department was evident during the pre-outage meetings. Each department prepared and delivered a status of the milestones at each of the pre-outage meetings.

- The Control Room is a very busy area especially during the first several days of the outage. Pre-Authorization To Start (ATS) of about 75 percent of all work in the outage helped to reduce the bottle neck of traffic and workload in the Control Room. This also allowed operations to focus on system outage configurations and reduced the time craft spent waiting for packages to be ATS'd. One example is the Pre-ATS of the snubber packages which reduced the amount of time spent by the snubber inspection group waiting to commence work.

- 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 close involvement in the planning of the outage schedule and the integration phase by the first line supervisor.

- 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. The

tagging process improved with several innovative clearances hung for systems which have historically been major problems. As in previous outages, several Reactor Operators were dedicated to reviewing the outage schedule and preparing the tags before the outage started.

- Outage preparations improved in virtually all areas. All designs were complete, work packages prepared, and tests written prior to the start of the outage.

- Just prior to the outage, when the schedule is final, two safety assessments are performed. Design Engineering does a probabilistic assessment using ORAM risk models. Additionally, Design Engineering performs risk analysis for specific cases that may occur during the outage. For RFO7, Design Engineering looked at natural circulation and core offload.

- Nuclear Safety and Regulatory Affairs performs a deterministic assessment of the schedule. This assessment is fed into the Shutdown Operations Protection Plan (SOPP). The SOPP is a detailed plan identifying periods of relatively high risk, contingency plans, equipment requirements, etc.

  - The SOPP was reviewed with the Operations Shift Superintendent prior to each shift turnover and before the Key Safety Functions Status board was updated. The status board showed the relative risks for the day and the corresponding color to indicate the risk level. The status board was reviewed with plant staff personnel each morning.

  - Additionally, NS&RA monitors outage activities and reassesses the schedule periodically against the NS&RA assessment and the ORAM model to check for unanticipated changes in safety. Should this occur, the schedule change would be supplemented by contingency plans or other actions to maintain safety of an acceptable level.

Outage Implementation

Some noteworthy tasks performed during the outage include:

- Drywell Insulation

  Removed fiberglass insulation from drywell components and duct work to eliminate a potential source of emergency core cooling pump strainer clogging.

- High pressure Turbine

  Replaced the High Pressure Turbine rotor and inner casing as a turbine efficiency upgrade consisting of a new blade design, a new last row of blades of a new "twisted" design, and a new nozzle admission ring with a reduced throttle capability. The

diameter of the rotor was increased from 1430 to 1500 mm. This design change has yielded 37 Mwe increase. The High Pressure Turbine upgrade was the first phase of upgrades scheduled for implementation. The Low Pressure Turbines are scheduled for upgrade in RFO8, RFO9 and RFO10.

- The feedwater reliability upgrade continued and increased the overall system reliability and thermal performance:

  - In the past, all Condensate and Condensate Booster Pumps tripped at once upon a low flow condition with no time to take Operator action. The Condensate Pump and Condensate Booster Pump low flow trip logic was modified to stagger the pump trips.

  - The LP Feedwater Heater level control logic was changed such that the level setpoint is automatically set-down based on extraction steam pressure. This will ensure that the dump valves open promptly to prevent isolation of the heater string on high level during turbine trips.

  - A new dead-band control scheme was added to the control logic for the Condensate Pump, Condensate Booster Pump, Feedwater Pumps and Heater Drain Pumps minimum flow valves. This new feature eliminates the continuous oscillation of the feedwater system during plant low power operation. One benefit of this modification will be reduced wear to the seals and internals of the minimum flow valves by elimination of the continuous oscillations/valve movement.

- Recirculation System Discharge Gate Valves

  Modification of the B33F067A&B internals corrected the potential failure mode due to disc rotation. The total time that we were in an operation with the potential to drain the vessel was 38 minutes for the F067A and 32 minutes for F067B. Considerable time was saved by replacing the valve internals with refurbished unit II valve internals and using a go-no-go gauge.

- NOREM was applied to the seats on the B21F010A & B and guides on the B21F010B Feedwater check valves. This modification supported the Source Term Reduction program by eliminating stellite from F010A/B. In addition to the hardware change, design analysis enabled us to change the local leak rate testing method on the feedwater check valves from an air and water test to a water test only. Mock-ups were used extensively in preparation for the feedwater check valve work. This was another significant dose savings. The personnel performing this work were able to identify interferences and other problems prior to work in radioactive/contaminated areas.

- The B21F032A and B valves were modified to a two piece disc and arm arrangement from a one piece disc and arm assembly. This modification allowed for easier alignment of disc to valve body seat during installation and allows for a slight

automatic adjustment during operation if wear or slippage occurs. In support of cobalt reduction, the resilient seats were replaced with stainless steel seats.

Two areas were also noted during the outage which are in need of improvement. Both these areas concern radiological practices.

- Several items were found in the Hot Tool Room that were above plant limit to be tagged. These items were >5000 cpm. In addition, several items were found to have fixed contamination and were not painted yellow and magenta. Some tools were found with paint very faint on their surfaces. The Hot Tool Room was resurveyed by HP and items identified as problems were removed or corrected.

- During this period there was evidence of gum and candy wrappers and used tobacco products inside the RCA. This continues to be a problem and is being addressed through training. One contractor was terminated for chewing gum in the RCA.

Outage Performance

- Maintenance outage performance was very effective in plant repair and showed a marked improvement in personnel and contractor performance. No significant safety events occurred relating to contractor control during RFO7. Grand Gulf personnel performance showed a marked improvement.

- Another key aspect of outage performance was resource sharing between Entergy Nuclear Units. Approximately forty eight personnel from the other nuclear sites were loaned to Grand Gulf during RFO7. Grand Gulf feels this leads to a more reliable unit since company craft generally demonstrate a higher level of ownership and quality.

Fuel Failure Identification and Response

On September 10, 1995, plant operators noticed a small increase in offgas radiation monitor readings after return of the instrument to service following a purge. An investigation was promptly initiated to determine the cause. Offgas isotopic samples, coolant iodine samples, and charcoal vault area radiation monitors all showed an increase above normal levels. Reactor Engineering was contacted and initiated the Grand Gulf Failed Fuel Action Plan. Offgas grab sample frequency was increased to twice per day and a coolant sample was taken for a cesium ratio analysis. Corporate Fuels was contacted to perform an assessment of the available data.

The failure was soon confirmed to be a single, small to medium sized cladding perforation or tight defect. A plan was put in place to continue to monitor for signs of worsening of the failure. Additional analysis indicated that the failure was likely to be in a medium-aged assembly. Special power suppression testing was conducted during a subsequent plant

startup. This testing showed that the most likely location for the failure was a central control rod cell containing two assemblies of the suspected age.

Prompt action on the part of Operations, Reactor Engineering, Chemistry, and Fuels Dept. personnel resulted in the failure being identified quickly. This made it possible to plan future power maneuvers with the failure in mind, and to closely monitor for degradation so that additional actions could be taken to mitigate releases if necessary. Continual monitoring is planned for the remainder of the cycle to determine outage activities required to address the leaker.

PROGRESS SUMMARY OF SALP PERIOD CHALLENGES

Grand Gulf's last SALP report for the period of 8/23/92 - 02/26/94 contained no recommendations. The NRC did identify at least one challenge for each functional area during the SALP exit. These challenges are briefly summarized in this section and are discussed in greater detail in the "functional area" section.

OPERATIONS

Challenge

- Continue to focus on eliminating "inattention to detail"

  During the last SALP period, we experienced multiple control rod mispositioning events. Although procedures were identified as a contributor, it was evident that human performance issues were the most significant factors. As a result, Operations management continues to provide strong focus on human performance issues such as "inattention to detail" events. In fact, this was a major focus area during the current SALP period. Steady improvement has been noted as evidenced by a reduction in the number of LERs and violations due to operator error as well as in lower level documents such as quality deficiency reports.

SALP PERIOD	# of LERs
'89 - '91	12
'91 - '92	8
'92 - '94	6
'94 - '96	4

SALP PERIOD	# of VIOLATIONS
'92 - '94	14
'94 - '96	6.5

Although, this trend is encouraging, continued effort in the area of human performance is necessary. For example, during this SALP period, we experienced a number of personnel errors associated with the protective tagging process. Despite the fact that these errors were of low safety significance, it is recognized that all errors, regardless of their significance, must be addressed to preclude more serious consequences. Details of corrective actions are included in the Functional Area Regulatory Summary.

MAINTENANCE

Challenge

- Control of Contractors

  Although significant improvements have been made since the last SALP period (i.e., a marked improvement in contractor personnel performance and no significant safety events occurred related to contractor control during RFO7) continued management oversight remains imperative for successful outage performance.

  - Raise contractor performance to the same level as plant employees.
  - Review and improve incentive programs so that management expectations for contractor performance are clearly communicated.
  - Evaluate need for better trending of contractor performance.
  - Communicate management expectations to all contractor coordinators.
    See Details in Functional Area Regulatory Summary (Maintenance).

ENGINEERING (System Engineering, Reactor Engineering, Design Engineering)

Challenge

- Sustain Improving Performance

  System Engineering

  System Engineering continues to have a dedicated, proactive attitude towards resolution of long standing plant problems. In order to improve performance, System Engineering strives to perceive the "big picture", then provide insight commensurate with their system knowledge. This perceptiveness combined with a "questioning attitude has resulted in resolution of numerous plant issues and improvement of system and thus overall plant operations.

  Reactor Engineering

  To enhance performance, Reactor Engineering has modified procedures, changed to the Plant Data System computer, and continues to work with BWROG. Reactor Engineering trends key reactor operating parameters such as core monitoring code Keff, load line, core flow, and thermal limits. This allows any adverse or unexpected trends to be identified early and addressed as the situation requires.

Design Engineering

In Design Engineering's quest for improvement in efficiency and quality many self-assessments and process improvements have taken place. Since a large number of recommendations for improvement are generated, Design Engineering maintains a consolidated tracking mechanism for all these identified recommendations. The status of these recommendations are periodically updated and presented to Design Engineering management as a tool to identify progress and focus available resources where they can be best utilized.

PLANT SUPPORT

Challenges

Radiological Controls - Health Physics

- Improve the shipment of radioactive waste
  - Changed the vendor checklist and procedures
  - Trained vendor and Grand Gulf personnel
  - Instituted use of liners with verification test legs
  - Developed new liner type for dewatering mixed media shipments
- Methane

  The Radwaste department and Radwaste Health Physics group took significant steps to combat the methane production problem in liners. Activities include:

  - Revised procedures to include methane monitoring protocol.
  - Fillhead modification to allow remote gas sampling.
  - Hosted EPRI conferences.
  - Implemented Natural Work Teams.
  - Acquired outside technical expertise.

Fire Protection

Challenge

- Enhance fire protection awareness and involvement in the design change process.
  - Fire protection personnel were added to the review cycle for all modifications.
  - All fire pre-plans were reviewed and updated.

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	None

Event/Enforcement Comparison:

	Previous SALP (16 Months) (08/23/92 - 02/26/94)		**Current SALP** (24 Months) (02/27/94 - Present)	
LERs	8		4	
Violations	IV	NCV	IV	NCV
	8	9	6.5	7

Inspection History (other than Resident Inspector):

Inspection	Date	Notes*
94-16	11/28/94	V, S, W

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

OPERATIONS PERFORMANCE ANALYSIS

PLANT OPERATIONS

Strengths

Command and Control

Strong command and control by Operations is necessary for the safe operation of the plant. It has been a centerpiece of licensed operator classroom and simulator training through use of events requiring diagnostics and focus by each team member. This includes review and critique of recorded crew simulator exercises.

- Effective command and control was noted on numerous occasions such as:
  - Approach to criticality during off normal events such as reactor scram during severe weather.
  - During special evolutions such as replacement of scram solenoid pilot valves.

Attention to Detail

During the last SALP period, we experienced multiple control rod mispositioning events. Although procedures were identified as a contributor, it was evident that human performance issues were the most significant factors. As a result, Operations management continues to provide strong focus on human performance issues such as "inattention to detail" events. In fact, this was a major focus area during the current SALP period. Steady improvement has been noted as evidenced by a reduction in the number of LERs and violation due to operator error as well as in lower level documents such as quality deficiency reports.

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Although this trend is encouraging, continued effort in the area of human performance is necessary. For example, during this SALP period, we experienced a number of personnel errors associated with the protective tagging process. Despite the fact that these errors were of low safety significance, it is recognized that all errors, regardless of their significance, must be addressed to preclude more serious consequences.

Control Room Annunciators

- A significant effort continued this SALP period to achieve a Control Room "black board" concept in which, under normal conditions, no annunciators are illuminated.
  - We currently have only 4 annunciators remaining to achieve black board.
  - These annunciators are scheduled for modification during the last quarter of 1995.
- Routine status meetings composed of Operations, Maintenance and Engineering personnel are conducted to not only address the black board issue, but also to focus on repair of inoperable annunciation.

Conservative Decision Making

Conservative decision making is a standard focus of plant operations, from daily work control management to integration into operator requalification training. Examples of conservative decisions include:

- Insertion of a manual scram upon detection of elevated main turbine vibration.
- The decision to replace the scram solenoid pilot valves for all 193 control rod drives after experiencing slow control rod scram times.
- The decision to perform a controlled reduction in power and remove the main turbine generator from service following discovery of a failed generator ground trip circuit.

Communications

- The Operations Superintendent often holds informal monthly meetings offsite with the SROs to discuss Operations philosophy.
- Separate offsite meetings are also held between the Operations Superintendent and reactor operators, radwaste supervision, and non licensed operators. These meetings allow for open discussion of problems as well as operating philosophy.
- The General Manager and Manager, Plant Operations meet with each shift crew during the requalification training week to discuss goals, management expectations and issues of concern to the shift.

- During the requalification training week, the Shift Superintendent conducts an informal team building session that is independent from the Training department. This session provides a forum for improving teamwork skills.

Work Control

Operations maintains strong input into the daily planning/scheduling of plant work activities. Examples include:

- Use of Senior SROs as the site work coordinator.
- Conservative release of safety significant equipment.
- Use of PRA insights and maintenance rule requirements in maintaining plant equipment.

Technical/Process Improvements

Human Performance Initiatives

A number of initiatives have been undertaken to continue improvements in Human Performance.

- "Improving Human Performance Program" - the foundation of this program was developed by an Entergy-wide quality action team composed of Operations personnel of all ranks. This program is designed to further strengthen human performance by:
  - Setting formal expectations at every level.
  - Promoting ownership of key processes.
  - Providing process improvements in protective tagging.
  - Increasing operator knowledge levels.
  - Refining of control room formality and procedure adherence.
- Continuation of the "Peak to Peak" employee meetings by senior managers to reinforce and build upon concepts affecting human performance. These sessions are intended to foster the notion that we can move from one performance "peak "to another performance "peak" skipping over the intervening performance "valleys".

- Assignment of an experienced Operations SRO to the Root Cause Analysis Group to increase the group's awareness of operational issues and broaden their knowledge of plant operation.

- Internal trending of human performance issues by Operations. These trends are distributed to the operating shifts so they may acknowledge and address adverse trends and areas needing improvement.

- Formal root cause analysis and human performance enhancement system (HPES) training for a portion of on-shift licensed and non-licensed operators.

- Continued emphasis on the self-checking program Stop, Think, Act, and Review (STAR). STAR has been a routine topic during requalification classroom training, simulator training, and pre-evolution briefs.

Self-Initiated Assessment

- During this SALP period, Operations conducted a self initiated assessment which included both main line and radwaste operations. This assessment identified weakness in the following:

  - Operator ownership.

  - Operator knowledge.

  - Protective tagging process.

  - Attention to inoperable Control Room instrumentation and "black board" concept.

  - Radwaste Control Room material condition.

  - Effectiveness of shift briefings.

- As a result of improvement initiatives to address the assessment, performance improved in these areas as discussed below.

  - Six Operations SROs participated in assessments at other sites providing those sites with insight to programs successful at Grand Gulf and providing a benchmarking mechanism for improvements to our processes.

  - Strong support of site visits by other Operations crews (six sites) provided the opportunity to share successful processes and identify areas for improvement.

Operator Training

The Operations Department continues to provide leadership to and ownership of operator training. Improvements in operator training this SALP period include the following:

- Increased diagnostic skills via simulator exercises, enabled by extensive simulator computer and modeling upgrades.

- Use of a formal simulator critique process that includes defining the major categories of performance and ensuring involvement of all members of the shift crew.

- Implementation of an operator knowledge improvement program to increase operator knowledge and retention. This program consists of closed book, written exam questions and questions outside the covered material to identify knowledge areas needing reinforcement.

- Command and control seminars.

- Three experienced SROs were transferred to the Training Department to broaden the experience base of both operator initial and requalification training, and provide additional operator ownership of training.

- Formal simulator evaluations at the beginning of the requalification training week to measure operator knowledge retention.

- A merger of non-licensed and radwaste operator training to broaden knowledge level.

Radwaste Control Room Improvements

Site management and an internal assessment identified the need to improve the material condition and functionality of the Radwaste Control Room. Completed improvements include:

- Redesign of the Radwaste Control Room

  - Increased the work space for operators and supervisors.

  - Improved lighting in the Radwaste Control Room.

- Upgraded the Radwaste computers to allow access to site network.

- General material condition improvements such as painting the Radwaste Control Room floors and walls.

- Repair of Radwaste Control Room instrumentation and annunciation.

- Inclusion of the Radwaste Control Room annunciation and instrumentation as part of routine status meetings.

Radwaste Program Improvements

Operations has been active in reducing liquid radwaste generation, reducing liquid discharges to the environment, and eliminating biological gas generation (methane). Initiatives include:

- Implementation of a reverse osmosis system for processing liquid radwaste to provide for less waste generation, recycling a much greater percentage of radwaste water resulting in fewer discharges to the environment, and discharges with lower curie content.

- Volunteering as host utility for a EPRI tailored collaboration project on elimination of biological gas generation in low level radioactive waste storage.

- **Implementation of Improved Technical Specifications** (See Notable Site-Wide Activities)

- The Improved Technical Specifications (ITS) were issued March 20, 1995, 25 days prior to the start of RFO7. Although ITS were a significant change, no LERs have occurred as a result of their implementation. Operations personnel were key participants in each stage of development. Major items of involvement included:

- Operations review of ITS prior to submittal.

- Early commencement of licensed operator training to improve their understanding of the specifications, provide for additional reviews, and obtain ownership.

- Extensive changes to Operations procedures.

- A program to monitor for Loss of Safety Function.

Process Improvements

Operations continues to be instrumental in the work control process. Process improvements include:

- Increased involvement of the Shift Superintendent in daily work control planning and scheduling meetings.

- Tracking of out-of-service hours for use in the Maintenance Rule.

- Assisting Maintenance department in achieving an extremely low work order backlog.

Areas for Improvement

Protective Tagging Process

- Internal plant trending and self assessments have identified weakness in the protective tagging process. Initiatives to strengthen the process include:

  - Formation of a dedicated tagging group chaired by a SRO and composed of ROs.

  - Development of a new computerized tagging system.

  - A major revision to the protective tagging procedure to provide a more user friendly and understandable procedure.

Equipment Configuration Control

- Root cause analysis and internal trending recognized weaknesses in equipment configuration control. Actions in progress include:

  - Initiatives such as a formalized configuration control status board and face-to-face meetings between the Operations Superintendent and operating crews.

  - Revision of the protective tagging procedure and elements of the improving human performance program.

Timely Performance of Reporting Requirements

- During July 1995, we failed to notify the NRC within one hour when HPCS injected following a reactor scram.

- During this SALP period we also failed to notify the NRC within four hours of a single train failure and did not make timely notification to local agencies upon loss of meteorological monitoring equipment.

  While none of these events were significant, failure to meet reporting requirements is a concern to Grand Gulf. Operations is seeking ways to strengthen the ability of operators to rapidly determine reporting requirements.

Measurement of Shift Performance

- In an effort to continue improvement in human performance a program that will measure and trend shift performance is being implemented. This program includes:
    - Formalized trending/measuring
    - Identification and use of event free attributes/behaviors
    - Increased focus on accountability

OPERATIONS PERFORMANCE ANALYSIS

NUCLEAR OPERATIONS TRAINING PROGRAM

Strengths

- Successfully maintained INPO accreditation for the Operations and Technical Training Programs.

- Continued a very successful onsite college degree program. Five participants, including management, operations, and technical personnel, received baccalaureate degrees during this SALP cycle.

- Utilized subject matter experts in Engineering Support, Chemistry, and Health Physics continuing training resulting in more efficient and effective training.

  - Student feedback is positive due to the subject matter experts sharing personal experiences.

  - Training instructors assist in developing lesson plans, reviewing presentation strategies, and monitoring the first presentation of a topic.

Health Physics/Chemistry Training

- Revised all Health Physics and Chemistry practical factors to meet the new INPO suggested format.

- Implemented an enhanced site training program by:

  - Qualifying several Health Physics and Chemistry personnel as basic instructors.

  - Revising the site training procedure to include guidance for preparing site training material that meets the Systematic Approach to Training criteria.

Operations Training

- Effective simulator post-exercise critiques has strengthened operating crew teamwork skills and improved performance in areas of previously identified weaknesses. Instructors brief the crew shift superintendent immediately following simulator exercises to help identify strengths and weaknesses for discussion in post-exercise critiques.

- An instructor has been assigned to each shift. This instructor tracks crew and individual training needs and crew performance trends. This information is supplied to the shift superintendent prior to the operator self critique.

- The simulator upgrade project has resulted in more effective operator training.

- There has been an added emphasis on teamwork skill training using both tabletop techniques and simulator scenarios.

Operator Self-Critiques

- To enhance self-critiques, an area behind the simulator main control panels has been reserved for the crew to assess its own strengths and areas for improvement.

  - The plant supervisor leads the crew through the sequence of events, asking which activities were performed well, which activities should have been performed better, and what steps could be taken to bring about improved operator performance.

  - An instructor involved in running the scenario typically joins the operators to answer their questions.

  - The shift superintendent participates in the instructor post-exercise discussion. Operations and Training managers frequently observe these discussions. The shift superintendent then facilitates discussion among the crew regarding their performance, focusing on the strengths and areas for improvement identified by the crew and the instructors.

Systematic Evaluation of Training Feedback

- Plant management, discipline plant supervisors and job incumbents provide feedback to the training program through the Quarterly Training Review Group (TRG) meetings. Feedback is also provided through the various interdepartmental meetings. The Manager, Nuclear Training regularly attends the daily plant status meeting, the Vice President's staff meeting with his direct reports, the Site Management Team meeting, and the Monthly Management Review meeting.

- Training Observations and Feedback Mechanisms include:

  - Plant line management from first line supervisors to department heads observe training in the classroom, laboratory and simulator.

  - Management's evaluation of the adequacy and effectiveness of training is documented using Training Observation Forms.

  - Observations identify areas of strengths and weaknesses.

- Feedback is provided on recommendations received at TRG meetings.

- Management comments are reviewed and assessed for future training improvements. If weaknesses are identified which require training material revisions, Training supervisors initiate a Training Materials Review form.

- After each training class, students complete a Course Feedback Form. Feedback results are summarized by the Training supervisor or designee using the Course Evaluation Summary sheet which includes:

  - ◊ Recommended actions
  - ◊ Actions completed
  - ◊ TRG approval
  - ◊ Sign-off when the action is completed
  - ◊ Supervisor's signature

- At each Training Review Group (TRG) meeting, all feedback (a permanent agenda item) is reviewed. Any required actions are approved by the TRG and the Evaluation Summary Form is signed by the supervisor.

- The Training Department has established a systematic evaluation of training feedback.

  A filing system has been established for Student Course Feedback, Course Evaluation Summaries, Examination Reviews, Post Training Evaluations, and Annual Supervisor Surveys submitted for accredited programs administered at Grand Gulf.

- Training Program Evaluations conducted are reviewed quarterly for each training program during the Training Review Group (TRG) meetings. The evaluation includes:

  - A review of course feedback.
  - Industry events.
  - Job and task analyses data.
  - Exam review data.
  - Any OJT observations, and management observations.

- Action items are assigned and tracked by TRG meeting minutes, and Training Material Reviews (TMRs) forms are generated, if necessary.

Maintenance Training

Multidiscipline Training

- Multidiscipline training of teams of instrument and control technicians, mechanics, electricians, operators, and engineers promotes teamwork and plant equipment ownership. The results of this training contribute to:

  - Reduced radiation exposure.
  - Reduced equipment downtime.
  - Improved working relations among the Maintenance, Operations, and Engineering organizations.

  Multidiscipline training was conducted during each of the past three years. The results of these training activities include the following noteworthy items:

Motor-operated Valve Maintenance

- Following multidiscipline training of crews of operators, engineers, mechanics, and electricians, the radiation exposure received by the motor-operated valve maintenance crews during recent refueling outages was significantly reduced compared to previous outages.

- Station managers stated that the multidiscipline training was the single most important contributor to the radiation exposure reduction.

Drywell Chiller Performance

- Multidiscipline training was conducted in 1993 that addressed specific troubleshooting activities and crew ownership of the chiller units.

- Following training, a multidiscipline crew of operators, electricians, mechanics, engineers, and instrument and control technicians recommended operating procedure changes that were subsequently implemented.

- The multidiscipline training on this equipment and the subsequent procedure changes contributed to reduced equipment failure rates of these units during this SALP period.

Air-operated Valve Performance

- In 1994, Grand Gulf managers identified air-operated valve performance as needing improvement. As a result, multidiscipline training of Instrument and Control technicians, Operations personnel, Mechanical Maintenance personnel, and engineers was conducted in 1994 to address troubleshooting and setup of the air-operated positioners and valves.

- These crews established good rapport that resulted in improved working relationships. Maintenance and engineering personnel monitor air operated valve performance to help determine the effectiveness of the multidiscipline training.

Recirculation/Feedwater Hydraulics and Controls

- Two classes offered in 1995

- Attended by Mechanical, I&C, Planners, and System Engineering Disciplines

Interactive Video Training

Interactive video and computer-based instruction are used during Mechanical and Electrical Maintenance personnel and Instrument and Control technician initial training. This results in effective and efficient delivery of training information and active involvement of the students.

- This training increases instructor efficiency by allowing instructors to periodically monitor student progress while performing other duties.

- Low maintenance personnel attrition results in only one or two students per year in initial training. Incorporating interactive video and computer-based training into initial training reduces instructor contact time without reducing overall training effectiveness.

- Interactive video and computer-based training features include:

  - Electronically administered section pretests and post-tests.
  - Immediate remediation.
  - Instructor review capabilities.

- This training is also viewed by students as better than self-study due to increased student involvement and attention.

- Comprehensive written examination and laboratory exercise scores indicate that the training is effective.

Technical/Process Improvements

Self-Initiated Assessments Conducted

The practice of conducting independent assessments and self assessments continued throughout this SALP period.

- Three assessments were conducted with one focusing on Technical Training Programs, and two focusing on training processes, including:

  - Training material reviews (TMRs).
  - Feedback.
  - Annual supervisor surveys
  - Scheduling of training.
  - Class attendance.
  - Instructor training.

- Assessment results continue to be factored into training program and process improvements.

Process Improvement

The Training Review Groups (TRGs) serve as the governing body for the accredited training programs and are the formal interface between plant departments and the Training Department.

- The structure of the station's Training Review Groups (TRGs) changed in December 1994. Formerly, all TRGs were chaired by the same individual for the accredited training programs. This approach established a consistent working format for all TRGs. Station management decided to have each TRG chaired by the applicable department manager. Participants in each TRG include the manager, nuclear training; the department manager, superintendent and training coordinator; the applicable training supervisor; training program instructors; selected department supervisors and a job incumbent. The following benefits resulted from changing TRG leadership:

  - Direct department manager approval of training program schedules, materials, tasks, and future training changes.

  - Direct interface with training manager, training supervisors, students, and training instructors for training program feedback.

  - Direct input to Training regarding plant job performance deficiencies.

  - Timely resolution of training program deficiencies by department managers, including first line supervisors.

Initiatives

- The upgrade of the Plant simulator was completed.

  - The feedwater model has been modified to incorporate the design change to low pressure (LP) and high pressure (HP) feedwater controls.

- Software upgrades to three system models are scheduled to be completed by the end of 1995.

- Recent Training facility improvements include adding 5,000 square feet of space for maintenance training mock-ups and equipment.

  - Equipment acquired includes a fully operational Rod Control and Information System (RC&IS), Reactor Recirculation Flow Control Panel, Reactor Recirculation Hydraulic Power Unit Skid, Nuclear Instrumentation Panels, General Electric Power Vac Breaker and Cubical, and other associated equipment.

  - Acquisition of additional training space and equipment has allowed more hands-on troubleshooting of major plant control systems in a training environment.

  - Benchmark testing of design changes and modifications prior to implementation on plant installed equipment is also being performed.

- Installed a new gamma spectroscopy system in the training count room.

- Developed computerized database systems using bar-codes to streamline RFO7 contractor processing which automated generation of check-in forms, course packages and other reports

Areas for Improvement

- Detailed implementing procedures for the development and administration of examinations need to be better controlled and reviewed to ensure adequate compliance with 10CFR55.

  - A TCN was issued to ensure compliance to 10CFR55 Exam Security requirements.

  - A QA audit was completed that evaluated Grand Gulf's program to 10CFR55 requirements and found all programs were in compliance with 10CFR55.

- "Guides" used to develop and administer testing material need to be controlled and approved by the Training Manager.

  Using the applicable data from a QA Audit, Grand Gulf's last Inspection Report, (50-416/94-16), and NRC Information Notice 95-24, Grand Gulf Guides were written in procedure format. These procedures were approved prior to the recent Annual Requalification Exam.

- Develop a specific training program for refueling activities.

  - During 1994, Training developed and presented a Fuel Handling Operator Training Program to the Non-licensed Operators. The program consists of approximately 40 hours of classroom training with a comprehensive written examination and qualification cards for each refueling component.

  - During 1995, Training developed and presented a Fuel Handling Contractor Training Program to Westinghouse Fuel Handling Contractors. The program consists of approximately 24 hours of classroom training with a comprehensive written examination and qualification cards for each refueling component. Feedback indicated that the very successful fuel movements during RFO7 were due largely to this training.

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

Previous SALP Recommendations:

None

Event/Enforcement Comparison:

	Previous SALP (16 Months) (08/23/92 - 02/26/94)		Current SALP (24 Months) (02/27/94 - Present)	
LERs	10		9	
Violations	IV	NCV	IV	NCV
	2	1	2.5	5

*Level IV/Non-Cited Violations

Inspection History (other than Resident Inspector):

Inspection	Date	Notes*
95-01	2/21/95	NV

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

MAINTENANCE PERFORMANCE ANALYSIS

Strengths

Maintenance has continued to improve in this SALP period in several important areas such as reduction in Work Order backlog and control of contractor performance. Based on internal and external audits, Grand Gulf Nuclear Station remains strong in the area of human performance, but has not yet achieved management's expectations. Effective team work, noted in previous evaluations, is a constant against which the performance of maintenance will always be measured, both internally and externally. Performance in other areas noted as excellent in past SALP evaluation, such as the ISI program, management involvement, and procedural adequacy has been the subject of continued improvement. The corrective maintenance program continues to be effective with additional attention focused on Root Cause Analysis aimed at reducing maintenance preventable equipment failures.

In an effort to detect areas that require a more focused approach before they become significant, Maintenance has established a program referred to as "Maintenance Standard of Repetitive Excellence". This program consist of four basic parts as outlined below:

- Maintenance Assessment Process
- Maintenance Enhancement Process
- Maintenance Initiative Process
- Maintenance Corrective Action Tracking /Trending

Maintenance Assessment Process (MAP)

The practice of conducting independent assessments and self assessments continued to be a strong maintenance asset this SALP period.

Tools for measuring the effectiveness of maintenance and identifying opportunities for improvement include the following:

- Internal assessments such as:
  - Trending of Deficiency Reports
  - Quality Deficiency Reports (QDRs)
  - Quality Program Audits
  - Security Deficiency Reports (SDRs)

- Post Trip Analysis (SCRAM Reports)
- SCRAM Frequency Reduction Committee Reports (SFRC)
- NRC Inspection Reports
- Personnel interviews
- Craft Feedback forms

- Suggestion boxes
- Plant walkdowns
- Benchmarking other plants and industries with similar maintenance processes.

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

Four external assessments were conducted this SALP period that focused on Maintenance directly. Two additional assessments, Industrial Safety and Health Physics, focused on aspects of nuclear operations in which maintenance is directly involved. These assessments were programmatic in nature and intended to evaluate all maintenance processes. Revealed in the assessments are both positive results and areas that present challenges to the Maintenance Department of Grand Gulf.

Maintenance Enhancement Process (MEP)

This part of the maintenance program is directed at improving maintenance processes. 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
- Independent verification

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 most efficient, safe and reliable plant in the world. Initiatives include:

- Minor Maintenance Program
- Shared Resources
- SFRC (SCRAM Frequency Reduction Committee)
- Procedure Simplification/Reduction
- 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 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.

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

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).
- Five section rotation in Mechanical Maintenance thereby allowing more supervisory oversight in the field.
- 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.

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

Material Condition

Material 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 material condition by performing routine plant inspections. This ensures plant personnel are aware of the importance of plant material condition. All discrepancies 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 RFO7 there were 466 open work orders including Minor Maintenance Trouble Tickets (MMTTS). This increase was due to work orders being written just prior to and during RFO7 that were prioritized as non-critical and/or non-refueling which could be worked during normal operations .

Two of the most significant programs that led to reduced backlog are:

- **Minor Maintenance Program**:

  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.

  The Minor Maintenance Program consists of a minor Maintenance Review Committee (MMRC) that reviews every Condition Identifier (CI) to determine if it meets predetermined guidelines to qualify as a Minor Maintenance Trouble Ticket (MMTT). A MMTT requires a less formal planning process which increases efficiency. CIs that do not meet the criteria are subjected to a formal planning process due to their impact on plant safety and reliability.

  The MMRC is composed of the following minimum representatives to ensure all procedure, regulatory and quality requirements are met.

  - Operations
  - I&C Maintenance
  - Mechanical Maintenance
  - Electrical Maintenance

- Planning and Scheduling
- Quality Programs
- P&SE

- **Reliability Centered Maintenance (RCM)**

  The RCM list of critical components and the RCM process are applied to the review of the outage schedule and establish priorities determining maintenance tasks that could be deferred or eliminated. The RCM analysis of the electrical distribution systems has also simplified and expedited outages by extending the interval of AC distribution bus outages to alternate outages instead of each outage as was previously done. This allows for a more proactive approach to maintenance on the selected bus for that outage.

  The Grand Gulf RCM project has produced two key results.

  - The basic mission of improving reliability is the first result. Review of the corrective maintenance (CM) history shows the overall trend of CM man-hours for all RCM evaluated systems is consistent with a decreasing trend in CM man-hours following the RCM analysis. This information indicates that the RCM program is reducing corrective maintenance man-hours by reducing the frequency of failures or achieving a better balance between significant and non-critical failures.

  - The second result of the project is cost reduction, while generally increasing overall system performance and reliability.

  Although the work order backlog has been reduced, maintenance management is aggressively pursuing the maintenance backlog reduction through system outages and performance of corrective/preventive maintenance tasks. In addition, maintenance has implemented a nine (9) week work schedule which allows a more structured focused effort on planning maintenance work. This nine week schedule also allows for more efficient resource loading and contingency planning.

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; therefore, during this SALP period, the Maintenance Manager has served as the TRG Chairman for each Maintenance discipline. This ensures consistent direction between each Maintenance discipline and between the Maintenance and Training Departments.

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 AOV's, B33, recirculating 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 conduct at least two assessments each week to assess the interaction between the first-line supervisors and their crews. The assessment results are documented on a survey form and routed 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

Outage Performance

Contractor Control

Maintenance Outage performance was very effective in plant repair and showed a marked improvement in in-house and contractor personnel performance. In the last SALP period, weaknesses were noted in contractor control during RFO6. Two events involving contractor performance led the NRC to make this observation. The events included:

- Failure to follow procedures and work outside of the scope of the maintenance activity (improper cutting of LPRM cables).

- Failure to replace turbine casing bolts.

No significant safety events occurred related to contractor control or plant personnel during RFO7. I&C performance was exemplary during this outage, no LERs, inadvertent

equipment operations, or isolations occurred as a result of I&C activities throughout the outage. Grand Gulf personnel performance showed overall marked improvement.

Resource Sharing

Another key aspect of outage performance was resource sharing between Entergy Nuclear Units. Approximately forty eight personnel from the other nuclear sites were loaned to Grand Gulf during RFO7. 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, performed more of the corrective maintenance. Also, this allows for reduced reliance on contractor personnel and, 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 Rule program at Grand Gulf is fully implemented well ahead of the required due date. Operations, System Engineering and Maintenance have utilized the 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 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 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 plant down time.

Areas of Improvement

Adherence to Procedures

Management expectation on procedure use has been and continues to be emphasized to the maintenance craft. Therefore, Level of Use Training is on-going for all plant personnel which includes:

- Training on Level of Use Procedure
- Simplifying procedures for ease of use
- Communication of expectations for each craft/supervisor that they will be held accountable for their actions.

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 (QDRs)
  - Maintenance manager review and reinforcement of expectations with all maintenance staff (accountability)
  - Re-emphasize "STAR"
  - Peer monitoring by supervisor, superintendent, manager
  - Develop and implement JPMs that emphasize basic work practices such as FME and spill prevention
  - Use 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 is presently located within several plant procedures, without specific reference to FME. Currently, plant staff is developing a new plant procedure devoted entirely to FME. The procedure is being developed based on process controls currently in place at Grand Gulf, as well as other plants benchmarked in the procedure development process.

    ◊ Industry events training is being provided on SOER 95-01 to Mechanical, electrical, I&C, and Engineering Support Personnel.

    ◊ New lesson plans are being 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 RFO6 resulted in a failure of the condenser boot seal. Actions already taken in RFO6 consisted of improvements in the procedure which added signoffs for the pedestal closeout. These improvements were implemented in RFO7 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.

Outage Maintenance

- Attention to Detail

  Although maintenance performance throughout RFO7 was excellent, a maintenance preventable failure occurred during startup. 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	None

Event/Enforcement Comparison:

	Previous SALP (16 Months) (08/23/92 - 02/26/94)		**Current SALP** (24 Months) (02/27/94 - Present)	
LERs	6		8	
Violations	**IV**	**NCV**	**IV**	**NCV**
	3	3	0	1

*Level IV/Non-Cited Violations

Inspection History (other than Resident Inspector):

Inspection	**Date**	**Notes***
N/A		

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

ENGINEERING PERFORMANCE ANALYSIS

SYSTEM ENGINEERING

The Performance and System Engineering department at Grand Gulf continues to be a strength in providing support to Operations and Maintenance. The System Engineering (SE) section has focused its attention towards system reliability and providing the environment, administrative authority and controls to enhance a proactive approach to system management, trending and problem resolution. The SE program continues to focus on the engineer's involvement in the field, monitoring system performance and reliability.

The program continues to be assessed and fine tuned to incorporate new information and lessons learned. Revision 2 to the System Engineering Handbook was issued in January of 1995 to incorporate both internal and external comments from various sources. The new revision reformatted the handbook and further defined expectations and guidelines for the System Engineers. The program continues to focus on system ownership and proactive attitudes. Highlights of the program include:

- **Weekly Walkdowns** - System Engineers are required to record maintenance and operating conditions that indicate how well the system is performing. Observations are documented and maintained in a system book.

- **Trending** - System Engineers are required to trend various system parameters to identify adverse trends or failures and any parameters that may exceed accepted values.

- **Design Walkdowns** - System Engineers are required to perform design walkdowns to confirm that the system is installed and operated in accordance with its design basis.

- **System Logbooks** - System Engineers are required to maintain system logbooks to provide a place to document system specific events and provide a place to store current system information such as current walkdown reports, quarterly reports, trend data, and any other data deemed important by the engineer.

- **Quarterly Reports** - System Engineers are required to develop quarterly reports on each system. This report requires the engineer to review, evaluate and report the current status or health of each of his systems. In doing so, he considers the following information:

    - Current system document status
    - Weekly walkdown reports
    - Evaluation of system trend data

- Logbook entries
- Significant system events and concerns identified during the quarter

The current revision of the SE handbook was devised following completion of a natural work team, whose mission was to produce a "Check and Adjust" revision to the handbook to include the concerns identified during a 1994 self assessment. Improvements included:

- Consolidating and streamlining the handbook to make it easier to use
- Reformatting the content
- Adding specific goals and expectation sections
- Further developed duties and responsibilities section
- Added more detailed guidelines with examples
- Added a formal turnover process including a system turnover checklist

The SE program is a living program that continues to be refined and adjusted to meet the changing needs of the station. The program continues to be a valuable tool to assist Operations and Maintenance in increasing system performance and reliability and ultimately plant performance.

Strengths

System Engineering Involvement

Strong support to operations and maintenance, through day to day involvement of the system engineer, continues to be a real strength. By having a "System Expert" to monitor system performance by performing walkdowns, trending performance data, keeping abreast of industry events and changing technology, and pushing resolution of outstanding issues, the reliability of systems and ultimately the plant, is increased.

Examples of proactive engineering involvement include such items as:

- In addition to the above problems, RWCU historically tripped off-line spuriously. The System Engineer researched previous events and performed extensive testing and monitoring. As a result, an interface mismatch was found to exist with the system programmable controller coaxial cable and transfer switch. This mismatch was eliminated via a temporary alteration, pending a permanent design change. Since implementation of the temporary alteration, no further spurious trips of this nature have been experienced.

- Drywell temperature monitoring indicated a gradual upward trend over several cycles. Degraded insulation, chiller performance problems, and marginal system design were considered the likely cause and were being investigated for corrective action. The System Engineer, using the Plant Data System (PDS), began monitoring performance of various components of the system. He found that a contributing cause was degraded performance of the cooling coils in the drywell. He arranged for replacement

during RFO7, which resulted in a 20 degree drop in drywell temperature following startup. An additional benefit is that now he is able to optimize chiller performance, such that chiller replacement at a future date can be eliminated or deferred for many years.

- Cooling tower performance is routinely monitored by Engineering Support and began showing a degraded trend last cycle. The System Engineer, along with Chemistry personnel, began experimenting with cooling tower models in order to develop an improved chemical addition system. Several on-line approaches were tested during the cycle, but dilution was a problem. A contractor was located that could perform fill cleaning during shutdown. As much as 70% effective cleaning was achieved with this method during the outage. To facilitate efforts to determine an even better on-line cleaning method, injection ports were installed during the outage to allow additional on-line testing.

- The System Engineers involvement with the Lightning Task Force has produced various enhancements to power supplies, grounding and interface cards. By thoroughly investigating all components associated with neutron monitoring, paths were found that could lead to lightning induced problems. These were systematically eliminated and tested. In addition, state-of-the-art monitoring technology has now been incorporated into other areas of the plant, due to the understanding and availability of this instrumentation at Grand Gulf by SE. The end result is that Grand Gulf no longer backs down in power prior to a storm front.

- Instrument Air dew point has been monitored by the plant for many years. As problems arose, maintenance would be performed on the dryers that would temporarily correct the problem. Through SE investigation and testing, the dryer exhaust mufflers were found to be the problem. Preventive maintenance tasks were set up for periodic muffler replacement while the System Engineer worked with vendors and the design organization to obtain an improved design. A design change to replace the mufflers is now issued and scheduled for implementation. Dew point monitoring has continued, with no indication of adverse trends.

- SE monitoring of work orders has found an increased failure rate of power supplies. Investigation of all trip critical and safety related power supplies across the plant was initiated. One particular type supply, which had a large increase in failures, was identified and accelerated replacement was performed. Sensitive power supplies are being evaluated to address preventive maintenance tasks and improved design or refurbishment. In addition, a method of on-line monitoring for component degradation is also being investigated.

- During a weekly walkdown by the System Engineer, it was noted that a spare 4160 switchgear breaker was in the disengage position. The engineer knew the seismic qualification of the panel required that the breaker either be racked in or racked out

and engaged. An MNCR was generated, resulting in procedure changes and training for both operators and Electricians.

- During System Engineer review of information being trended on the Emergency Diesel Generators, it was noted that some of the data points for diesel generator fuel oil were outside acceptable limits. This condition had gone undetected, even though the surveillance had been signed off as satisfactory.

- Increased monitoring of main generator vibration occurred, when generator Bearing #11 vibration alarmed with an indicated step change in vibration. The unit was taken off line and the generator was inspected for damage. After several investigations, it was discovered that the generator rotor, which is water cooled, had an internal leak causing an imbalance in the rotor. The system engineer suggested that, as a temporary fix, holes be drilled in the opposite cooling pipe inside the rotor to regain a balanced condition. This was successful and the unit was restarted, while plans for a rotor changeout were finalized.

Resolving Long Standing Issues

- System Engineers continue to have a dedicated, proactive attitude towards resolution of long standing plant problems. They strive to perceive the "big picture", then provide insight commensurate with their system knowledge. This perceptiveness combined with a "questioning" attitude has resulted in resolution of numerous plant issues and improvement of system and thus overall plant operation.

Examples of issue resolution include such items as:

- Lighting induced scram issues
- RWCU system reliability
- Drywell temperature improvement
- Cooling tower performance
- Instrument Air dewpoint
- Power supply reliability
- Electrolytic capacitor degradation
- Spurious Safety Relief Valve trips
- Condensate and Feedwater System improvements
- Scram solenoid pilot valve operation
- Recirculation Pump shaft failures
- Feedwater dump and drain valve reliability
- Feedwater Check Valve LLRT performance

Improved Technical Specification Project (See Notable Site-Wide Activities)

System Engineering was extensively involved in the initial review and comment development of Improved Technical Specifications. During development of the

implementation and review requirements, System Engineering was successful in including reviews of several procedural areas in an effort to enhance the quality of the Surveillance program and its interface with the plant. These areas included:

- Verification review of Logic System Functional Test (LSFT) procedures for technical adequacy and procedure overlap. This was to re-verify applicable testing of all required components of the logic system.

- Development of drawings and written verification depicting exactly how the LSFT requirements were being satisfied by each procedure.

- Verification review of procedures against licensing commitment tracking database to ensure all Tech Specs were satisfied by procedure and that the database was correct and reflected new procedure revisions.

- Verification of Plant Impact Statements for Surveillance procedures to reflect proper LCOs, out of service times, equipment and system impacts.

The project was successfully implemented just prior to RFO7 with no LERs generated during the outage and very few subsequent procedure changes required (< 2% of more than 630 procedures changed/written). An additional benefit was the incorporation of more than 200 procedure enhancement requests and 240 procedure change notices during the revision of procedures requiring change for the implementation.

Senior Reactor Operator Training

Operator training for engineering personnel is seen as a necessity for broadening overall experience base, enhancing qualifications, and providing superior plant support. The training provides an opportunity for the engineer or supervisor to receive instruction on various subject matter from an operator's perspective. This allows the engineer to better understand operation of the plant and further enhance the interface with Operations personnel. Three superintendents, five supervisors, and four engineers have completed operator training. In addition, two supervisors and two engineers are currently attending operator training.

System Engineering Use of Trending Programs

Utilization of trending programs and the Plant Data System (PDS) to detect adverse conditions or trends continues to be a strength. Numerous predefined 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

ENGINEERING PERFORMANCE ANALYSIS

ENGINEERING SUPPORT

Strengths

Surveillances:

Grand Gulf has continued to maintain a strong awareness of surveillance task tracking and performance, only one surveillance deficiency involved a missed surveillance task. The other surveillances deficiencies were associated with inadequate performance of a surveillance or incorrect surveillance interval. The issues were self-identified by Grand Gulf during required and routine reviews. In all cases the occurrences were immediately documented as deficiencies. The causes of the surveillance deficiencies were unrelated and were immediately addressed:

- An incorrect calculation for a local leak rate test was identified during the review of a surveillance. The calculation did not affect the validity of the LLRT. Action to prevent recurrence will specifically identify the expectations for verifications of calculations.

- An incorrect update of the surveillance tracking database resulted in a missed surveillance. Formal root cause analysis determined the cause and corrective actions. Corrective actions included:

  - A complete review of the surveillance tracking database.

  - Development of written guidance for performing manual calculations in the database.

- An incorrect frequency was discovered while reviewing a surveillance procedure for the Improved Technical Specification (ITS). Corrective actions included:

  - Successful performance of the surveillance.

  - A task change to correct the frequency. Careful review of procedure purpose statements for surveillance procedures revised during the ITS revisions to ensure correct frequencies.

Access to Plant Data:

Grand Gulf has greatly increased the access to current and historical plant data via a new Plant Data System. The new system combines several plant computers, increases data available to plant personnel, and provides a connection to the site area network. This allows for distribution of on-line plant data to a wide segment of plant personnel. Access

and ease of availability to historical archived plant data has enabled personnel to work much more effectively, especially in the area of troubleshooting and problem analysis. On-line accessibility to system data from process diagrams is being used by individuals to determine and evaluate station and system performance along with individual parameter status of thousands of components.

Some examples of the widespread use of this system include:

- Troubleshooting and analyzing component vibration (e.g., main turbine, reactor recirculation pumps, etc.)
- Reactor recirculation pump seal oscillations.
- Pinpointing drywell leaks.
- Locating a four-megawatt loss in condenser efficiency.

Check Valve Non-Intrusive Testing:

- Grand Gulf has expanded its use of acoustics, ultrasonics and external magnetics to determine the condition and/or position of check valve internals. This practice is referred to as "non-intrusive testing".
- The use of non-intrusive testing eliminates the need for disassembly in many of our check valves. In addition to monitoring check valve condition and position, this practice reveals the condition in which the valve normally operates such as disc fluttering or full open against the backstop.
    - This information is helpful in determining the next scheduled maintenance activity.
    - During RFO7, eight check valves were not disassembled based on the results of non-intrusive testing data. This eliminated system downtime and reduced outage cost and dose.

Vibration Monitoring Program:

The vibration monitoring program at Grand Gulf continues to be a leader in the nuclear power industry for equipment condition monitoring through its innovative approaches to continuous and periodic monitoring, and its active support of ASME/O&M Committees.

- This program:
    - Collects and analyzes data to support Operations and Maintenance for equipment retest following maintenance.

- Evaluates equipment condition to preclude unnecessary equipment outages.

- Provides trending capabilities of overall and spectral components in velocity, displacement or acceleration.

- New systems are being investigated which will enhance analysis techniques, improve trend capabilities, and provide transient data monitoring. Grand Gulf plans to install a vibration test panel to bring all monitored points to a central location for easy access. Methods to decrease the sample time for spectral and overall data collection are being investigated.

- In addition to the Continuous Monitoring Program which monitors approximately 25 machines, the Portable Monitoring Program has been expanded to collect spectral and overall vibration data on approximately 170 plant machines on a scheduled basis.

- Permanent vibration probes have been installed on portable program machines that exhibit problems and are difficult to access. Cables are run to convenient, low dose areas so that routine data collection is not hampered or dose-prohibitive.

- Laser alignment procedure was written for Mechanical Maintenance to allow for more accurate and faster alignments. Several other maintenance instructions were enhanced to improve monitoring of rotating equipment and provide stricter controls on machine disassembly/ reassembly.

- The Vibration Monitoring Program continues to reap significant benefits by minimizing machine downtime and allowing maximum lead time to plan machine outages. Benefits are also realized in reduced radiation exposure, ability to adjust monitoring ranges and alarms to reflect changing equipment operating parameters, improved fault analysis and trending, and improved maintenance retests.

Technical/Process Enhancements

Component Failure Review and Trending

The P&SE Engineer Review Group reviews, monitors, and packages equipment failures for easy use and evaluation by system engineers. This is accomplished through review and trending of corrective maintenance work orders.

- A work order bar code tracking system has increased the accountability, improved the tracking, and shortened the close-out processing time of work orders.

- All work orders are reviewed to identify and report repeat component failures. The reports are tracked and processed to ensure timely evaluation by system engineers.

- A Component Failure Analysis Report was modified for easy trending and evaluation. This was accomplished by:

  - Providing component failure charts of Grand Gulf component failure trends versus industry.

  - Failure narrative briefs and failure cause briefs.

  - Significance of factors all on one page which provides a single source document for evaluation and analysis.

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. Additionally, the SFRC approves additions, deletions, and changes to the trip-critical and trip-sensitive system list and reviews all post-trip analysis reports. The committee consists of representatives from Plant and Design Engineering, Maintenance, Operations, Nuclear Safety and Regulatory Affairs (NS&RA), Quality Programs, and Modifications.

The committee meets a minimum of four times a year to discuss existing items, near misses, and potential scrams. The committee has evaluated eight near miss or potential scram issues. Twelve corrective actions have been implemented to prevent scrams or the recurrence of a previous scram during this SALP period. Resolutions include:

- Actual Scram Related

  - Lightning strikes
  - Evaluation of spurious high pressure core spray injection
  - EHC duplex filter
  - Loose connections in RPS terminal box

- Potential Scram Related

  - SRV set logic
  - Main steam line high-rad scram isolation logic
  - Condensate booster pump trips
  - Elimination of unused B21 gauges/instrumentation
  - Deletion of C51 jumper requirement
  - Change out of power supplies
  - Level oscillations due to failure of o-rings

While the SFRC's actions have been effective, they are not sufficient on their own to prevent all scrams. See "Notable Site-Wide Activities" for further discussions on scrams.

Maintenance Rule Program

The Maintenance Rule program at Grand Gulf has been fully implemented since January 1994 covering two cycles of data reviewed. Since 1/1/94, ongoing monitoring and failure analysis has been performed to ensure this program is functioning well before the rule implementation date of July 10, 1996.

- Since January 1994, the Maintenance Rule program has monitored prescribed performance criteria. This includes system or train functional unavailability time as well as reliability or MPFFs (Maintenance Preventable Functional Failures). Each year an evaluation of the performance of systems within the Rule scope is conducted as well as determining programmatic adequacy. In this evaluation, (a)(1) or (a)(2) status of systems is determined with the results communicated to the plant staff.

- Training on the basic elements of the rule has been conducted with plant staff and management at Grand Gulf during this SALP period. Through the ESP (Engineering Support Personnel) program, a training session was given during November and December of 1994 with a short exam to demonstrate proficiency in the elements of the Rule. All personnel in each of the maintenance disciplines have received training on how the Maintenance Rule affects their jobs and how important proper documentation is for evaluation of component performance.

- Early in the implementation of the Rule at Grand Gulf it was decided that in order to have a successful program, compliance and cost were important.

  - Existing programs and processes already in place should be used to the fullest extent.

  - Tracking of unavailability hours by the Planning and Scheduling Department, use of the IPE for risk determination, and application of industry-wide operating experience by the Operating Events Department are a few examples of processes used to implement the rule.

- An expert panel, made up of experienced plant personnel, was assembled to determine risk significant systems. The panel utilized results from the IPE combined with their expert judgment to determine what systems should be risk significant and receive focused performance monitoring.

- During this SALP period, assessments of the Maintenance Rule program were conducted to check and adjust the processes and programs used for implementation.

- On 5/17/94, NEI coordinated a week long assessment of the Maintenance Rule program and processes at Grand Gulf.

- NEI, INPO and industry peers participated in this informal assessment which was a key for early successes at Grand Gulf.

- This assessment pointed out minor course corrections needed to ensure compliance with the rule and to prepare for pilot inspections by the NRC.

- On 9/12/94, the NRC conducted the first of nine pilot inspections on the Maintenance Rule. The purposes of these pilot inspections were to determine adequacy of the inspection procedure used for the rule, as well as, to judge industry readiness for July 10, 1996.

  - Grand Gulf received high ratings on progress of elements of the program developed for the Maintenance Rule.

  - Minor changes were made during and prior to this inspection to meet all expectations of a fully implemented program.

- Since the NRC pilot Inspection, the Maintenance Rule program at Grand Gulf has continued to develop.

  - Minor course adjustments made from the pilot inspection has validated the Grand Gulf program as a leader in rule implementation.

  - Grand Gulf has participated in industry activities such as an NEI assist visit at Clinton Power Station and presenting insights from the pilot inspection at NRC/NEI workshops. Visits to Grand Gulf from other utilities to discuss implementation insights included Browns Ferry, Brunswick and Iberdrola (Spanish Utility).

- In June and July of 1995, Grand Gulf (along with other pilot plants) traveled to Washington, D.C. to discuss with the NRC critical issues brought out during the pilot inspections.

10CFR50, Appendix J Performance Based Testing Program

A performance based testing program as an exemption to 10CFR50, Appendix J containment testing requirements was developed in August of 1993. It was approved by the NRC in April of 1995 and successfully implemented during RFO7. This program uses testing history and other risk based analysis to develop extended testing intervals consistent with safety. The performance based testing program was awarded the "Top Industry Practice Award" in 1994 at the Nuclear Strategic Management Conference. In addition, Grand Gulf has been proactive with the NRC and NEI in revising 10CFR50, Appendix J to provide a similar performance based testing option to the industry. The new rulemaking was recently approved.

- Under the performance based testing approach, containment components that have not demonstrated excessive leakage are assigned extended test intervals that reflect their reliable performance. Components that demonstrate excessive leakage are still tested during each scheduled refueling outage. Other factors, such as component application, industry experience, engineering judgment, etc., are also used to evaluate the testing interval.

- The following table compares the Appendix J test intervals and the performance based test intervals as approved with NRC exceptions:

Test Type	Existing Rule	Performance Based Program/NRC Approved
Type A, Integrated Leak Rate Test (Containment)	Every 40 months	Every 10 Years after two previously successful tests at 40 month intervals.
Type B and C Local Leak Rate Test (Seals and Valves)	Every 2 Years	Every 5 Years after two previously successful tests at two year intervals.
Airlock Overall	Every 6 Months	Every 2 years after two previously successful test at 6 month intervals.
Airlock Seal	Every 72 hours	Every 30 Days after two previously successful tests at 72 hour intervals.

- The projected benefits of the program were validated during RFO7 through a reduction of ECCS outage durations, person-rem, contract costs, and plant resources.

- To further enhance the performance based program, Entergy will continue to pursue longer Type B & C test intervals through interaction with the NRC and NEI. The exemption, which requested 10 year intervals for Type B & C components, was only granted for 5 year intervals for good performers. Entergy will continue to study component characteristics, testing results and aging affects to validate our original request for 10 year intervals.

Snubber Program

A generic lubricant problem was identified in the industry concerning Pacific Scientific "PSA" mechanical snubbers. Functional test failures throughout the nuclear industry have been increasing due to dried lubricant on snubber internal components. After extensive testing, the primary cause of lubricant drying was found to be simple evaporation.

- During RFO6, a snubber which was located in a moderate ambient temperature area was found to have dried lubricant attributed solely to evaporation. Although the forthcoming service life information from Pacific Scientific was expected after Grand Gulf's next refueling outage (RFO7), it was deemed prudent to begin a systematic

maintenance program during RFO7. Grand Gulf is the first nuclear power plant in the United States to implement a maintenance plan scheduled to relubricate our mechanical snubber population to address dried lubricant service life reduction.

- During RFO7, Grand Gulf began a systematic rotation of spare inventory into the plant each refueling outage. Prior to shutdown, approximately 150 PSA mechanical snubbers were regreased in preparation for installation into the plant during RFO7.

- By taking a proactive approach to the PSA mechanical snubber dried lubricant issue, Grand Gulf expects to reduce snubber functional test failures and associated cost and person-rem.

Initiatives

Natural Work Teams

Performance & System Engineering has continued a strong emphasis on internal assessments through the use of Total Quality Natural Work Teams. In a Natural Work Team, those closest to the process work as a team to improve their work process. There have been eight Natural Work Teams in this SALP period.

- **Inservice Testing** - A procedural enhancement was made to the inservice testing procedure for improved guidance to ensure correct actions and documentation were implemented for pump and valve inservice testing failures.

- **Reliability Centered Maintenance** - Improvements included involvement of system engineers, use of an instrument matrix, fault trees, and additional application of trip critical and trip sensitive components. The changes are expediting the analysis of all trip-critical and trip-sensitive systems before the Maintenance Rule is effective.

- **Work Order Close-out** - Bar code tracking was incorporated and redundant reviews eliminated to streamline review and close-out of work orders. Corrective maintenance history is readily available which facilitates Maintenance Rule evaluations, Maintenance Monitoring evaluations, NPRDS evaluations, and troubleshooting.

- **Surveillance Tracking** - Redundant tracking was eliminated and resource utilization was realigned to streamline the tracking process.

- **System Engineering Handbook Revisions** - Provided better definition of responsibilities and duties, a formal turnover process, and more efficient utilization of system engineering resources.

- **System Engineering Internal Communication** - Opened communication lines by establishing monthly group meetings, weekly supervisor meetings, face-to-face

meetings with management, and specific times set aside for supervisor consultations.

- **Work Management Processes** - Provided software programs to use to assign and manage due dates for activities. This allows supervisors to see each engineer's workload when assigning work and allows for priority changes. This also permits the engineer to have a common list of their workload.

- **Lubrication Control Program** - Development of a centralized oil issue facility to enhance control, ease of issue, and lubricant level of use tracking.

AOV Program

Because AOVs can experience performance problems similar to MOVs, and key steam cycle valve performance has been less than optimum, a proactive approach was taken to review, evaluate, and initiate an action plan to improve the long-term performance of important air operated valve (AOV) assemblies. Based on industry surveys, this program is one of only several of its kind in the U.S. and is truly unique in its use of prioritization techniques

- Aggressive actions have been instituted to review all aspects of AOV performance.

  - Utilizing "lessons learned" and knowledge gained from the site MOV program, a proceduralized program was developed utilizing risk-based scoping methodology.

  - Detailed maintenance instructions have been issued patterned after EPRI-NMAC procedures for MOVs. Diagnostic equipment was procured and used extensively in the last refuel outage.

  A rigorous evaluation was conducted on plant problem valves.

  - Findings resulted in upgrading actuator elastomers to high temperature materials.

  - Program scoping methodology obtains inputs from the 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 committed to conduct full program efforts (design reviews / enhanced maintenance / diagnostic testing) on the high and medium risk AOVs.

  - Each reviewed AOV has been ranked using a weighting system considering risk significance, safety significance, failure/problem history, design margin, worth relative to power generation, and its physical environment.

- Use of the ranking system ensures optimum allocation of resources by concentrating on the plant's most important AOVs.

Thermal Performance:

During this SALP period, Grand Gulf implemented several items to improve overall plant thermal efficiency, routine monitoring and reporting.

- The HP turbine was upgraded during RFO7 as a part of the main turbine upgrade effort to improve the plant thermal efficiency. The improvement resulting from the HP turbine upgrade was more than the 20 MWe.

- Additional improvement in final feedwater temperature was also realized from the HP turbine upgrade, in that delivered 5th stage extraction pressure to the #6 HP heaters increased ~ 4 psi.

- An Air-Operated-Valve improvement program has been implemented. This program covers most of the important high-energy line drain and dump valves that were prone to leakage problems in the past.

  Thermocouples installed on many high-energy drain and dump lines continued to be an important part of cycle isolation and provided valuable information for initiating corrective actions. Fourteen more thermocouples have been installed since the last SALP evaluation.

- Action Plans developed from self-assessments with the assistance of INPO/EPRI/Peer Group have been implemented. These actions included:

  - Performance of a feedwater flow rate tracer test using non-radioactive lithium nitrate to determine if feedwater flow elements were fouled.

  - Reduction of calibration intervals for the main condenser pressure transmitters to 18 months.

- Changes to monitoring and reporting techniques included:

  - Routine performance of thermal performance evaluations using 24-hour average data to reduce fluctuations

  - Development of utility programs to facilitate long-term trending

  - Revision of daily Executive Summary thermal performance report

- Modification of the thermal performance monitoring program to include some automatic checking of possible data drift.

- The Thermal Performance Improvement Group has been active in pursuit of improvements to plant thermal efficiency. The results included:

  Faster resolution of thermal performance problems such as leaking or stuck valves as well as prioritization of design modifications to improve plant thermal performance.

- The Plant Data System (PDS) allows post-event collection of thermal performance data for trending and evaluation thereby enabling investigation of past events more fully. Also, the faster PDS allows data collection at higher frequency for more accurate time averaging.

ENGINEERING PERFORMANCE ANALYSIS

REACTOR ENGINEERING

Strengths

Core Management

Conservative core management and in-house pattern development has resulted in zero thermal limit violations and no significant preconditioning overpowers 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 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.

New Fuel Receipt

The coordination and control of the new fuel receipt and inspection (performed 3/3/95 - 3/14/95) for Cycle 8 fuel was "exceptional" per NRC comments. Receipt and full inspection of all new fuel was performed in less time (12 days) than ever before with no errors or incidents.

- Processes for safe and more efficient handling of the fuel were improved while there were no corners cut in the inspection process.
- One fuel bundle with a missing spring was found during the inspection and the bundle was repaired on site.
- 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.

Process Ownership

Fuel Shuffle

Direct participation by reactor engineers 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. This was very helpful during coordination with chemical decon efforts during RFO7.

- Improvements to the format of the fuel movement sheets suggested in the critique of RFO6 made them easier to understand and resulted in a fuel shuffle with no fuel mispositioning errors in RFO7. 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.

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 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.

Core Monitoring

At Grand Gulf, Reactor Engineering is directly responsible for the maintenance of the core monitoring computer system and the PRIME computers. This gives the Reactor Engineers a direct involvement with problem resolution.

- They are familiar with both the hardware and software 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.

- CYCLOPS monitoring system was developed in-house by Reactor Engineering to assist the RE and STA in their daily activities.

- Reactor Engineering has been involved in modifying and enhancing the core monitoring software to meet specific Reactor Engineering needs.

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. This includes common issues to all plants (e.g. Boraflex testing, corporate reactivity management policy, and organizational issues)

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

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.

Evaluation of New Fuel Supplier

Reactor Engineering played a key role in selecting a new fuel supplier during recent bid evaluations. This ensured that crucial safety factors concerning core monitoring capability, fuel operability, and fuel handling were properly considered.

- Reactor Engineering is the most experienced group in actual fuel operating characteristics and is considered by corporate fuels to be the "customer" for nuclear fuel.

- Reactor Engineering input to the selection process was heavily weighted to ensure the fuel vendor selected could provide fuel which could be safely operated at Grand Gulf with minimal chance of fuel failure.

- Reactor Engineering continues to play a central role in site preparations for new vendor fuel receipt, loading and operation.

High 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.

- Initially, the suspect assembly was located by flux tilt testing. Reload plans were changed to discharge this assembly early. The fuel vendor extensively examined this assembly and previous failures to improve future fuel design.

- The failure mechanism was determined to be debris-related as opposed to any operational overpower. This information was factored into training on the importance of foreign material control.

- A similar approach will be taken for the current fuel leaker discussed under "Notable Site-Wide Activities".

Initiatives

Control Rod Mis-Positioning Natural Work Team

Grand Gulf Reactor Engineering conducted a Natural Work Team to eliminate control rod mis-positioning events that were primarily occurring during scram time testing activities last SALP cycle.

- The team developed a new format for control rod manipulation sheets and merged the data packages for scram time testing and control rod movements for sequence exchanges into one comprehensive package. This prevents switching from one package to another which challenges the operator's concentration.

- The sheets are now typed and the new package format is easier to understand and follow.

RE Support of SSPV Changeout

Reactor Engineering initiated a detailed plan to accomplish the SSPV changeout in the existing pattern while keeping power at 70 - 75 percent during the evolution.

- The plant was having major problems with scram solenoid pilot valves early during the cycle. (See further discussions under "Notable Site-Wide Activities".) Resolution required complete changeout of all SSPVs. This was a significant challenge in that rod movement plans had to be developed to achieve the minimum rod moves necessary plus performing the scram time tests in a specific order to assist Operations. The order was further explained to the operating shifts with detailed color maps showing order and location of rod rebuilds and re-tests.

- The plan was executed flawlessly and actually performed in just over six days versus the estimated ten days. This saved the plant many megawatt hours of potential lost generation.

Management Oversight

Reactivity Management Self-Assessment

Reactor Engineering requested a reactivity management assessment performed in April 1994. The assessment team members were from inside and outside the company. Overall assessment results were favorable, and recommendations for improvements were systematically addressed by the Reactor Engineering Staff. Actions included:

- Additional training in station-wide reactivity management (implemented through continuing ESP training).

- Better feedback of industry events into daily activities, and improvements to the Failed Fuel Action Plan.

Controls for Reactivity Management

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

Neutron absorption, or "blackness", testing is required at Grand Gulf by commitment to the NRC as part of the program to address the on-going issue of degradation of spent fuel pool rack boraflex poison material. Reactor Engineering arranges for testing, prepares and maintains the test procedure, coordinates actual conduct of the test, and assesses test results. NRC observers found the tests conducted during December, 1994 to be "well coordinated." Blackness testing is a significant project requiring support from Health Physics, Operations, Quality Assurance, and corporate Nuclear Engineering. Proper coordination is necessary to arrange movement of fuel from the test area in the spent fuel pool, staging of vendor equipment including a neutron radiation source, and fuel bridge positioning to take readings. Improper test conduct can result in erroneous indications and failure to uncover potentially serious problems with spent fuel rack subcriticality. Reactor Engineering must ensure that if test results do not meet established criteria, Nuclear Engineering is alerted for further evaluation, as was the case for the 1994 test. The racks were subsequently verified to conform to existing criticality analysis assumptions.

ENGINEERING PERFORMANCE ANALYSIS

DESIGN ENGINEERING

Strengths

Elimination Of Lightning Induced Scrams

Grand Gulf approached elimination of lighting induced APRM scrams from two perspectives. Elimination of the lightning induced noise and prevention of noise coupling into the APRM circuit. Lightning rods were replaced with dissipation arrays designed to dissipate lightning induced charge and prevent lightning strikes from terminating to the plant protected area. Also modifications were made to the LPRM signal cables, APRM grounding system and APRM circuit cards to eliminate coupling of the noise.

Grand Gulf had originally planned to demonstrate the effectiveness of APRM modifications via two mocked up LPRM channels - one without any modifications and one with modifications. It was soon recognized that this was not practical due to the inability to mock up the pre-modification condition without compromising the APRM system from lightning induced noise, so a different approach was pursued.

- Utilizing a lightning detection network and a high speed data acquisition system, the effects of lightning induced noise on the APRM system for near site lightning strikes were recorded. This data was analyzed to infer the coupling path of the lightning induced noise onto the APRM system. This information was used to recreate these noise transients on a test APRM panel within a controlled environment where the effects of this noise could be determined. Also, key design changes were implemented on the test APRM panel to demonstrate how these modifications prevent lightning induced noise from coupling into the system. With the knowledge gained through testing, circuit analysis of the susceptibility of the APRM system to lightning induced noise transients was performed. This analysis supported the results recorded during testing.

- Strikes, which bound previous scram initiators in magnitude and distance, have been recorded since implementation of key designs without causing any APRM trips. This operating data demonstrates the effectiveness of these designs.

- As a result of the positive response of the APRM system to near site lightning strikes and in depth knowledge gained through the test APRM panel and circuit analysis performed, the APRM task force is confident that downpowering during lightning storms is no longer required to protect the plant from a lightning induced APRM scram.

Consequently, during the second quarter 1995, Grand Gulf ceased the practice of down powering during lightning storms.

Pressure Locking In Flex Wedge Gate Valves

- Entergy continues to receive recognition for the calculational methodology developed to assess pressure locking in flex wedge gate valves. Reports from the recent Motor Operated Valve User's Group quarterly meeting indicate the calculation is considered the "Standard in the Industry". Numerous phone calls from utilities across the nation confirm this status. NUREG/CP-0146 published in July 1995 documents the presentation of the calculation to the industry in an NRC sponsored workshop. NRC Information Notice 95-30, issued 8/3/95, describes an incident at the Hatch Plant which was resolved using the calculation as its basis.

Vessel Internals/Shroud Cracking

- Since the identification of cracking in reactor vessel components, Grand Gulf has aggressively worked towards resolution of this issue. Entergy has actively participated in industry efforts to evaluate and determine appropriate inspection and mitigation techniques for shroud cracking. The Grand Gulf reactor shroud was inspected in RFO7 using industry recommended inspection criteria. No cracking was found. Entergy is also participating in industry efforts to develop an overall strategic plan to address potential degradation of other vessel components.

- To ensure that a proactive and focused approach is used to identify any degradation in vessel internals, Grand Gulf has developed a vessel internals management program. This program provides a single source of reference for addressing internals issues. Current industry experience with vessel internals degradation has been incorporated to ensure appropriate inspections are performed at recommended intervals. Also, an RPV task group has been assembled with representatives from Grand Gulf and River Bend to ensure a consolidated approach to resolving vessel internals issues is utilized.

Flow Accelerated Corrosion (FAC)

- The FAC program at Grand Gulf was strengthened by the completion of the system susceptibility analysis. The analysis considered all plant piping for potential FAC induced wall thinning, using criteria developed by EPRI guidance NSAC 202L. Piping that is susceptible to flow induced corrosion was identified. Identification of susceptible piping that is appropriate for modeling was also performed and the data used in development of the Grand Gulf program. Two hundred and one areas were monitored for FAC during RFO7.

- For small bore piping (2" NPS and smaller) an evaluation was performed that identifies FAC-susceptible piping using accepted EPRI criteria and defines the scope of the small bore FAC monitoring program.

- Grand Gulf completed the update of its piping models into CHECWORKS, which provides enhanced prediction of flow induced corrosion. Also, Design Engineering monitors plant parameters for their effects on erosion/corrosion, thus providing enhanced capabilities to monitor erosion.

Design Basis Documentation Program

- Design Engineering has developed comprehensive design basis documents organized as System Design Criteria (SDCs), Topical Design Criteria (TDCs), and Analysis Basis Documents (ABDs). This family of documents describes and controls the design criteria for the most important systems, generic design and safety analysis subjects, and specific plant safety analyses. These documents provide the design engineer with a better understanding of important design and analytical requirements and interdependencies as well as the knowledge necessary for maintaining safety margins. The DBD program is continuously updated and expanded to capture the best understanding of the plant design and safety analyses (including the safety analyses for each fuel cycle).

Prevention Of Potentially Hazardous Loose Items

- Civil Standard GGNS-CS-17, "Criteria for Prevention of Potentially Hazardous Seismic II/I Situations" has been issued for use at Grand Gulf. This standard is used for the safe handling and temporary storage of equipment and tools without imposing any risks to the operation of safety related components during design basis events such as earthquake and hydrodynamic loads due to a LOCA and SRV actuation.

Design Engineering Training

- Design Engineering (DE) has had a very busy training schedule during 1994-95. DE has completed 98 percent of its required Engineering Support Personnel (ESP) training. Through October 1995, DE has spent approximately 31,600 man-hours in ESP training. 75 percent of DE management has completed SRO Management Certification training and one individual is currently enrolled. Additionally, 11 percent of DE technical staff has completed the SRO Management Certification Training. Technical training has been provided to site DE personnel in eight different areas, five of which were offered to DE personnel system-wide.

PRA Training for Engineers

- During late 1994, Design Engineering developed a PRA training module for Engineering Support Personnel. Training conducted by Safety Analysis section personnel was provided to all ESP by the end of 1994. In addition, NPE assisted the Training Department in developing a PRA module for Operator Requalification training. All operators were provided this training during 1994.

- Future PRA training will be provided to various groups as needed or as indicated by new results for the Grand Gulf IPE.

NPE Support of RFO7 Risk Assessment

- Support prior to and during RFO7 consisted of:
  - Updating the Grand Gulf ORAM risk model (i.e., the shutdown PRA)
  - Specific analysis of risks associated with the natural circulation mode of decay heat removal.
  - Risk assessment of whether to offload the core for B33-F067A/B valve repairs.
  - Analysis/interpretation of ORAM output and risk sensitivities.
- The ORAM model was revised to reflect recent calculations on decay heat levels, to increase the model's detail for FPCCU/RWCU as a decay heat removal mechanism, to remove excessive conservatisms associated with some event sequences, and to correct the treatment of a common cause failure of all ECCS pumps. These changes impacted both RCS boiling and core damage frequencies.
- For the natural circulation risk assessment, the ORAM input data from the RFO7 outage schedule was modified to model the availability and operation of a single RHR shutdown cooling subsystem (RHR-A) with the FPCCU system serving as a backup decay heat removal system and as the primary decay heat removal system. This modeled the FPCCU/RWCU heat removal combination as a decay heat removal system during this period. The results were compared to those calculated with RHR available but not operating.
- For the planned recirculation valve repairs, the assessment helped identify configurations which would allow the no-offload option to have equivalent or lower risk than the offload option. This justified use of the no-offload option which resulted in fewer fuel moves and less near-critical path time for this work, while significantly decreasing the potential for a fuel handling accident compared to the approved offload case.
- Analysis and interpretation of ORAM risk profiles were provided as requested by outage personnel based on the latest schedule information. In addition, Design Engineering provided an evaluation of containment water inventories and operational contingencies to Outage Scheduling to allow additional flexibility without increasing outage risks.

ISI/IST Peer Groups

- Entergy has continued to consolidate efforts related to the ISI and IST programs through effective use of Peer groups. In addition to sharing expertise in these areas to address emergent issues, consolidated program documents have been developed. A consolidated ISI program has been drafted and is currently being reviewed for final implementation. This document is scheduled to be issued in 1995. A consolidated

ASME Section IX Repair and Replacement program has been developed and will be issued in 1995. Work on the consolidated ISI program has been started but is currently on hold pending regulatory action related to 10CFR50.55a rulemaking and a risk-based approach to ISI/IST. Also, a consolidated welding program has been issued and will be implemented at Grand Gulf in 1995. The use of Peer groups has strengthened the ISI/IST programs at Grand Gulf by reducing cost and increasing shared expertise. These efforts will result in greater focus on important safety issues and burden reduction initiatives.

Technical/Process Enhancements

Turbine Issues List

- In order to address turbine reliability and maintenance, DE, System Engineering, and Mechanical Maintenance are currently working with Siemens Power Corporation to develop an open turbine issues list. This list will be used to determine the top ten significant issues associated with the turbine/generator. This effort will ensure that the appropriate resources are focused on the significant turbine/generator issues to ensure continued reliability of the turbine/generator.

Penetration Program

- DE is developing guideline C-CS-002-00, "Opening and Closing of Plant Boundaries", which will contain the requirements and references for each type of plant boundary such as air-tight, water-tight, pressure, fire, safety related, and radiation. This document will standardize the penetration design process and expedite penetration requests between design disciplines. It is scheduled for issuance this year.

Suppression Pool Debris

- DE has been active in the BWROG during 1994 and 1995. DE provided technical reviews and input to the development and testing of alternate ECCS suction strainer designs, debris generation models, and utility resolution guidance document. DE developed a model to calculate the amount of insulation debris generated for all breaks within the drywell based on the model used in NUREG 6224. The DE goal is a proactive approach in developing acceptable solutions to this issue. DE will participate in the NRC workshop on the draft NRC bulletin and Reg. Guide 1.82 to address these concerns.

Design Engineering Assessment

An assessment was performed to evaluate Grand Gulf Design Engineering program effectiveness in the areas of the design change process and in the implementation and control of design engineering activities.

This assessment was performed under the auspices of the Entergy Operations Corporate Nuclear Safety & Licensing Assessments Group. The team consisted of a team lead from the Assessments Group and engineering peer evaluators from Waterford 3, Callaway, Fort Calhoun, Wolf Creek, Comanche Peak, and Florida Power & Light.

The assessment areas were investigated by reviewing corporate and site procedures and other documentation. Over thirty personnel in the Design Engineering area and their customers in Operations, Maintenance, System Engineering, and Plant Modification & Construction were interviewed.

Major strengths were:

- The perception of Design Engineering by their customers that the group is very customer focused, provides quality products, and is continually seeking ways to improve the products provided to their customers.

- The (proposed and partially implemented) Site Integrated Schedule process may alleviate many of the prioritization and scheduling problems experienced by Design Engineering and their customers with respect to the design change process.

Prominent areas for improvement included:

- There is no single point of accountability for the design change process. The modification process suffers due to the lack of continued involvement of key personnel throughout the entire process.

- The roles of the System Engineer and the Design Engineer in the design change process are inefficient with respect to the implementation/retest areas of the design change process and in the material non-conformance process.

- The minor modification process is viewed by Design Engineering and their customers as being administratively burdened.

Initiatives

Source Term Reduction

- Grand Gulf has initiated an extensive source term and exposure reduction program. This effort has resulted in the identification and characterization of significant source term contributors, a thorough evaluation of alternative materials, revisions to key purchase specifications to provide for the procurement and use of appropriate alternative materials, design provisions for aggressive system decontamination and shielding, changes in maintenance work practices, and many other efforts that have begun to result in reduced dose and lower operating costs. Grand Gulf has recently begun replacing cobalt hardfacing with cobalt-free alternative alloys as part of normal maintenance practices.

Resource Sharing

- Grand Gulf, Waterford 3, and ANO are each providing support to River Bend on the design of their alternate decay heat removal system and suppression pool clean-up system. Grand Gulf is providing pipe stress analysis support and overall design review expertise.

- Other areas being explored for potential resource sharing between Grand Gulf and River Bend include setpoint calculations at River Bend and MOV modifications to eliminate pressure locking concerns.

Design Quality

- To improve design quality, DE is implementing a Design Review Committee to review designs prior to issuance for construction. The committee is to improve design quality by creating an environment where design changes are consistently reviewed and evaluated in the depth commensurate with their safety significance and potential to impact plant availability. Committee members, selected by the Director, DE and discipline managers, will provide a broad range of expertise and training in nuclear power plant design.

SCRAM Solenoid Pilot Valve Root Cause Team

- Grand Gulf site engineering personnel established a root cause investigation team which aggressively searched for the root cause for slow SCRAM times. The root cause team reached a different conclusion than the supplier and manufacturer based on independent testing and analysis. The root cause was manufacturing processes for the valve sealing disc material which resulted in adhesive forces at the valve seat. These forces caused hesitation of the SSPV to shift, slowing scram times. Subsequent testing by the supplier and slow SCRAM times at other nuclear plants of similar design clearly established that the Grand Gulf root cause team had reached the correct conclusion. Replacement valves (modified to correct the problem) from the supplier/manufacturer are being tested at another facility for long term reliability.

Process Improvements

Engineering Change Process

Grand Gulf has recognized the need to improve the Engineering Change Process in order to reduce costs and maintain design quality.

- Design Engineering has been actively involved in this effort through the corporate Design Process Peer Group. The peer group has developed guidelines for implementation of an engineering change process which provides responses based on the technical requirements of the change. The level of documentation and review will be based on the significance of a change related to safety and plant reliability. This

process will be streamlined through the removal of documentation which is not required for equipment not subject to the QA Program and whose functions do not impact the conclusions reached in the Plant Safety Analysis. The guidelines were formed based on good practices recognized at the Entergy nuclear sites as well as recommendations from Quality Action Teams. In addition, the peer group benchmarked the engineering change process against initiatives at numerous sites in the nuclear industry. The Grand Gulf Site Lead Team endorsed the initiative and will implement process changes through a Modifications Process Management Team with representatives from each department involved in the process.

Graded QA Program

Entergy Operations is proceeding to implement a Graded QA Program. Graded QA is a natural extension of the Entergy Operations philosophy and strategy for achieving and maintaining nuclear excellence. Grand Gulf was selected as the Lead Plant to implement Graded QA within Entergy. Grand Gulf has targeted implementation of the Graded QA procurement process by December, 1995.

- Extensive work was done by SAIC through an EPRI Research Project to develop preliminary criteria for grading systems and components.

- An expert panel consisting of senior level technical personnel from Grand Gulf finalized the system and component level criteria. DE will develop bases for component classification. Engineering standards and affected plant procedures will be revised to facilitate implementation of the Graded QA Program. Systems and components will be classified as safety significant or low-safety significant, and Graded QA component list will be developed.

- Numerous meetings have been held with NRC and the industry to keep all parities abreast of progress.

Feedwater Check Valve Media Change

The Feedwater Check Valve Project (MIL 94-003) was initiated in April 1994, to formalize an organization for dealing comprehensively with the safety related feedwater check valve issues. Engineering Report 94-0039, Rev. 0, summarizes the engineering effort for changing the feedwater check valve test media from air to water. As part of the efforts initiated under the Feedwater Check Valve Project, Design Engineering - Safety Analysis began a series of calculations and evaluations to support a change to the check valve testing methodology. This effort includes a justification for hydraulic testing and specification of new test acceptance criteria. These changes were made under the provisions of 10CFR50.59. The engineering report provides the justification for changes to the plant design basis, accurately characterizes the important functions of these valves, and establishes a thorough understanding of applicable safety and design margins. The report is supported by comprehensive accident dose and transient thermohydraulic analyses and enhanced seismic design evaluations.

NRC Information Notice 95-20, "Failure in Rosemount Pressure Transmitters Due to Hydrogen Permeation into the Sensor Cell"

NRC Information Notice (IN) 95-20 was issued to alert addresses to a potential failure mode in certain Rosemount model transmitters. Rosemount Nuclear Instruments, Inc. provided notification under 10CFR Part 21 for transmitters with Monel Alloy 400 isolating diaphragms being inadvertently supplied as nuclear qualified. Monel Alloy 400 is a nickel-copper alloy and is susceptible to permeation by hydrogen. Transmitters of this type are not recommended in applications where hydrogen is present in the process fluid. The affected transmitters were identified by serial number in the Part 21 notification issued by Rosemount. Plant records confirmed that seven of the transmitters in question were purchased by Grand Gulf; five were installed and two were stored in the warehouse.

A plan of action was established to respond to IN 95-20 and the Rosemount Part 21 notification. The safety functions of the affected transmitters were identified and an engineering evaluation performed to support resolution of operability concerns. The evaluation addressed factors which affect the rate of hydrogen permeation and indications of assurance that transmitter failures would not occur. Information was also provided to address the safety significance of the affected transmitter functions. On the basis of this evaluation, justification was provided for continued operation with the transmitters in service until RFO7. The installed transmitters were replaced during RFO7.

Grand Gulf provided transmitter location and application information to the BWR Owners Group (BWROG) Regulatory Response Group (RRG) for submittal to the NRC. The "prompt and comprehensive manner" of the response was noted in a letter of "appreciation" from the Office of Nuclear Regulatory Regulation. It was noted that the "expeditious and thorough response enabled the staff to perform an immediate assessment of the safety significance and impact of this issue, and to resolve it effectively".

Areas for Improvement

Shared Resources/Virtual Multi-Unit Site Concept

Design Engineering is working to develop resource sharing among all the EOI sites, with particular emphasis on treating Grand Gulf, River Bend, and possibly Waterford 3, as a multi-unit site. Design Engineering Directors and Managers from these three plants met on June 29 and 30, 1995, to discuss how best to share engineering resources. Both short-term and long-term resource sharing issues were considered, as well as barriers to their success.

- Short Term

  For short term issues, the mission was to identify activities to share resources between sites within the next 6 months. Short term issues were prioritized based on cost

savings, ease of implementation, and time required for implementation. Teams were then established to address the following high priority issues:

- Outages
- Materials
- Project Management
- Industry Meetings
- Documentation
- Modifications

- Long Term

The long term team identified focus areas which need to be addressed to expedite resource sharing, such as:

- Consolidated budgeting
- Standardized work processes
- Effective use of information technology
- Revision of company policies
- System-wide planning
- Sharing goals and incentives

Following the June 29th Design Engineering meeting, Arkansas Nuclear One (ANO) asked to be included in the resource sharing teams.

ENGINEERING PERFORMANCE ANALYSIS

OUTAGE SCHEDULING

STRENGTHS

Scope Freeze

- Scope additions after the scope freeze date milestone required Senior management's approval by signature before adding to the outage scope.

Milestones

- Accountability to pre-outage milestones by each department was evident during the pre-outage meetings. Each department prepared and delivered a status of the milestones at each of the pre-outage meetings.

Pre-ATS

- The Control Room is a very busy area especially during the first several days of the outage. Pre-Authorization To Start (ATS) of about 75 percent of all work in the outage helped to reduce the bottleneck of traffic and workload in the Control Room. This also allowed operations to focus on system outage configurations and reduced the time craft spent waiting for packages to be ATS'd. One example is the Pre-ATS of the snubber packages which reduced the amount of time spent by the snubber inspection group waiting to commence work.

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 close involvement in the planning of the outage schedule and the integration phase by the first line supervisor.

Global Tagouts

- The philosophy of a global system tagout was reviewed by a Quality Action Team and changed to better reflect the needs of our maintenance departments. The tagging process improved with several innovative clearances hung for systems which have historically been major problems. As in previous outages, several Reactor Operators were dedicated to reviewing the outage schedule and preparing the tags before the outage started.

Engineering Focus

- Outage preparations were better in all areas. All designs were complete, work packages prepared, and tests written prior to the start of the outage. This preparation allowed Engineering to concentrate on emergent work during RFO7. One example of the emergent work that requires Engineering resources is the Material Nonconformance Report (MNCR). Approximately 145 MNCRs were generated during RFO7.

TECHNICAL/PROCESS ENHANCEMENT

Emergent Work Control

- An emergent work control team consisting of key operations, maintenance, engineering, paper close-out, and planning and scheduling personnel was developed to review emergent work CIs initiated in the last 24 hours. This review greatly reduced the emergent work load. This program reduced the amount of emergent CIs worked by 50 percent over previous outages.

Burden Reduction

- Burden Reduction efforts can greatly improve the execution of an outage. One example of an improvement that the Outage Department actively pursued was Primary Containment requirements. During modes 4/5, Primary Containment requirements were removed, except some Shutdown Cooling and ventilation valves.

Single Schedule

- In past outages, Plant Modifications and Construction (PM&C) and Outage Scheduling had two separate outage schedules. This separation caused PM&C to expend numerous man-hours comparing their schedule to the outage schedule to obtain start dates and windows for their modifications. The two schedules were successfully integrated for RFO7.

Pre-Outage Task Review

- The Reliability Centered Maintenance program at Grand Gulf has reduced the number of tasks performed during an outage. To date, 53 of 65 systems have been reviewed by the Reliability Centered Maintenance program. Approximately 261 tasks were removed from RFO7 due to frequency change, deletion, worked at power, or tasks combined with other tasks. Two examples of scope reduction are:

    - I&C performed 77 surveillances at power that were previously required to be performed during an outage.

- Frequency of the bus outages extended from every 36 months to every 6 years.

PC Based Scheduling

- RFO7 was the first outage to use the PC software Prestige. This saved the cost of computer resource units charged by using a mainframe software. Converting to Prestige also made it easier for schedulers to perform what-if scenarios to further improve outage efficiency.

SAFETY CULTURE

Outage Risk Assessment Management (ORAM)

- The ORAM software was used to help develop and maintain the Risk Management Guidelines (RMG) for RFO7. In conjunction with the RMG development, the Shutdown Operations Protection Plan (SOPP) was developed as a desk top procedure.

- The SOPP was reviewed with the Operations Shift Superintendent prior to each shift turnover and before the Key Safety Functions Status board was updated. The status board was generated by the RMG portion of the software and the SOPP. The status board showed the risk for the day and the corresponding color to indicate the risk level. The Status Board was reviewed with Plant Staff personnel each morning.

Significant RFO7 Modifications

- Feedwater Check Valves

  - NOREM was applied to the seats on the B21F010A & B and guides on the B21F010B Feedwater check valves. This modification supported the Source Term Reduction program by eliminating stellite from the F010A/B. In addition to the hardware change, design analysis enabled us to change the Local Leak Rate Testing on the Feedwater check valves from an air and water test to a water test only.

  - The B21F032A and B valves were modified to a two piece disc and arm arrangement from a one piece disc and arm assembly. This modification allowed for easier alignment of disc to valve body seat during installation and allows for a slight automatic adjustment during operation if wear or slippage occurs. In support of cobalt reduction, the resilient seats were replaced with stainless steel seats.

- Drywell Insulation

  Removed fiberglass insulation from Drywell components and duct work to eliminate a potential source of emergency core cooling pump strainer clogging.

- High pressure Turbine

  Replaced the High Pressure Turbine rotor and inner casing as a Turbine efficiency upgrade consisting of a new blade design, a new last row of blades of a new "twisted" design, and a new nozzle admission ring with a reduced throttle capability. The diameter of the rotor was increased from 1430 to 1500 mm. This design change has yielded 37 Mwe. The High Pressure Turbine upgrade was the first phase of upgrades scheduled for implementation. The Low Pressure Turbines are scheduled for upgrade in RFO8, RFO9 and RFO10.

- Feedwater Control

  The Feedwater reliability upgrade increased the overall system reliability and thermal performance by:

  - In the past, all condensate and Condensate Booster Pumps tripped at once upon a low flow condition with no time to take Operator action. The condensate Pump and Condensate Booster Pump low flow trip logic was modified to stagger the pump trips.

  - The LP Feedwater Heater level control logic was changed such that the level setpoint is automatically set-down based on extraction steam pressure. This will ensure that the dump valves open promptly to prevent isolation of the heater string on high level during Turbine trips.

  - A new dead-band control scheme was added to the control logic for the Condensate Pump, Condensate Booster Pump, Feedwater Pumps and Heater Drain Pumps minimum flow valves. This new feature eliminates the continuous oscillation of the feedwater system during plant low power operation. One benefit of this modification will be reduced wear to the seals and internals of the minimum flow valves by elimination of the continuous oscillations/valve movement.

- Recirculation System Discharge Gate Valves

  Modification of the B33F067A&B internals corrected the potential failure mode due to disc rotation. The total time that we were in an operation with the potential to drain the vessel was 38 minutes for the F067A and 32 minutes for F067B. Considerable time was saved by replacing the valve internals with refurbished unit II valve internals and using a go-no-go gauge.

- MOV Program:

  The original GL 89-10 work scope for RFO7 included 49 MOVs of which 7 were initial baseline test, 6 DP test and 36 revisit test. MOV work activities included mechanical MCPs, electrical MCPs, Actuator refurbishment's, valve repacks, valve teardowns/inspections and diagnostic testing.

  The projected work scope was completed. 7 new MOVs were added to the RFO7 scope due to packing changes/adjustments or torque switch changeouts due to part 21 roll pin concerns. Also several of the above MOVs were tested multiple times, again due to torque switch changeouts or packing adjustments/changeouts.

- AOV Program

  RFO7 began a new valve program to test and refurbish AOV's (Air Operated Valves). This program was successful in RFO7 and will be continuing it in RFO8.

  Work was scheduled on 25 AOVs for RFO7. Twenty-two AOVs were balance-of-plant (BOP) Fisher actuated valves, three AOVs were safety-related Hiller actuated valves.

  Completed all scheduled work. In addition, refurbished four more valves, refurbished ten more actuators, refurbished eleven more positioners, performed diagnostic testing on twelve more assemblies. Total work completion percentage was 148% of the originally scheduled scope of work (based on number of valves maintenanced).

- Core Shroud Inspection

  As a result of cracks found in BWR shrouds over the last few years, all BWRs were required to develop and submit a shroud inspection plan to the NRC and implement the inspections as required.

  In spite of equipment and operational problems experienced, the shroud inspection effort was a success. The required areas were inspected and no indication of any cracking was found. A total of 383 inches of weld were inspected. The inspection was completed near budget and the critical path of the refueling outage was not affected.

  In addition to the above successes, lessons learned from this inspection will improve future shroud inspections. A list of equipment improvements were documented and given to Westinghouse to develop a design much better than the equipment currently on the market.

AREAS FOR IMPROVEMENT

- Due to the pace of an outage, emergent work activities are sometimes completed or in progress before appearing on the schedule. Emergent work is not reviewed by Outage

Risk Assessment and Management software (ORAM) for its impact on defense-in-depth until it is scheduled. Before RFO8, a sub-process for emergent work will be in place. This sub-process will formally document process details and will improve the method of reviewing emergent work for impact on defense-in-depth.

- The Outage Review visit conducted by INPO during RFO7 identified inconsistencies in the definitions of what constitutes a high-risk condition among the Defense-in-Depth assessment, the Shutdown Operations Protection Plan, and the Refueling Outage Organization procedure. Outage Scheduling will participate in the evaluation of the differing definitions and remove the confusion concerning actual levels of defense-in-depth.

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	None

Event/Enforcement Comparison:

	Previous SALP (16 Months) (08/23/92 - 02/26/94)		**Current SALP** (24 Months) (02/27/94 - Present)	
LERs	0		1	
Violations	IV	NCV	IV	NCV
	3	2	4	5

*Level IV/Non-Cited Violations

Inspection History (other than Resident Inspector):

Inspection	Date	Notes*
94-09	04/15/94	NV
94-13	07/12/95	V
94-22	01/19/95	NV
95-03	05/18/95	NCV
95-08	06/21/95	NV, S
95-10	07/27/95	NV, W
95-13	09/28/95	NV, W, S

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

PLANT SUPPORT PERFORMANCE ANALYSIS

RADIOLOGICAL CONTROLS - CHEMISTRY

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 Evaluation

  The plant completed an evaluation of the applicability of Hydrogen Water Chemistry for vessel internals protection. Plant staff plans to utilize data from a mini-test at a foreign BWR-6 in fall of 1995 as a cost effective method to gather accurate data on operating dose rate increases and electrochemical potential reduction at low, moderate and high levels of hydrogen addition.

- Iron Reduction - EPRI tailored collaboration

  - Grand Gulf participated in an in-plant test program to develop an on-line iron monitor. The monitor was used on the feedwater system in parallel with conventional sampling and analysis methods. The test data agreed well with conventional analyses and confirmed that transients in the iron concentration are associated with condensate demineralizer operations.

- Reduction of resin intrusion

  - Installation of a small pore (1 μ) filter on the effluent of the equipment drain demineralizer has effectively eliminated reactor coolant conductivity increases which had followed transfer of water to the condensate storage tank. This has been confirmed via the plant BOP system which monitors reactor coolant conductivity during waste tank transfers.

  - Improved Reactor Water Cleanup septa were installed in September 1995. The replacement design has a smaller pore size which will reduce resin leakage and allow use of a higher resin: fiber ratio.

Self Assessment

A July 1994 self-assessment examined analytical accuracy, procedural adequacy, problem identification, minimization of radioactive effluents, condensate demineralizer operation, and iron and sulfate transport.

The self-assessment was conducted using Chemistry and Quality Assurance personnel from inside and outside the Entergy system. Strengths identified included:

- Radioactive Effluent Monitor Calibration Practices
- Radiochemical Quality Control Program
- Use of the PDS system (on-line data) for detection of short term problems
- Instrument Specialist Job Knowledge and Performance
- Good interface between Operations and Chemistry personnel to minimize radioactive waste / effluents.
- Reactor Chemistry Improvements / Iron and Sulfate Transport

  In the areas of improving reactor chemistry and reducing iron and sulfate transport, the self-assessment recognized strengths and made recommendations. Strengths identified and actions completed in response to recommendations include :

  - Condensate Storage Tank (CST) cleaned to eliminate accumulated crud and resin available for transport.
  - Plant staff developed a test method to limit the amount of resin fragments (fines) in Condensate Resin.
  - Individual condensate demineralizer sample points were modified to allow insoluble iron sampling.
  - Condensate demineralizer performance has improved due to:
    - ◊ Modified ultrasonic resin cleaning method (increased crud removal).
    - ◊ Graduating demineralizer in-service flow rates.
    - ◊ Seven bed start-up operation.
  - Additional filtration was added downstream of equipment drain demineralizers to prevent resin fines transfer to the CST.

- Turbine and Auxiliary Building Floor Drains were cleaned by hydrolasing in 1994-1995 to reduce organic inputs to radwaste. Additional cleaning will be performed in the Radwaste Building .

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. 1994 and 1995 (Jan - Sept) results for interlaboratory monitoring have been 100 percent acceptable for cold chemistry and radiochemistry.

Chemical Control Program

- A system wide Chemistry peer group effort is underway to streamline the chemical control program by combining the best features of each site's program. Enhancements include bar coding of controlled chemicals at a central issue/storage facility and Material Safety Data Sheet access / permitting from a computerized database. Chemical Control Program modifications are scheduled to be underway at Grand Gulf by Fall 1995.

Service and Cooling Water Chemistry Control

- Plant Service Water improvements have continued to reduce chemical costs and improve heat exchanger performance. Optimizations of chemical feed made in the last 12 months have reduced costs by more than $50,000 yearly and we continue to see reduced heat exchanger cleanings. Sodium hypochlorite feed implemented full time in 1993 has seen reductions as indicated below:

Heat Exchanger	1990 Cleanings	1994 Cleanings
Steam Jet	7	1
Plant Chill Water	17	5
CCW	15	7
TBCW	6	3

- A new sodium hypochlorite feed program has been implemented for cooling tower fill fouling control in the Circulating Water System. Measurements of fill weights in test sections during RFO7, and monitoring with the test tower indicate fill fouling control at lower costs than the old program utilizing non-oxidizing biocides.

Auxiliary Systems Chemistry Control

- From 1989 until 1994 a borated buffered product was used in the closed loop treatment program. Concerns to eliminate sources of boron in reactor coolant prompted a program change to a non-borated product. Testing begun in 1993 led to an improved product that not only eliminates the boron source but gives comparable corrosion results at a lower cost.

- To elevate concerns for closed loop system leakage, Chemistry initiated weekly reports to Operations and Plant Staff including trends on leakage from the closed loop systems. This was done by utilizing the Thursday 1:00 plant status meeting. This has resulted in increased plant awareness of leakage and prompted a more coordinated response to the leakage.

Error reduction

In 1994, through the Quality Programs deficiency document tracking system, an adverse trend was identified by the increase of deficiency report tracking. In addition, several weaknesses in sampling and analysis activities were identified through Nuclear Assurance Group Assessments.

- In response to these concerns, plant staff expended a significant effort to examine the deficiencies using Human Performance Enhancement and Root Cause Analysis tools.

- The result of these investigations included:

  - supplemental training (including self verification)

  - increased work observations by management

  - development of a departmental error reduction program.

- The error reduction program was designed using a Natural Work Team. Measurements indicate the number of errors has decreased. The program has gone through one check and adjust period and is continuing.

Liquid Radioactive Effluent

	1994	1995 Jan - Sept
Whole Body (mrem)	6.98E-2	3.95E-2
Organ (mrem)	1.99E-1	3.19E-1
Discharge Volume (gal)	7.34E+6	4.81E6

Liquid effluent doses remain well below the applicable quarterly and annual limits. Radwaste discharge volume is down slightly from previous years and is on track to meet

the 1995 goal of <6.5 million gallons (lowest in commercial operation). Liquid radwaste processing modifications scheduled for Fall 1995 are expected to reduce effluent discharge volume significantly.

Gaseous Radioactive Effluent

	1994	1995 Jan - Sept
Gamma Air dose (mrad)	1.38E-2	2.12E-2
Beta Air dose (mrad)	1.02E-2	2.187E-2
Organ (mrem)	7.11E-2	3.80E-2

Gaseous effluent doses remain well below the applicable quarterly and annual limits. Gamma and beta air doses will increase in 1995 as a result of updated atmospheric dispersion (χ/Q) values. Overall liquid and gaseous effluent doses remain low as the plant operated without fuel failures for the majority of the reporting period.

Reactor Water Chemistry

	1994	1995 Jan - Sept
Avg. Conductivity (μS/cm)	0.137	0.130
Avg. Sulfate (ppb)	3.4	2.9
Avg. Chloride (ppb)	0.5	0.4

Average values for 1995 reactor coolant chemistry improved slightly over 1994. Resin introduction from radwaste transfers has been effectively eliminated. Work continues on reduction of resin fines from the condensate demineralizers.

Technical/Process Enhancements

Service and Cooling Water Chemistry Control

- A system-wide chemistry and purchasing group has been formed to reduce system chemical costs by competitive bidding commodity and specialty chemicals. This will reduce costs at Grand Gulf by at least $500,000 during 1996.

- A task group for dealing with solids removal in the Standby Service Water (SSW) basins began meeting in 1995. Solids removal reduces potential for micro-biologically induced corrosion (MIC) in small bore and dead leg piping, allows for extending time between SSW basin drainings and has the potential to reduce frequency of pump runs for chemical addition. Progress has been made in the past few years to deal with solids accumulation in the basins. Air sparging followed by feed and bleed of the basins has been augmented with divers using cameras and suction lines to remove solids. This has resulted in measured solids accumulations being reduced from

several feet in RFO3 to generally less than an inch in RFO7. Even with this progress, keeping the SSW systems as solid-free as possible is the goal of the task group.

Advanced Resin Cleaner

- As part of an EPRI tailored collaboration, Grand Gulf is participating in an in-plant test of an Advanced Resin Cleaning (ARC) system for condensate resin. Installation of the ARC system is nearing completion and operation is scheduled for late 1995. This technology is less destructive to resin than current ultrasonic resin cleaning methods, has been shown to improve iron removal from resin, will utilize less water than the current methods and is the first BWR installation of its type.

Improved Radwaste Processing

- The plant installed radwaste processing equipment which will reduce the amount of solid waste generation and improve the quality of recycled liquid radwaste. We also anticipate a reduction in discharge volume. The process utilizes centrifugal solids removal, ultra filtration and reverse osmosis.

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. In addition, we have noted a correlation between changes in the reactor coolant boron and tritium levels associated with control blade re-positioning. Elimination of one possible source of tritium (via boron activation) was accomplished in Fall 1994 when the use of a boron-free corrosion inhibitor was implemented for the closed loop cooling systems.

- Initial control blade replacements are scheduled for RFO8. Additional monitoring at steady state, full power operation is continuing to determine the effect of elimination of the boron from the closed loop systems.

Liquid Effluent Volume

- Grand Gulf liquid discharge volume has been identified as an outlier. Installation of upgraded liquid radwaste processing equipment including a reverse osmosis unit is on schedule for December 1995. The processing improvements are intended to reduce discharge volume by improving the quality of water recovered for use in the plant. In addition, this will reduce the amount of cellulose (ecodex fiber) generated as solid radwaste which has caused problems with bacteria growth and resulting methane generation.

- Also, the Operations Department holds bi-weekly meetings to review all Condition Identifications (CIs) that have potential to increase radwaste inleakage. This allows prioritization of work activities on leakage impact.

PLANT SUPPORT PERFORMANCE ANALYSIS

RADIOLOGICAL CONTROLS - HEALTH PHYSICS

Strengths

The Health Physics (HP) department has gone through a number of industry assessments and self-assessments during this SALP period. This is an effort to keep us as an industry leader. Following are the results, strengths, and areas for improvement identified through these assessments:

- Maintained contaminated floor space to a minimum by aggressive action of the Health Physics department (surveying) and the Plant Services staff (deconning).

- Attention paid to maintain material stored in the Spent Fuel Pool and Upper Containment Pool. HP forms and maps showed that HP remained in control of material stored in pools, also Reactor Engineering personnel were active in keeping track of this material.

- Use of the E1000B source calibrator to calibration check radiation instruments. The use of the E1000B as opposed to button sources reduced the radiation exposure received by the HP technicians conducting the calibration/response check.

- Use of hydrolancing to reduce the radiation dose rate in high traffic areas. Hydrolancing is the use of high pressure water, a lance and nozzle to clean the interior wall of piping. The Suppression Pool Cleanup (SPCU) line and the Fuel Pool Cooling and Cleanup (FPCU) lines were cleaned. General area dose rates were reduced by a factor of 87 - 95 percent. These decons are expected to result in savings of 4.5 rem in a non-outage year to 21.5 rem in an outage year.

- Significantly reduced the number of respirators used during this period, through aggressive engineering controls and good HP practices. There were zero respirators used during RFO7.

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
	Outage	0 Filters

- HP proactively approaches job planning and support by participating in the job planning process. The ALARA staff is involved during the pre-job planning phase. HP attends and participates in daily planning, forced outage planning, system outage planning meetings as well as quarterly maintenance forecast meetings.

- Proactive planning by HP supervisor and HP in the planning stage of work enables the department to respond on a planned basis instead of having to be reactive. This results in dose reduction for the entire station.

- Frequent benchmarking visits to other nuclear facilities.

  - Members of Grand Gulf HP staff visit other facilities to benchmark their programs and practices. These trips are in the form of INPO team evaluations, benchmarking visits and corporate audit teams.

  - Many ideas have come from these visits. Individuals get an opportunity to step back and watch alternative methods of doing business.

- The steam leak list has been valuable in tracking and identifying leaks in the Turbine, Containment and Auxiliary Buildings. Both active and inactive leaks can be tracked and trended. Information on the list includes:

  - CI#, location

  - Dose rate history

  - Catch basin status

  - Amount of leakage

- The list is updated as leaks are found or fixed. Copies are sent to the Control Room and to the Daily Planning meeting. Benefits include:

  - Determining the urgency of repairs and dose cost for repair.

  - Help in planning forced outage lists because a leak may require too much dose to repair at full power.

- Methane

  - The Radwaste Department and Radwaste HP group have made significant progress in combating the methane production problem in liners. Activities include hosting EPRI conferences, implementing Natural Work Teams and using outside technical experts.

- Grand Gulf has experimented with several biocides to kill the methane producing "bugs". This is an ongoing process to optimize biocide addition.

- Floor drains and some floor and equipment drain sumps were cleaned to remove bacteria contributing to the methane problem. This process removed oxyonics that are responsible for the methane producing "bugs".

- Installation of "socks" in floor drains to prevent dirt and other material from being introduced into the system will help to eliminate the source of organic contamination.

- Method of sampling radwaste casks for free standing water and explosive gases prior to shipment.

- Stationing HP personnel at Security Island exit during RFO7

  Due to the number of alarms and anxiety felt by other groups during RFO7, HP personnel were stationed at the security exit to deal with the alarms and ensure proper frisking by the large number of personnel with no prior nuclear plant experience. This resulted in a decreased anxiety level by these contractors.

- Contamination areas are maintained low due to continued management attention, more aggressive decon efforts and contamination area tracking.

2/91	3.4% of RCA	(17,000 sq. ft.)
4/92	4.3% of RCA	(21,938 sq. ft.)
8/93	3.0% of RCA	(15,137 sq. ft.)
12/93	3.7% of RCA	(18,765 sq. ft.)
4/94	3.7% of RCA	(18,765 sq. ft.)
9/94	3.3% of RCA	(16,735 sq. ft.)
2/95	3.0% of RCA	(15,155 sq. ft.)
8/95	3.3% of RCA	(16,995 sq. ft.)

- The use of Entergy HP technicians from River Bend facility.

  These personnel were knowledgeable about Grand Gulf refuel processes since River Bend is similar in design. River Bend technicians also exhibited increased plant ownership compared to contract technicians.

- Several HP and HP Supervisors attended joint team building sessions to foster a better working relationship and understanding of each other's needs.

Technical/Process Enhancements

- Use of video camera and surrogate tour in job planning

  - Video cameras have been used repeatedly and have been proven very effective in both job planning and job history. The use of cameras has significantly reduced exposure on several jobs through better planning. Video was used extensively during the application of NOREM on the Feedwater Check Valves.

  - The surrogate tour computer, software and camera have also proven to enhance ALARA. The use of this equipment helps to lower dose by showing component locations to personnel that must enter radiation areas thus reducing their time in the area.

- Merlin-Gering M-G radio dosimetry was used on several high dose job evolutions such as undervessel work. The new software and dosimetry gave the HP an added level of confidence when covering these jobs and reduced the overall dose on the jobs by allowing HP to do remote monitoring

- Updated the Dositec System computer software and new dosimeters to correct past problems. This allows us the flexibility to change or improve the software as needed.

- Reduced the number of personnel monitored by TLD in accordance with 10CFR.

- During the refueling outage, NOREM was installed on the Feedwater Check Valves in the Drywell. Stainless steel internals were installed in the Feedwater Check Valves outside the Drywell. Both of these modifications are part of the source term reduction program to eliminate CO_{60} from the plant.

- Mock-ups were used extensively in preparation for the Feedwater Check Valve work. This was another significant dose savings. The personnel performing this work were able to identify interferences and other problems prior to work in radioactive/contaminated areas.

- HP uses industry events, historical data (lessons learned) and job history files as part of pre-job planning. This information is accessed via database.

- Several hot spots were flushed post-outage. These hot spots were significant general dose contributors. Post outage the G41 (FPCU) line in containment had dose rates of 2-7 R/hr and had a hot spot on G47F330 of 2 R/hr. These were flushed and dose rates on the line dropped to 150 mR/hr and the hot spot dropped to 50 mR/hr.

- Wall maps are located outside various rooms and locations throughout the plant. Many of the areas also have valve locator maps so personnel can look for a valve or component prior to entering the area. This has proven to be a good ALARA tool.

- The Waste Reduction Quality Action Team is now in the check and adjust stage of the Plan, Do, Check and Adjust cycle. They identified the largest cost/volume contributors and began a systematic reduction of these items. Most items were disposable (i.e., plastic booties, yellow bags, herculite) and were replaced with reusable products. Future reductions are planned (using the Reverse Osmosis System) for processing radwaste water and further reduction in Dry Active Waste (DAW).

- HP has purchased 5 portable HEPA units for engineering controls. This allows for easier setup and a more versatile controls system. HP has also revised the HEPA procedure to define and implement all aspects of the HEPA program. Use of these units has made it possible to significantly reduce the number of respirators used.

- HP procedures contain written contingencies for past Grand Gulf incidents and industry events.

- HP personnel frequently tour areas and document deficiencies on tour report forms. The comments are tracked on an HP specific database for trending.

Areas For Improvement

- Radioactive material not being properly tagged

  Several items were found in the Hot Tool Room that were above the plant limit to be tagged. These items were >5000 cpm. In addition, several items were found to have fixed contamination and were not painted yellow and magenta. Some tools were found with paint very faint on their surfaces. The Hot Tool Room was resurveyed by HP and items identified as problems were removed or corrected.

- Eating and Chewing Inside the RCA

  During this period there was evidence of gum and candy wrappers and used tobacco products inside the RCA. This continues to be a problem and is being addressed through training. One contractor was terminated for chewing gum in the RCA.

- Radiological deficiencies on Tour Reports not properly documented

  Several radiological deficiencies have been identified and corrected via the plant tour report. However, these deficiencies were not being tracked for recurrence or root causes. A database has been setup for this purpose and is kept current by Health Physics.

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), Nondestructive Testing, Materials Engineering and Quality Engineering.

- QP is a member of the Region IV Technical Specialist Exchange Program supporting audits. Our Audit Group obtains technical specialists 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 in 1994 and 1995. Examples of audits where Region IV technical specialists 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

  We plan to continue using 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 considered by third party assessments to be substantive and beneficial to the improving performance of operating 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. This provides better focus of oversight resources toward groups and activities with declining performance. 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, licensee event reports, INPO inspections, Quality Deficiency Reports (QDR), etc. The data analysis is similar to the methods used in the NRC Integrated Performance Assessment Process.

- Standard audit plans are used and are being enhanced to include appropriate Performance Data System (PDS) key elements to assist in audit scope planning. These plans incorporate lessons learned and minimize unnecessary overlap between audit activities. The PDS will serve as the basis for a performance-based audit scheduling program as discussed with Region IV on November 16, 1995.

- QP continues to perform activity monitoring in addition to QC witness/hold points. Activity monitoring includes activities in potential problem areas which have no witness/hold point assignments. 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 month, a summary of activity monitoring results is presented to the Vice President, Operations and his management staff. These meetings provide a forum where management can be apprised of process strengths and weaknesses from an inspection perspective.

- The high level of technical expertise in the Non-Destructive Examination (NDE) group contributes to the very strong flow accelerated corrosion program. This program has been recognized as a strength in the last two SALP periods.

- The centralized trend reporting process includes a "real time" trend detection method. Each time a corrective action document is initiated the database 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 proactively deal with trend indicators. The following are examples of some trends noted and actions taken:

- A potential adverse trend indication noted that the number of QDRs issued to Chemistry were trending up. Chemistry formed a Quality Action Team to define the problem and develop an action plan. The action plan has been implemented and the number of Chemistry QDRs is trending downward.

- Last year, a potential adverse trend indication was noted regarding a short-term increase in personnel error rate. The Vice President, Operations initiated an action plan re-emphasizing management expectations. Site supervision and management implemented the plan to increase personnel awareness of the various self check programs. As a result the personnel error rate decreased.

- Procedures are monitored weekly as one of the parameters reviewed for deficiencies. A list of problem procedures was compiled and provided to affected departments. Effective actions were taken so that no significant recurrences have been noted.

- An adverse trend was noted in Radwaste operator errors. Operations took action to retrain Radwaste operators on the proper use of procedures and self checking. No further errors have been noted to date.

- Program violations are trended to provide management with indicators of the effectiveness and weaknesses 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 windows concept continues to be used for QDRs. 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.

- Receipt inspectors continue to effectively communicate directly with vendors when paper problems are found. This allows the people most familiar with the problem to deal with each other and reduces the time material is held up pending problem resolution.

- 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.

- Back shift monitoring and audits continue to be conducted. This provides management with an insight into activities occurring after normal working hours.

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

- The Entergy Operations Construction Materials Testing program located at Grand Gulf has been recognized as a strength by the Joint Utility Management Audit Group. The program is staffed with Entergy Operations inspection personnel. This program reduces dependence on contract support.

Management Oversight

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

- Each month, a summary of activity monitoring results is presented to the Vice President, Operations and his management staff. These meetings provide a forum where management can be apprised of process weaknesses from an inspection perspective.

- To support the continuing emphasis on resolving deficiencies in a timely manner, management meets regularly to review the ten oldest Material Non Conformance Reports (MNCRs). Priorities are adjusted and coordinated between departments to expedite corrective actions.

Technical/Process Enhancements

Process Improvements Initiated and Results

- The oversight processes are being improved by a Performance Data System which provides for the compilation and analyses of human performance data. Performance data is collected from audits, inspections, monitoring activities, procedure reviews, self assessments, NRC inspections, licensee event reports, INPO inspections, QDRs, etc. The data analysis is similar to the methods used in the NRC Integrated Performance Assessment Process. The data analysis process is still in the development stage. This will result in better focus of oversight resources toward groups and activity areas with declining performance. The Performance Data System provides management with a measure of compliance, strengths, weaknesses and program effectiveness.

- The performance based audit scheduling process continues to be developed. The Performance Data System is an important data point to be evaluated in this scheduling process. Audits will be scheduled based on recognized need to audit versus the current process of meeting established frequencies regardless of performance indicators.

- QP is a participating member of the Entergy Operations Corrective Action/ Root Cause Analysis Key Process Team. This team is chartered 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. For example, the team has developed a method to exchange information electronically between sites regarding deficiencies.

- 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 for 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 methods are still in the development stage.

- QP's contractor screening processes continue to be standardized between Entergy facilities. The QC contractor screening has now been standardized, NDE was previously standardized. 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 being standardized between Entergy facilities. When implemented, this process will provide more consistency in certifications and expedite the movement of auditors between facilities.

Self-Initiated Assessments Conducted

- A Service Water System Operational Performance Inspection (SWSOPI) was performed using the NRC SWSOPI guidelines. Grand Gulf has performed previous Safety System Functional Assessments (SSFA) on the Standby Liquid Control, Fuel Pool Cooling and Cleanup, High Pressure Core Spray, Reactor Core Isolation Cooling and Low Pressure Core Spray Systems. SSFAs are vertical slice system evaluations similar to NRC Safety System Functional Inspections.

- 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.

Company Headquarter's Quality Assurance audits are performed annually on QP's 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 will provide a more efficient and diverse work group.

- Supervisors are periodically rotated within the QP department which encourages new and innovative ideas within the various functional areas. This practice also provides a broader range of experience for the supervisors.

- QP is actively participating in the Graded Quality Assurance Expert Plan and Implementation Team. These groups are developing a program to implement graded quality assurance procurement at Grand Gulf by the end of calendar year 1995.

- QP is participating in the development of a paperless condition reporting system within Entergy Operations. The first phase of the project will be a paperless initiation capability.

- 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 costs.

- QP continues to aggressively perfect the Performance Data System. The goal is to provide management with valuable precursor trend data and to replace fixed, arbitrary audit frequencies and traditional QC witness/hold points with audits and inspections based on performance history.

Areas for Improvement

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

- Continue to enhance the Performance Data System input and analysis processes making them more user friendly.

- 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.

PLANT SUPPORT PERFORMANCE ANALYSIS

EMERGENCY PREPAREDNESS

Strengths

- **Procedural Upgrade** - Eliminated redundant classification procedures and are in the process of flow-charting Emergency Procedures.

- **Annual Exercise** - The 1994 Exercise was characterized as fully successful and all objectives were met.

- **1995 Annual Exercise** - The 1995 NRC Graded Annual Exercise was characterized as successful and all objectives were met, however, two objectives only partially met. Redemonstration Exercise was conducted November 15, 1995.

- **Continuation of Quarterly Drills** - In addition to the Annual Exercise, Quarterly Site Drills are conducted to activate and demonstrate all on-site emergency response capabilities. This allows participation by most emergency response organization personnel at least once a year.

- **Table Top Drills** - Drills were conducted in each Emergency Response Facility in which all emergency response organization (ERO) personnel participated. These drills were conducted to better prepare the ERO personnel to perform their duties and responsibilities.

- **Emergency Plan Maps** - Emergency Preparedness maps have been revised to simplify use and enhance readability.

- **Emergency Response Facilities (ERFs)** - In the process of upgrading ERFIS and SPDS in all appropriate facilities. Implemented new computer software to maintain inventories and emergency equipment in the facilities.

Technical/Process Enhancements

- **VIP 2000 Upgrade** - The VIP 2000 software was upgraded with the latest version of software on June 29 and 30. The new software provides more flexibility in notification and increases the speed at which the ERO is notified.

- **OSC Upgrade** - Installed Automated Dosimetry, new independent radios, 10Kw generator, and added new briefing room in the facility to enhance operation.

- **Emergency Response Radio System** - A new radio system was installed in all Emergency Response Facilities (ERF). This system simplifies use and enhances communications between ERFs while allowing for future expansion.

Self- Initiated Assessments

1994 Emergency Preparedness Self Assessment

- Performed in April 1994
- Assessment team consisted of nine personnel from various nuclear organizations, both internal and external, including an INPO representative.
- Scope, Findings and EP Action

Performance Objective	Recommendations	EP Actions
EP interface with other site organizations resulting in a high degree of emergency preparedness	• Improve performance of maintaining Emergency Response Facilities	• Complete. Changed implementing procedures to provide consistent process for facility maintenance
	• Goals of EP should reflect corporate mission	• Complete. EP mission statement derived from PP&S mission statement.
	• Improve ERO rotation process	• Complete. Have determined which positions are suitable for rotation. Memo has been sent to all Managers to encourage ERO rotation.
	• EP interface with other dept. can be improved.	• Ongoing. Conducting more frequent TRG meetings (Quarterly). Using ERO feedback from drills. Conducting short question and answer seminars.
EP ensures effective implementation of corporate and station policies, mgmt expectations and standards of performance.	• Goals of EP should be more clearly defined to support company goals and objectives. Need method to measure effectiveness in meeting those goals.	• Complete. This has been done through the performance evaluation process. Mgr., EP goals reflect Director, PP&S goals. EP staff goals directly reflect Mgr., EP goals.
	• Responsibilities for each staff member need to be clearly established.	• Complete. Organization chart for EP, with responsibilities, has been distributed.

Performance Objective	Recommendations	EP Actions
	• Give priority to team building within staff.	• Ongoing. More frequent staff meetings. Using Natural Work Teams (NWT) to increase cross-discipline communication.
	• Staff personnel development needs to be continuously reviewed. • Develop EP mission statement and communicate it throughout the ERO. • Develop method for analysis of real events.	• Ongoing. EP Mgr. conducting meetings to discuss personnel development plans approximately every 3 months. • Complete. Mission statement complete. Importance of EP communicated in training and EP Hotlines. • Underway. This is part of NWT on real events/drills. May use NRC inspection criteria for evaluation.
The customer/supplier interface between EP and other site organizations is well established and communications occur such that feedback is provided for continuous improvement of the process.	• Establish goals and resolve identified problems in a timely manner. • Use tracking system to trend recurring problems. Use the information to improve EP processes. • EP should provide feedback to persons that identify problems related to EP.	Ongoing. Using feedback process to respond to problems identified by ERO personnel. Also using short Q&A seminars and more frequent TRGs. Have established goals to determine timely performance against the objective.
ERO training is provided in a timely and effective manner such that ERO personnel clearly understand program changes and their duties and responsibilities.	• Initial qualification should include drill participation. • Drill participation should be tracked. • Industry and drill events should be included as part of ERO training.	• Issue under evaluation by cross-discipline Team.

Areas for Improvement

- Lack of adequate communications between the Emergency Response Facilities (ERF) was identified as an area of concern during past drills/exercises. This lead to ineffective decision making regarding the emergency situation. In future drills, communication between ERF's will be a major focus.

- Historically the controller and evaluator duties for drills/exercises have been performed by a single person. This was identified as a concern due to the difficulty in performing these functions simultaneously. Currently there is a pilot program underway to separate these functions to enhance the critique process.

PLANT SUPPORT PERFORMANCE ANALYSIS

SECURITY

Strengths

- Provided facilities and assisted officers from Claiborne County Sheriff Department during weapons requalification. Our training instructors acted as Range Master while deputies qualified. Deputies were certified by Claiborne Country Sheriff's Department as they completed weapons requalification.

- Our instructors received recognition from the Emergency Preparedness Department for their outstanding support and assistance during annual training of offsite agencies.

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

- Our Security Compliance Section personnel performed an assessment of the Document Control Safeguards Information Program.

- Provided a Firearms Training System (FATS) for security personnel training and familiarization.

- Hosted system-wide pistol matches. Grand Gulf Security officers took all honors.

- The Security Superintendent attended the National Security Conference in Baltimore, Maryland.

- Six members of the security staff attended Core Protection Training as a part of the continuing training program.

Technical/Process Enhancements

Process Improvements Initiated and Results

- Working together, Security, Maintenance, Operations and Planning and Scheduling personnel developed a maintenance work order program to allow immediate response and repair of security equipment. The program provides security and maintenance personnel the latitude to expedite maintenance through direct coordination and eliminates the planning and scheduling process. Implementation of this program simplified the maintenance process, significantly reduced maintenance response time, and expedited repair of system/equipment failures. It improved system reliability while significantly reducing operating costs.

- Working as a team, the Security and Materials Department established a schedule for delivery of materials and supplies to the Protected Area Warehouse. Implementation of this schedule reduced the hours of security operations at the warehouse, thus releasing security personnel to perform other security duties reducing overtime expenditures.

- Prepared a manuscript (what-to-do) and produced a video (how-to-do) on the proper techniques for handling safeguards information (SGI). The video provides Grand Gulf personnel with familiarization of how to identify, handle, protect, store and account for SGI should they have a need for access The video has been an important tool in educating personnel and is readily available to anyone desiring refresher training.

- Modified security infrastructure by combining vital areas. The vital area barriers were relocated to the outer walls of the Auxiliary and Control Buildings which reduced the number of vital areas by 42 and the number of card readers by 90. The expansion resulted in reduced man-hours expended on compensatory measures, and reduced maintenance and equipment replacement. A substantial savings in equipment, maintenance cost, and manpower was realized from this project.

- Removed and replaced Sygnetron key card readers with a new "swipe-type" reader and replaced existing key cards. Sygnetron card readers and replacement parts as well as key cards were almost non-existent with a lag time of up to six months for procurement. The new card readers and key cards are plentiful and can be procured immediately. A substantial savings was realized through the reduction of maintenance and replacement of key cards due to breakage.

- Replaced the Key Code (pin-number) system with the Biometric Hand Geometry (hand reader) at the entry turnstiles. Installation of the hand geometry streamlined operation, enhanced the entry process, and reduced individual processing time by at least 20 percent.

- Obtained an exemption from the NRC to allow contractor personnel to carry photo key cards off site. The exemption resulted in security personnel not having to retrieve, store and issue individual photo key cards. Approval of the exemption was a burden reduction which reduced manning by five positions.

- Removed the partition at entry screening, painted walls and installed a repository for personnel to store their key cards when not being worn. Removed the portal metal detectors at the exit turnstiles. And, rearranged the radiation detection portals to provide expedient exit from the protected area. Realized a savings through the elimination of maintenance and upkeep on the portal metal detectors.

- Assumed some of the Fire Brigade functions from the Plant Operations Department. Assumption of these functions streamlined operations.

- Supported three employee and family tours (including our tenth anniversary of on-line operation) as part of our continuing role in developing good community relations with families and friends of our employees. The tours were very successful and provided the family members with insight into nuclear power generation.

Initiatives

- We have a consulting firm under contract to perform a target-analysis study of our vital areas and provide training on protection strategies.

- Ongoing project begun to install a land vehicle barrier system as a defensive strategy to protect vital equipment.

- Enlarging the weapons range to include a Tactical Firing Course (i.e., shoot-don't-shoot, stress fire, etc.)

- The Grand Gulf Security Department has taken the lead role in drafting a generic system-wide integrated Physical Security Plan and Training and Qualification Plan to be used at the four nuclear sites. Approval of these plans will enhance security operations by establishing standard requirements/commitments system-wide and eliminate site-specific plans now in existence.

- Continue to promote liaison with offsite agencies through an exchange of information programs designed to develop a better understanding of committed support for overall protection of the facility.

- Eliminated three sub-accounts and Safeguards Custodians duties at three locations.

- The Security Department is putting together a team to streamline the existing Safeguards Information Program to reduce records storage and maintenance. We believe that as much as 60 percent of the information being maintained is no longer useful and can be destroyed. This project will simplify safeguards information protection and remove the burden of possible compromise.

Areas for Improvement

The security department has taken the lead in a quality process (formerly called Work Improvements Now or W.I.N.) to establish standard security operating practices across Entergy Nuclear Sites.

- W.I.N. is designed to capture and implement best operating practices, eliminate redundancy, add value and streamline administrative functions system-wide.

- Initiatives like hand geometry, decentralized key card control, networked visitor and employee processing functions are pending system integration under this program.

- At the same time, the system-wide security organization is being evaluated for better management control through reorganization and restructuring at both site and corporate levels.

PLANT SUPPORT PERFORMANCE ANALYSIS

FITNESS FOR DUTY

Strengths

- Implementation of the new random program "HEIDI". It allows interfacing between HEIDI and Security Qualification Tracking System (SQTS) to avoid excessive input time.
- Reduction of random testing to 50 percent.
- Drug testing for River Bend is done at Grand Gulf Fitness For Duty at considerable savings to the company.
- Cross training at other sites to assist when needed.

Initiatives

- The onsite Corporate Security section (Investigations, Fitness for Duty, Medical) completed the following initiatives during this SALP period:
  - Implemented rule change that reduced frequency of respiratory physicals for employees.
  - Improved outage processing by condensing site specific training to two and one half days.
  - Using the INDEX System and NUMARC 91-03 Guidelines, obtained background investigations through data transfer which resulted in substantial savings.

PLANT SUPPORT PERFORMANCE ANALYSIS

PLANT SAFETY

The Grand Gulf Industrial Safety Assessment was performed July 18-22, 1994. This assessment was conducted at the request of Grand Gulf and consisted of personnel from Entergy and other utilities. It was performed by reviewing procedures and other documentation and by interviewing plant personnel.

Strengths

- The Safety Training Program
  - Phase I (Formal employee safety training)
  - Phase II (Manager safety training/educations)
  - Phase III (Film made specifically for Entergy to educate old and new employees).

    All four Entergy sites now utilize the same safety film. This provides continuity for employees/contractors traveling from site to site.
- The Hazardous Material Program has clearly written procedures/well-defined program
- Tracking/Trending Program
  - First aid accident database program developed by Plant Safety which provides instant capability to trend accidents by name, dates, location, nature of injury, type of injury, supervisor, etc.
  - Safety Marshall program which involves management in performing safety walkdowns. This includes identifying and correcting safety/housekeeping issues.
    - ◊ Plant Safety tracks the discrepancies found by management.
    - ◊ The tracking system is maintained in a database.
    - ◊ Open items are sent to the Manager, Plant Operation for distribution of items which are open over two months.
  - Proactive, total quality approach to problem resolution

    Improved heat stress program utilizes meters which read out in temperature and humidity.

- ◊ Charts are attached so workers can assess their stay times based on work loads and clothing requirements versus temperature and humidity.

- ◊ The Heat Stress Charts provide a "trigger point" for employees to contact Health Physics to perform heat stress assessments.

- ◊ The Heat Stress Charts are located in all known heat stress areas of the plant.

This program was a result of benchmarking other utilities.

PLANT SUPPORT PERFORMANCE ANALYSIS

NUCLEAR SAFETY & 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 creative burden reduction initiatives which have been well received, leading to several generic applications of our submittals. 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 flow through upon 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 RFO7. 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 RFO7, 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 RFO7 Outage Critique.

  As part of the Grand Gulf's self-assessment, a Scram Task Force was formed to compare the scrams that have occurred at Grand Gulf since November of 1994. The purpose of the task force was to identify common problems that are related to the scrams in order to help resolve the Grand Gulf excessive scram rate. The five man task force was requested to focus on the scrams and determine any common links and was also asked to review the corrective actions and reports associated with the scrams. A Safety Issues group member acted as lead for the task force. The results of the task force assessment were issued in ISEG Report OA-95-07, Scram Task Force Assessment of Scrams 82 through 89. The task force concluded that six of the scrams could have been prevented from a work practice or design change aspect. Additionally, the trip critical concept was not adequately incorporated into the design process. The task force also concluded that the corrective action process was not aggressively followed through for scram related items. This assessment was identified as a strength in an NRC Inspection Report as an example of a critical licensee self assessment.

Proactive Cost Beneficial/Burden Reduction Licensing Function

- Grand Gulf has assumed a leadership role within the Nuclear Power industry in the promoting and accomplishing initiatives in this area. Some of the more recognized accomplishments are:

  - Improved Technical Specifications were implemented at Grand Gulf in March 1995. In addition to extensive operator training, approximately 600 procedures were revised to support implementation. The implementation went very smoothly throughout RFO7 and the subsequent startup. No reportable events have been identified as caused by the implementation of the improved Technical Specifications.

  - Exemption to 10CFR50, Appendix J

  - 10CFR50.55a change: deletion of the 10-year update requirement for the ISI and IST programs

- Implementation of the revised source term initiative started by the licensing of advanced reactors

- Grand Gulf is Entergy Operations' pilot plant for the application of a graded approach to quality (Graded QA). Graded QA employs a combination of deterministic and probabilistic insights combined with results from the maintenance rule to determine the safety significance of plant structures, systems and components (SSCs). The Graded QA approach classifies plant SSCs as either safety significant or low-safety significant and is independent of the traditional safety-related/non safety-related framework.

- The Graded QA concept realigns the application of quality assurance criteria to plant SSCs with the intent of 10CFR50 Appendix B, through applying quality assurance elements to SSCs in a manner commensurate with their importance to safety. The end result is continued application of the existing level of quality assurance to the safety significant group, while a reduced level of quality assurance will be applied to those SSCs determined to be non-safety significant, thereby resulting in a reduction in overall plant operating cost while improving safety through focusing finite resources on activities that are important to safety.

Emergent Issue Control

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

- ECCS Suction Strainers

  As a result of the ECCS suction strainer clogging event that occurred at Bärseback 2, a Swedish BWR, Grand Gulf implemented several cleanliness measures to reduce the plant's susceptibility to this event. Also, in the last refueling outage, Grand Gulf removed the fibrous insulation that covered the drywell ventilation ductwork. Grand Gulf is pursuing modifications to the design of the present drywell insulation and suppression pool strainers. The plant engineering staff is evaluating the removal of fibrous insulation from drywell piping systems, as well as the replacement of fibrous insulation with insulation that does not degrade strainer performance. Grand Gulf is actively involved with the BWROG in evaluating alternative geometry strainers that could handle large quantities of fibrous insulation without degraded strainer performance. Grand Gulf plans to continue working with the BWROG and NRC to provide a timely resolution to this issue.

- Reactor Vessel Internals

  Grand Gulf is actively participating in the BWR Vessel and Internals Project, an organization that is actively pursuing resolution of materials issues with the reactor

vessel and internal components. The most visible issue being addressed by this group so far has been the shroud cracking issue. Grand Gulf has performed inspections and found no cracking of our shroud. We are currently evaluating mitigation techniques such as hydrogen injection to provide future assurance against cracking of the shroud and other internal components. Grand Gulf has members on the various subcommittees of the BWRVIP, and will continue the active participation in seeking resolution of existing issues and methods to prevent future concerns.

- Core Stability

  The possibility of power oscillations due to thermal hydraulic instabilities in BWRs has been a concern for many years. NRC Bulletin 88-07 (June 1988) requested licensees of BWRs to ensure that adequate operating procedures and instrumentation are available to prevent the occurrence of uncontrolled power oscillations during all modes of plant operations. The long-term corrective action to resolve this concern was the addition of hardware modifications to avoid flux oscillations or to suppress power oscillations should they occur. Grand Gulf has participated in the industry initiative to develop long-term solutions for power oscillations since its inception. Plant hardware to address this issue is planned for installation during RFO8.

- Thermo-Lag Fire Barriers

  NRC Bulletin 92-01 identified the thermo-lag fire barriers may not satisfy the perceived fire endurance rating. Since this time, Grand Gulf has actively participated in the industry initiative to generically address this concern. Grand Gulf has approximately 1,000 linear feet of installed thermo-lag. Grand Gulf has performed detailed evaluations to determine the properties of installed thermo-lag against the NEI Applications Guide. Plant modifications to restore operability of Grand Gulf thermo-lag barriers are planned for mid-1996.

- Reactor Pressure Vessel Integrity

  The NRC issued GL 92-01 (March 1992) to obtain information necessary to assess compliance with requirements regarding RPV integrity in view of certain concerns raised during review of the Yankee Nuclear Power Station RPV. Grand Gulf responded with the requested data and the issue was closed for Grand Gulf. During recent reviews of pressurized thermal shock evaluations for several PWRs, the Staff has concluded that licensees may not have included all relevant data in the responses to GL 92-01. As a result, licensees and the industry organizations are researching data sources to provide the information requested. Grand Gulf does not expect to identify any concerns as a result of this issue.

- Motor Operated Valves

  Generic Letter 89-10, Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance, issued in June 1989, requested licensees to develop and implement a program to verify MOV switch settings for safety-related and position-changeable valves in all safety-related fluid systems to assure design basis operability. Since 1989 six supplements to the Generic Letter have been issued, with a seventh supplement pending. The first NRC inspection of the MOV program was conducted in January 1992 in which the inspectors determined that the GL 89-10 MOV program was satisfactory at that stage of implementation. The Phase II inspection of the program was conducted in January 1994. Many of the concerns from the first inspection were resolved; however, there was still some concern over the grouping methodology used by the licensee and one unresolved item (URI) was identified. Grand Gulf met with the NRC/NRR in March 1994 to discuss this URI and to present specific details of the Grand Gulf MOV testing and evaluation process. In June 1995, Grand Gulf submitted its notification of closure to the NRC, and a closure inspection has been scheduled for January 1996.

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.

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: GGNS uses the issue date of the inspection report when categorizing violations. Inspection Report 94-06 was conducted during the last SALP period but issued in the current SALP period. Therefore, the two Level 4 violations issued are included in the current SALP period data.

The three most common comments in inspection reports related to Knowledge, Communications, and Command and Control.

Knowledge: 27 comments were found addressing knowledge level of various plant disciplines. Of these comments 24 were positive and 3 indicated weakness. This equates to 89% positive observations.

Communication: 16 comments were found related to communication. 12 of these comments were positive with 4 failing to be acceptable. This equates to 75% positive observations.

Command and Control: There were 11 comments made related to command and control. The majority of these comments were made about control room operations. All 11 comments were positive equating to 100%.

Strengths

Inspection Report No. 50-416/94-08

- Problems with the SSW pumps were conservatively addressed.
- The installation of jumper connections was a strength.
- Quality program audits continue to be a strength.
- Plant personnel displayed concern with safety outside of their normal area of work.
- The licensee's work package review on backshift was viewed as a strength.

Inspection Report No.- 50-416/94-10	The inspectors found the management decisions dealing with the problems of the plants scram solenoid pilot valves to be conservative.
Inspection Report No.- 50-416/94-12	Decisions made by Plant Safety Review Committee (PSRC) to continue Scram Time Testing when not required showed plant management's high concern for safety.
	- Engineering input into the decisions made with respect to slow control rod scram times and the search for a root cause was timely and conservative and considered a strength.
Inspection Report No.- 50-416/94-13	Audit and appraisal process continues to be considered a strength.
Inspection Report No.- 50-416/94-14	The SSPV Root Cause Group's aggressive search for a root cause for a slow scram time reached a different conclusion than the supplier or manufacturer of the SSPVs based upon independent testing and analysis. This questioning attitude is seen as a strength.
Inspection Report No.- 50-416/94-16	The inspectors concluded that the requalification program feedback system was very effective and considered the program a strength.
Inspection Report No.- 50-416/94-19	While the plant was in shutdown following a scram, 38 of 47 items on a forced outage work list was completed. A forced outage work list is maintained by Maintenance. The planning and scheduling of this work was considered to be an excellent use of shutdown time.
	- The procedure for "Conduct of Maintenance Activities" included attachments to be completed for lifted/relanded electrical leads which specified independent verification of the work. The inspector considered these controls to be very strong.
Inspection Report No.- 50/416/94-20	Activities to reduce hot-spots was considered a strength.
	- The effort to reduce personnel exposure was considered a strength of the ALARA program.
Inspection Report No.- 50/416/95-02	GGNS control of the use of temporary alterations to plant systems was considered a strength.

Inspection Report No. - 50/416/95-04	Licensee response to NRC Information Notice 95-20 was considered proactive.
	- Exceptional coordination and control were exhibited during new fuel receipt.
	- The inspector considered the Outage Safety Assessment to be very thorough.
Inspection Report No. - 50/416/95-05	Preservation of high pressure core spray system components was excellent.
	- Morning outage status meetings were very informative and emphasized shutdown risk conditions and status of key safety functions.
	- Direct participation by reactor engineering during fuel moves was considered a strength.
Inspection Report No. - 50/416/95-08	Effective program in place to handle radioactive materials shipments and the staff responsible for this work is dedicated and professional.
	- The inspector concluded the licensee was being proactive in its chemical decontamination to mitigate a personal dose.
Inspection Report No. - 50/416/95-12	A review of the recent scrams by a GGNS task force was considered thorough and a strength of the self assessment program.
	- Good engineering involvement was evident during troubleshooting of a reactor core isolation and cooling valve, unit differential relay, and load shedding and sequencing.
Inspection Report No. - 50/416/95-13	An exercise strength was GGNS's self-evaluation/critique process which objectively identified, and presented to management, significant performance problems observed during the exercise.
Inspection Report No. - 50/416/95-16	The inspectors noted that the suspension of the test by the Shift Superintendent, so the Control Room resources could be focused on the offgas problems, was an example of excellent command and control.

Weakness/Areas for Improvement

Inspection Report No. 50/416/94-10 — The licensee demonstrated poor radiological work practices.

Inspection Report No. 50/416/94-12 — Parts stored underwater in the upper pool area could potentially block rapid dumping of the pools or contribute to ECCS strainer fouling in the lower pools.

Inspection Report No. 50/416/94-15 — Concerns were raised by the NRC staff that "shrink-wrap" material used to cover some refueling equipment (cattlechute) could be dislodged during post-LOCA or containment spray conditions. This issue had already been identified by the licensee.

Inspection Report No. 50/416/94-16 — Failure to control overlap between exams was a weakness.

- Failure to train and evaluate the operators in the manner they are expected to operate was a weakness.
- Two examples of failure to appropriately proceduralize activities related to the licensed operator requalification program.

Inspection Report No. 50/416/94-18 — Inattention to detail was noted during control rod movements.

Inspection Report No. 50/416/94-20 — The inspector considered the engineering review of this deficiency weak.

Inspection Report No. 50/416/95-04 — Evaluation by HP prior to storage of this equipment was weak.

Inspection Report No. 50/416/95-05 — The inspector concluded that management attention was warranted related to the valve status panel located in the control room.

- The inspector considered the licensee's control of SDC system configuration to be weak.
- The approval of work on the protected electrical division, without ensuring no adverse effects, was poor.
- Operator depressing the wrong push button was considered weak attention to detail.

- The inspector considers the practice of taking logs on diesel generator operation without identifying abnormal operating parameters to supervisory and engineering personnel to be poor.

- The inspector considers engineering response to lack of definitive limits on some D/G parameters to be poor.

Inspection Report No.- 50/416/95-09

Poor radiological controls inside of containment over a period of several days was observed.

Inspection Report No.- 50/416/95-10

The inspectors findings associated with the VHRA keys and LHRA door maintenance would be identified as a continuing concern.

Inspection Report No.- 50/416/95-12

Preliminary planning for troubleshooting a circulating water pump discharge valve was deficient and almost resulted in a reactor scram.

- The inspector considered the omission of deficiencies on these issues to be indicative of a problem in the licensee's corrective action process.

- Improperly controlled drawings being present in the field during troubleshooting of a load shedding and sequencer was considered a bad practice..

Inspection Report No. - 50/416/95-13

During the scenario plant events became decoupled from the radiation data. This was discussed with the licensee as an area for improvement.

- Significant performance problems were observed during the exercise. These problems were in the area of (1) formulation of offsite protective action recommendations and (2) evaluation of the source term and determination of offsite dose projections.

Inspection Report No. - 50/416/95-16

The restoration of the condensate transfer system resulted in a high number of personnel errors, which was an indication that additional management attention was required.

LERs BY FUNCTIONAL AREA

FUNCTIONAL AREA	PREVIOUS SALP - 18 MONTHS (08/23/92 - 02/25/94)	PRESENT SALP-21 MONTHS (02/26/94 - PRESENT)
OPERATIONS	8	4
MAINTENANCE	10	9
ENGINEERING	6	8
PLANT SUPPORT	0	1
TOTAL	24	22

LERs BY CAUSE CODE

CAUSE CODE	PREVIOUS SALP - 18 MONTHS (08/23/92 - 02/25/94)	PRESENT SALP - 21 MONTHS (02/26/94 - PRESENT)
PERSONNEL ERROR	6	4
MAINTENANCE PROBLEM	0	0
DESIGN	3	3
CONSTRUCTION /INSTALLATION	0	2
EQUIPMENT FAILURES	10	7
INADEQUATE PROCEDURES	2	5
OTHERS	3	1
TOTAL	24	22

VIOLATIONS BY FUNCTIONAL AREA

Functional Area(s)	No. of Violations in Severity Level**			
	(8/23/92 - 2/25/94)		(2/26/94 - Present)	
	NCV	IV	NCV	IV
OPERATIONS	9	8	7	6.5
MAINTENANCE	1	2	5	2.5
ENGINEERING	3	3	1	
PLANT SUPPORT		3	4	5
TOTAL	15	16	18	13