REGION II

ATLANTA, GEORGIA

PLANT STATUS REPORT

ST. LUCIE

MARCH, 1995

DD156

PLANT STATUS REPORT FOR ST. LUCIE (3/95)

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PART 1 - FACILITY DESCRIPTION

1.1 FACILITY/LICENSEE

FACILITY: St. Lucie Units 1 and 2
PLANT LOCATION: Hutchinson Island near Port St. Lucie, Florida
LICENSEE: Florida Power and Light Co. (Corporate Office in Juno Beach, Florida)

1.2 UTILITY SENIOR MANAGEMENT

CORPORATE:

J. L. Broadhead (Jim), Chairman of the Board and CEO
J. H. Goldberg (Jerry), President, Nuclear Division

SITE:

D. A. Sager (Dave) - St. Lucie Plant Vice President
C. L. Burton (Chris) - Plant General Manager
L. W. Bladow (Wes) - Nuclear Assurance Manager
H. F. Buchanan (Hank) - Health Physics Supervisor
R. ~~L~~. Dawson (Bob) - Licensing Manager
D. J. Denver (Dan) - Site Engineering Manager
H. L. Fagley (Herman) - Construction Services Manager
P. L. Fincher (Pat) - Training Manager
R. J. Frechette (Bob) - Chemistry Supervisor
J. Marchese (Joe) - Maintenance Manager
W. L. Parks (Bill) - Reactor Engineering Supervisor
C. A. Pell (Ash) - Outage Manager
J. Scarola (Jim) - Operations Manager
J. A. West (Jeff) - Services Manager
D. H. West (Dan) - Technical Manager
C. H. Wood (Chuck) - Operations Supervisor

1.3 NRC STAFF

REGION II, Atlanta, GA:

S. D. Ebneter (Stew), Regional Administrator, (404) 331-5500
L. A. Reyes (Luis), Deputy Regional Administrator (404) 331-5610
E. W. Merschoff, Director, DRP, (404) 331-5179
D. M. Verrelli (Dave), Branch Chief, (404) 331-5535
K. D. Landis (Kerry), Section Chief, (404) 331-5509
R. P. Schin (Bob), Project Engineer, (404) 331-5561

SITE:

R. L. Prevatte (Dick), Senior Resident Inspector, (407) 464-7822
M. S. Miller (Mark), Resident Inspector, (407) 464-7822

NRR:

- S. A. Varga (Steven), Director, Division of Reactor Projects-I/II, (301) 504-1403
- J. A. Zwolinsky (John), Deputy Director, Division of Reactor Projects-I/II, (301) 504-1335
- D. B. Matthews, Deputy Director, Project Directorate II-2, (301) 415-1490
- J. A. Norris (Jan), Senior Project Manager, Project Directorate II-2, (301) 504-1483

AEOD:

- S. Israel (Sandy), Reactor Operations Analysis Branch, (301) 415-7573

1.4 LICENSE INFORMATION

	Unit 1	Unit 2
Docket Nos.	50-335	50-389
License Nos.	DPR-67	NPF-16
Construction Permit Nos.	CPPR-74	CPPR-144
Construction Permit Issued	7/1/70	5/2/77
Low Power License	NA	4/83
Full Power License	3/1/76	6/10/83
Initial Criticality	4/22/76	6/2/83
1st Online	5/17/76	6/13/83
Commercial Operation	12/21/76	8/8/83

1.5 PLANT CHARACTERISTICS

Description	Units 1 and 2
Reactor Type	Combustion Engineering PWR, 2-loop
Containment Type	Freestanding Steel w/Shield Building
Power Level	830 MWe (2700 MWt)
Architect/Engineer	Ebasco
NSSS Vendor	Combustion Engineering
Constructor	Ebasco
Turbine Supplier	Westinghouse
Condenser Cooling Method	Once Through
Condenser Cooling Water	Seawater

1.6 SIGNIFICANT DESIGN INFORMATION

1.6.1 REACTOR INTEGRITY

Reactor Pressure Vessel (RPV)

With the present fuel type and management policy, Unit 1 is expected to reach a 40-year RPV life. On this unit, the fuel type and management policy have been modified to make that RPV life span possible. Presently, a pro:ram is evolving for RPV life extension beyond the projected 40 years, potentially to 60 years, via a flux reduction program. A flux reduction program has started with the addition of eight absorbers in core corner positions, performance of vessel fluence calculations, and determination of an optimum power profile for each core load. Calculations using current methodology and uncertainty predict a significant RPV life extension, but not to 60 years. Excore dosimetry installed for the current cycle [with planned removal in October, 199(] will be used to reduce calculation uncertainty.

Due to different design and construction characteristics, Unit 2 RPV life expectancy exceeds 60 years. Low leakage core designs are now used for economic reasons, however the low leakage designs provide even greater life expectancy.

Reactor Coolant Pressure Boundary

On this CE plant, ECCS-to-RCS injection points are isolated by at least two check valves and one closed MOV. High pressure safety injection (HPSI), low pressure safety injection (LPSI), and containment spray (CS) pumps' common containment sump suctions are isolated from the containment sump by one closed MOV in conjunction with a closed seismic piping system. The CS headers are isolated from containment by one closed MOV and a check valve in conjunction with a closed seismic piping system. CVCS has the normal complement of two automatic actuation isolation valves.

1.6.2 REACTOR SHUTDOWN

Reactor Protection System

The reactor protection system provides protection for the reactor fuel and its cladding by providing automatic reactor shutdowns (8 trips) based on input from reactor power, reactor coolant pressure, coolant temperature, coolant flow, steam generator pressure, and containment pressure. The RPS is a redundant four-channel system that operates on a two-out-of-four logic.

ATWS Protection

ATWS protection, outside the normal reactor protection system, is initiated via the ESF pressurizer pressure signal. It actuates by opening contactors in the output of the CEA MG sets, thereby interrupting control element assembly power at its source. This protection has been installed on both units per CE, the NSSS, recommendations.

Remote Shutdown Facilities

These facilities are located in the switchgear rooms beneath each unit's control room.

1.6.3 CORE COOLING

Feedwater System

The main feedwater pumps are motor driven with each delivering 50 percent of the flow required for full power.

Turbine Bypass/Steam Dump Capacity

Each unit has five steam bypass valves, providing 45 percent of total capacity.

Unit 1 has one atmospheric dump valve per train (two trains) and Unit 2 has two valves per train. Each unit has the capability of dumping nine percent steam flow to the atmosphere.

Auxiliary Feedwater System

There are two motor-driven pumps on each unit with 100 percent capacity per pump. There is one steam-driven pump on each unit with 200 percent capacity. Any of the three pumps can inject to either steam generator. Automatic initiation and faulted steam generator protection are provided by each unit's Auxiliary Feedwater Actuation System provided by the NSSS.

Emergency Core Cooling System

In each unit, there are two HPSI pumps and two LPSI pumps with no unit-to-unit cross-connections. One pump of each type per unit will handle a postulated LOCA. The LPSI pumps also provide decay heat removal as required when the unit is shut down.

Decay Heat Removal

As indicated above, the LPSI pumps also provide decay heat removal as required when the unit is shut down by taking suction from the RCS (hot legs), passing the fluid through the shutdown cooling heat exchangers, and returning it to the RCS (cold legs). The heat removing medium is CCW - discussed in section 1.7.6 below. Shutdown cooling flow path overpressure protection is provided by automatic isolation valves and various relief valves in the system.

1.6.4 CONTAINMENT

Pressure Control/Heat Removal

There are two containment spray pumps and four containment fan coolers available per unit to suppress pressure spikes and cool the containment. One CS pump and two fan coolers will handle a postulated LOCA. There are no unit-to-unit cross-connections. This engineered safety feature is automatically started by ESFAS.

Hydrogen Control

Containment hydrogen control post-LOCA is accomplished on each unit by two trains of hydrogen recombiners located on the operating deck inside containment. By elevating, in a controlled manner, the temperature of containment atmosphere flowing through the recombiner, the recombiner units recombine hydrogen and oxygen to form water, thus preventing the buildup of hydrogen to potentially explosive levels.

1.6.5 ELECTRICAL POWER

Offsite AC

The station switchyard is connected to the transmission system by three independent 240 KV lines that share a right of way and interconnect with FPL's grid on the mainland approximately 10 miles West of the plant site. There are two independent offsite power feeds from the station switchyard to the emergency busses.

Onsite AC

Onsite AC power is provided by four EDGs (two per unit). EDGs are independent of other plant systems except vital DC power for control of starting. A Station Blackout (SBO) cross connection is installed and tested. This cross-connection serves the emergency busses directly and reduces cross-connect time to less than 15 minutes.

DC Power

Two trains of vital batteries per unit have been routinely tested for four-hour DC load profiles. Recently, due to cell replacement, they have been tested for three-hour battery capacity instead. The battery capacity test is harsher than the load profile test. There are four normal chargers per unit with swing chargers available for service. Non-safety batteries can be cross-connected to the safety-related swing bus if needed.

Instrumentation Power

Each unit has four inverters, two powered from each vital DC train, that provide four trains of instrumentation power.

Station Blackout Resolution Status

Unit 2 is a four-hour "DC coping" plant per the original license while Unit 1 is subject to the station blackout (SBO) rule of 10 CFR 50.63 requiring additional licensee action (unit-to-unit cross-connect of 4160V bus).

1.6.6 SAFETY-RELATED COOLING WATER SYSTEMS

Intake Cooling Water (Service Water)

Intake cooling water (ICW) for each unit originates in a common canal called the Intake Canal. The canal level varies with the tides since it is filled by a level difference between the Atlantic Ocean and the canal. One 16-foot and two 12-foot diameter pipes pass under the beach to connect the ocean and canal. The intake pipe ends in the Atlantic are covered by intake structures (rebuilt in 1991) intended to limit flow velocities, particularly vertical velocity, to reduce marine life entrapment. After use, ICW returns to the ocean through a Discharge Canal and under-beach pipes.

Each unit has two trains of ICW plus a swing pump that can be aligned to either train electrically and physically. The licensee has converted the deep draft ICW pumps from externally (water) lubricated to self-lubricated to increase reliability of the lubrication water source. The 100 percent (each) capacity pumps take suction from the intake canal via a canal intake structure using traveling screen debris protection. The intake canal structures adjacent to the ICW pump suctions are continuously injected with a hypochlorite solution to reduce marine growth in the associated piping and heat exchangers. Commencing 3/92, periodic injection of a clamicide at the intake structures, primarily to control marine growth affecting the turbine condensers, has also somewhat reduced marine growth affecting the ICW system.

The ICW pumps move water through two trains of heat exchangers that cool component cooling water (CCW) and two trains of heat exchangers that cool main turbine cooling water. During a postulated accident, water flow isolates from the turbine cooling heat exchangers. The discharge from the heat exchangers returns via the discharge canal to the ocean.

Increases in debris and silt in the heat exchangers during 1993 indicated that the intake canal needed dredging.

- As of September 1993, the utility was routinely cleaning main condenser waterboxes at reduced power and obtaining necessary dredging permits from the state and Corps of Engineers.

- The canal was dredged in December 1993 and January 1994 with immediate results of reduced waterbox fouling.

Closed Cooling Water Systems

Each unit has two trains of Component Cooling Water (CCW). The arrangement of two pumps and a swing pump mimics the ICW system.

The swing pump can be aligned to either train. The 100 percent (each) capacity pumps drive water through the CCW/ICW heat exchangers and then on to the heat loads, mainly the containment fan coolers and the shutdown cooling (decay heat) heat exchangers (which also can operate as containment spray heat exchangers). Additionally, CCW cools a variety of bearings, seals, and oil coolers for the HPSI, LPSI, and CS pumps. A non-safety-related portion of the CCW system cools reactor coolant pump seals and the spent fuel pool. This section isolates upon engineered safety features actuation.

1.6.7 SPENT FUEL STORAGE

Wet storage capability exists up to the year 2002 (Unit 2) and 2007 (Unit 1).

1.6.8 INSTRUMENT AIR SYSTEM

Instrument air compressors and driers, installed several years ago on each unit, provide all instrument air for Unit 2 and all but containment air for Unit 1. These have increased instrument air reliability. Unit 1 also has instrument air compressors inside containment.

1.6.9 STEAM GENERATORS

Each unit has two large steam generators (SGs) rather than the three or four usually seen. The licensee has begun to focus on a Unit 1 SG replacement in 1997. The SGs are under construction at the B&W Canada shops and a site organization is functioning.

1.7 EMERGENCY RESPONSE FACILITIES/PREPAREDNESS

Emergency Operations Facility:	10 miles West of site, I-95/Midway Rd. Exit
Technical Support Center:	Onsite, Adjacent to Unit 1 Control Room
Operational Support Center:	Onsite, 2nd floor of North Service Building

The last annual emergency preparedness exercise was held February 9, 1994. Two followup items were identified; one involving the definition of containment failure and one involving the need to demonstrate a protected area evacuation. An evacuation drill on September 30, 1994, satisfactorily demonstrated the accountability program. The next emergency preparedness exercise is scheduled for May, 1995.

Since St. Lucie site has a high probability of hurricanes, communications facilities were improved following the Turkey Point experience with Hurricane Andrew in August, 1992. Improvements include:

- High Frequency Auto-link with other FPL sites and NRC.
- Enhanced 900 MHZ System for site and mobile communications, with radios also in the licensee's EOF and county emergency facility.
- Cellular phones with hardened antennas.
- Hardened Local Government Radio antenna ties.

1.8 PRESENT OPERATIONAL STATUS (3/9/95)

Unit 1 is operating at 100% power and has been operating since a reactor startup on March 8 following a short notice outage for pressurizer code safety valve replacement.

Unit 2 is operating at 100 % power and has been operating since a reactor startup on February 24 following a trip on February 21 due to an instrument failure.

Availability Factors:

	Unit 1	Unit 2
1991	81.0	100.0
1992	96.5	75.2
1993	74.0	71.8
1994	86.8	79.6
1995 (through 1/95)	100.0	100.0
Cumulative (through 1/95)	77.3	83.0

1.8.1 UNIT 1 OPERATING HISTORY (Past Twelve Months from 3/21/95)

Unit 1 operated continuously during the past 12 months with the following exceptions:

On March 28, 1994, Unit 1 experienced an automatic reactor trip when a maintenance foreman opened the generator exciter breaker. The worker had been issued a clearance on the Unit 2 exciter breaker and mistakenly entered the wrong unit's exciter control cubicle.

On April 2, 1994, the unit was returned to power; however, the unit automatically tripped on April 3 from 19% power while deenergizing a 4160 Volt non-vital bus to allow safe removal for maintenance of a failed startup transformer output breaker. The planned electrical lineup placed the A emergency bus on its EDG, which was running at a different frequency from the grid. The paralleled CEA MG sets, now with different frequency drivers, developed circulating currents, resulting in several tripped circuit breakers. A partial reactor trip tripped the turbine, which tripped the reactor. Unit 1 returned to power on April 4, 1994.

On June 6, 1994, Unit 1 tripped during a severe thunderstorm. The main transformer locked out the generator, causing a reactor trip, due to a phase differential on main generator transformer 1A. This occurred as a result of an approximately 8' length of flashing from an adjacent building which was blown across two phases of the 1A main transformer output. The licensee conducted inspections and tests of the 1A and 1B main transformers and the main generator, and performed repairs to the 1A main transformer. The reactor was taken critical on June 8; however, the licensee elected to remain off-line until repairs were completed to the 1A main transformer. Unit 1 was placed on line on June 11.

Unit 1 reduced power and entered mode 2 on August 28 to repair a DEH leak. The unit was returned to power approximately 18 hours later on the same date.

On October 26, the unit tripped from 100 percent power due to a loss of electrical load. This was the result of arc-over in a potential transformer in the switchyard due to salt buildup. The licensee then entered a unit refueling outage, which had been scheduled to begin four days later. The unit was returned to service on November 29.

On February 27, 1995, the unit was removed from service for the replacement of pressurizer code safety valves which had been leaking by the seat since shortly after startup in November, 1994. The unit was returned to service on March 8.

On March 4, 1995, the unit experienced a 14 minute loss of shutdown cooling. The apparent root cause was operator error by a reactor operator placing one loop of SDC in standby. The operator apparently closed the suction valve to the operating, vice standby, pump. The operator in question has denied the error. The licensee is considering disciplinary action and has relieved the operator of licensed activities.

1.8.2 UNIT 2 OPERATING HISTORY (Past Twelve Months from 3/21/95)

Unit 2 operated continuously during the past 12 months with the following exceptions:

On March 16, 1994, during a unit refueling outage, the licensee identified boron deposits indicative of leakage from one of four pressurizer steam space instrument nozzles. Licensee investigations identified unacceptable linear indications in three of four nozzle pressure boundary welds. The steam space nozzles were constructed of Inconel 690 and were installed in 1993 as replacements for existing Inconel 600 nozzles, which had been found to be cracked. The new nozzles were attached with Inconel 600-equivalent weld material, as 690-equivalent material was not approved for use at the time. The licensee determined that the indications were the result of Primary Water Stress Corrosion Cracking (PWSCC).

The licensee's corrective actions involved repairing all four nozzles by creating new pressure boundary welds at the exterior wall of the pressurizer. The new welds were of the Inconel 690-compatible material. During the repair efforts, region-based inspectors found that the overall repair effort was well controlled and that performance was good; however, one violation was identified involving incorrect bevel angles on two weld preps.

On March 18, Unit 2 experienced a six minute cessation of shutdown cooling when a misanalyzed clearance (tagout) resulted in automatic valve realignments that secured flow to one of two operating shutdown cooling trains. A second shutdown cooling loop was in operation at the time; however, operators stopped the operating pump as a precaution against damage after the unexpected valve realignments. Operators assessed the situation and restored shutdown cooling in six minutes.

Unit 2 completed the refueling outage and was returned to power on April 19, 1994.

On April 23, 1994, Unit 2 tripped due to a RPS cabinet manufacturer's wiring error which manifested itself during RPS troubleshooting. The wiring error existed since the original manufacture of the cabinet.

Following Unit 2 trip stabilization of April 23, 1994, the steam bypass control system operated unexpectedly, resulting in a rapid 7 degree cooldown and a resultant severe RCS shrink (pressurizer heaters deenergized on low pressurizer level). Prompt operator action was taken to secure the cooldown. Unit 2 was returned to power on April 26, 1994.

On July 9, 1994, Unit 2 turbine was shut down and reactor power reduced to Mode 2 because the 2B1 RCP lower oil level indication showed a leak. The sump was not leaking and an unusual failure in the indication system was determined to be the reason for the indication. The reactor was returned to mode 1 and the turbine started up on July 10, 1994.

On July 14, 1994, Unit 2 was shut down to allow repair of a stuck-closed trip circuit breaker. Operators did not follow Unit 2 Tech Spec LCO time requirements regarding shut down on July 14 to allow repair of a stuck-closed trip circuit breaker. The unit was restarted and placed on line on July 15, 1994.

On February 21, 1995, the unit tripped as a result of low steam generator water level. The condition was the result of a feedwater regulating valve closure after a steam generator water level control level transmitter failed high. The transmitter was replaced and the unit was returned to service on February 25.

1.9 OUTAGE SCHEDULE AND STATUS

Unit 1's last refueling outage began on October 26, 1994, and ended on November 29, 1994. Major activities included: refueling; reactor vessel nozzle and flange weld ISI inspection; installation of a permanent cavity seal ring; replacing reed switches for several CEAs; integrated safeguards test; steam generator tube inspection and plugging; steam generator sludge lancing; repair of refueling water storage tank; several instances of reduced inventory/ mid-loop operations; replacement of ICW/CCW LOOP logic [HFA latching relays] with pull-to-lock switches; removal [collection] of Rx vessel neutron flux dosimetry; modification of EDG skids to allow access underneath; inspection of ECCS sump area; replacement of a main transformer; modification of containment spray NaOH addition piping; and mechanical, electrical, and I&C systems maintenance.

Unit 2's last refueling outage began on February 13, 1994, and ended April 17, 1994. Major outage activities included: refueling; steam generator tube inspection and plugging; low pressure turbine blading replacement; emergency diesel generator inspection; replacement of two reactor coolant pump mechanical seals; and mechanical, electrical, and I&C systems maintenance. The next Unit 2 refueling outage is scheduled for October, 1995.

PART 2 - PLANT PERSPECTIVE

2.1 GENERAL PLANT PERSPECTIVE

A SALP presentation was conducted on February 15, 1994, covering the SALP period of May 3, 1992, through January 1, 1994. The facility was rated category 1 in all functional areas for the second consecutive SALP period.

In June 1994, St Lucie was dropped from the NRC management list of good performers after experiencing five unit reactor trips in the first half of 1994.

2.2 SALP HISTORY (Past 2 SALP Periods)

The last SALP period, SALP Cycle 10, ended on January 1, 1994. The current SALP period ends on July 1, 1995.

ASSMT. PERIOD	OPS	RAD	MNT/SURV	EP	SEC	ENG/TECH	SAQV
5/1/89 - 10/31/90	1	1	2	1	1	1	1
11/1/90 - 5/2/92	1	1	1	1	1	1	1

	PLANT OPS	MAINTENANCE	ENGINEERING	PLANT SUPPORT
5/3/93 - 1/1/94	1	1	1	1

2.3 SELECTED SALP AREA DISCUSSIONS (3/21/95)

Since the assessment of the SALP period ending in January, 1994, there have been no events that should significantly change the overall assessment of this facility. A new corrective action program, the St. Lucie Action Report Star System, was implemented in July, 1994. This program will be used to identify, review, analyze, resolve, track, and close out all plant discrepant conditions. It is intended to provide increased emphasis in this area.

Plant Operations

Summary of Previous Assessment

Within the current SALP cycle, previous assessments have noted a *potential* decline in Operations' performance. Noted indicators included five reactor trips in the first six months of the cycle. No common root causes were identified. Operator actions with regard to the noted trips were generally good. Two entries into reduced inventory operations during the Unit 2 outage were noted as excellent. Procedural weaknesses which indicated a lack of rigor in the review process were noted, as was the fact that temporary changes to procedures were on the increase (indicating increasing attention to procedural adequacy).

Management activities in response to the increase in operational events was determined to be strong, with an increase in overall focus directed at plant operations. The corrective actions program was enhanced, consolidating tens of programs into one which involves daily management reviews of all documented conditions.

The previous assessments concluded that Operations remained strong in the current period, that management actions were aggressive in dealing with identified weaknesses, and that increased attention to procedural adequacy may be warranted.

Last Six Months

The previous six months has shown a sharp decrease in the number of reactor trips, with two having occurred: one due to salt buildup on switchyard components which led to a loss of electrical load on Unit 1, and one due to a level transmitter failure which led to a low steam generator level trip on Unit 2.

Operator Performance

Operator performance has been noted to be good to excellent in evolutions such as post-trip response, startups, mid-loop operations (during the Unit 1 outage), and in the performance of surveillance testing. Several findings have indicated potential weaknesses in attention to detail on the part of operators. They include:

- Failure to sample a SIT within the TS-required time frame. Second occurrence in two years.
- Failure to identify an inoperable LPSI header pressure control board indicator which had been failed in mid-range for approximately two weeks.
- Minor refueling machine errors of omission
- Failure to identify/notify in response to Unit 1 hot leg stratification.
- Potential operator error in valve control manipulation which led to a loss of shutdown cooling on Unit 1.

An issue of a lack of professionalism and of a casual attitude toward EOPs on the part of one individual was identified during operator examinations. The licensee prepared and executed an aggressive remediation plan prior to allowing the individual to return to watchstanding duties.

Strengths

Strengths have been identified in the ability of the Operations department to integrate plant activities. Aspects included multidisciplinary briefings prior to major evolutions (be they operations or maintenance evolutions), and an increased involvement by Operations in the prioritization of maintenance activities.

Operations' management has played a major role in the identification and resolution of prominent problems, including:

- 2B LPSI pump air-binding
- Pressurizer relief valve seat leakage
- Failure to sample SITs following volume additions
- Minimum temperature for criticality discrepancies

- CVCS letdown control anomalies

In these and other cases, Operations has expressed an unwillingness to accept stopgap maintenance measures and has demanded that historically poorly performing systems be made to operate correctly.

Weaknesses

Weaknesses have been identified in annunciator response procedures (several were discrepant either in setpoint reference or in content), corrective actions (a violation resulted from the licensee's failure to recognize the impact of a failure to perform adequate surveillance testing on swing bus components), logkeeping (a violation resulted from the modification, by one shift, of another shift's log entries), and aspects of the Facility Review Group's activities (some members were identified as "going through the motions" of review; however, the Plant General Manager was consistently cited as a strong presence who articulated expectations and kept members on track).

Conclusion

On balance, Operations continues to be strong at St. Lucie. The licensee continues to be aggressive in the identification and resolution of operational problems. In the last six months, operations has shown a new involvement in maintenance prioritization which has increased the safety perspective applied to maintenance activities.

Maintenance/Surveillance

Summary of Previous Assessment

Maintenance was assessed as category 1 in the previous SALP. The previous assessments made during the current SALP cycle indicated that the performance level of maintenance activities had not abated. Strong performance had been noted in the support of the Unit 2 outage, and housekeeping and plant preservation activities were deemed good.

Last Six Months

During the past six months, twenty-seven maintenance activities were observed in varying levels of depth. Two violations were cited; one involving the misuse of an unreviewed vendor technical manual and one involving a failure to perform an adequate independent verification of landed leads. Workers were generally found to be well-trained, conscientious, and skilled.

Twenty-four surveillance activities were observed. No violations or major weaknesses were identified as a result.

. Strengths

The Unit 1 outage was considered a major strength. The outage was conducted in thirty-five days, three days ahead of schedule, without a safety-significant reduction in work scope.

The licensee developed and implemented a Critical Maintenance Management program for the performance of maintenance within TS ASs. Maintenance activities performed under this program have been observed and found to be well-planned and executed and have been performed after assessing the increased risk associated with the activity.

The licensee's predictive maintenance program has continued to provide early indications of impending failures. Most recently, the organization identified an unsatisfactory lug in cabling supplying one phase of a CEA MG.

Weaknesses

Isolated weaknesses have been identified both by the NRC and the licensee's QA organization. They include:

- A failure to properly incorporate changes into VTMs. Required FRG reviews were not performed.
- A failure to adequately define and perform independent verifications properly.
- A failure to properly implement elements of the site's welding program. This was identified by QA and resulted in the Maintenance Manager issuing a stop work order, which was in place for one week, while concerns were addressed.

Conclusion

Maintenance continues to be performed at superior levels. Planning and execution has improved through extensive planning efforts. The addition of the Critical Maintenance Management program has enhanced on-line maintenance by requiring extensive review and planning prior to work. Surveillances continue to be performed well.

Engineering

Summary of Previous Assessment

The previous assessments for this SALP cycle concluded that engineering was generally strong. Good support of the Unit 2 outage was noted, as was good QA with respect to fuel fabrication and receipt inspection. Potential problems were noted in the area of vendor technical manuals.

Last Six Months

The noted concerns with respect to VTMs were, in part, validated in the maintenance area, where a violation resulted; however, the violation was not reflective of a failure on the part of engineering. Good support to the Unit 1 outage was noted, with engineering personnel assuming pivotal roles in the management of the outage. One NCV was identified, relating to the design of NaOH supply piping, however, the problem had existed since shortly after construction and was appropriately addressed.

Five plant modifications and several safety evaluations were reviewed and were generally found to be thorough and correct. The licensee's program for the control of containment coatings was reviewed and found to be satisfactory. Engineering involvement has been evident in each major plant challenge in the last six months, including:

- Apparent air-binding of the 2B LPSI pump
- 1A LPSI pump relief valve lift
- Unit 1 Pressurizer relief valve seat leakage
- Post-event reviews of loss of Unit 1 SDC
- Unit 1 RWT leak repairs

Conclusion

Engineering continues to perform well. No weaknesses have been identified in this functional area.

<u>Plant Support</u>

<u>Radiological Controls</u>

Previous assessments this SALP cycle indicated an effective program. Inspections this period indicate good control of internal/external exposure and containment during outages. ALARA initiatives were noted: robotics, submersibles, and telemetry. The licensee was noted to be ahead of most of the region in the use of cameras, video and wireless communications.

<u>Emergency Preparedness</u>

The licensee continues to maintain an effective EP program.

Security

Security upgrades made prior to the last SALP were notable. The licensee continues to maintain a very effective security program.

Fire Protection

The licensee continues to maintain an effective fire protection program.

Housekeeping

Housekeeping has been generally very good.

PART 3 - SIGNIFICANT EVENTS

3.1 SIGNIFICANT EVENTS BRIEFINGS (Past 12 Months)

Unit 1: None this period

Unit 2: Failure of a GE AK-25 Trip Circuit Breaker

3.2 ENFORCEMENT STATUS/HISTORY (Past 12 Months)

Currently, there are no escalated enforcement actions pending at St. Lucie.

PART 4 - STAFFING AND TRAINING

4.1 OPERATIONS STAFF - OVERALL (8/94)

Above average performance of the operations staff has been noted. Control room demeanor of personnel is above average.

Number of Shifts: (RCO, SRO) Six shift rotation, 8-hour shifts; (NPO, ANPO, SNPO) Five shift rotation, 8-hour shifts.

Number of SROs:	22 active/21 inactive* / 43 total
Number of ROs:	30 active/2 inactive/ 32 total
Total Licensed Operators:	52 active/23 inactive/ 75 total

* 3 SROs perform only RO duties and maintain SRO licenses active only for RO duties. This practice is being reviewed by RII operator licensing.

4.2 WORK FORCE (8/94)

	FPL	Contractor
Plant personnel (excluding disciplines below)	713	122
Training	63	0
Quality Assurance/ISEG/SPEAKOUT	49	0
Materials Management	46	0
Security	11	122
Site Engineering	42	0

4.3 OPERATOR QUALIFICATION/REQUALIFICATION PROGRAM (Past Two Years)

4.3.1 REQUALIFICATION PROGRAM

NRC-administered requalification exams were completed in October, 1992. Results were good - 9 of 12 RO's passed and 12 of 12 SRO's passed. Three of the RO's failed the written exam and one also failed the JPMs. The program was rated satisfactory. Requalification exams are currently in progress (10/94). To date, 20 of 24 SRO's and 17 of 20 RO's have passed all portions of the exams Failures have included 5 written exams, 1 JPM, and 1 simulator failure.

4.3.2 INITIAL EXAMS

Previous initial operator exams were conducted on April 29, 1991. Six SRO upgrades were examined, and all six passed. Additional exams were completed October 25, 1991. Six operators, 2 SRO upgrades, and 1 instant SRO were examined. All passed. The last initial exam was given April 27 through May 1, 1992, to 6 SRO upgrades and 2 ROs, and all passed. A hot license class of 15 persons was started in late February, 1992 (14 still in class). Results of an initial exam conducted in October 1993 were that 10 of 10 prospective ROs passed. Results of initial exams in October 1994 were that 9 of 9 prospective SROs and 2 of 2 prospective ROs passed.

4.3.3 GENERIC FUNDAMENTAL EXAM

On an NRC administered Generic Fundamental Exam on June 6, 1990, 6 of the 10 St. Lucie operators who took the exam passed. On February 6, 1991, 3 of 3 operators who took the exam passed. On June 6, 1991, one operator took the exam and passed. On February 10, 1993, all 12 operators who took the exam passed. One person took the exam on February 9, 1994, and passed. No further Generic Fundamental Exams have been taken.

4.4 PLANT SIMULATOR

The simulator is on site and fully certified to meet ANSI/ANS 3.5, 1985.

4.5 INPO ACCREDITATION

All training programs are maintaining INPO accreditation. The site specific simulator has been used for training since 1988 and has been fully certified for approximately 4 years. Eight separate NRC inspections in the form of operator examinations at the simulator have found no serious problems.

PART 5 - INSPECTION ACTIVITIES

5.1 INSPECTION FOLLOWUP OPEN ITEMS SUMMARY (UNITS 1 AND 2 COMBINED) (10/6/94)

Division	Pre 93	Total	Change from Last Report
DRP	3	30	0
DRS	0	7	-3
DRSS	0	2	0
Totals	3	39	-3

Note: Each item that applies to both units is counted as one item.

5.2 MAJOR INSPECTIONS

IR-No.	Date	Type
89-02	1/89	RG-1.97
89-03	3/89	NDE
89-07	3/89	EQ
89-09	3/89	Design Control
89-24	10/89	Maintenance Team Inspection
89-27	11/89	EOP Followup
90-09	4-5/90	OSTI
91-03	2-3/91	EDSFI
91-18	9/91	MOV (no negative findings)
91-201	9-10/91	Service Water Inspection
92-14	7/92	Emergency Preparedness Program
92-17	7/92	EDSFI Followup
93-01	1/93	Check Valves
94-11	5/94	MOV Followup

5.3 PLANNED TEAM INSPECTIONS

None

5.4 INFREQUENT INSPECTION PROCEDURE STATUS

No core modules are overdue at this time.

5.5 SIMS STATUS - OPEN TMI ITEMS

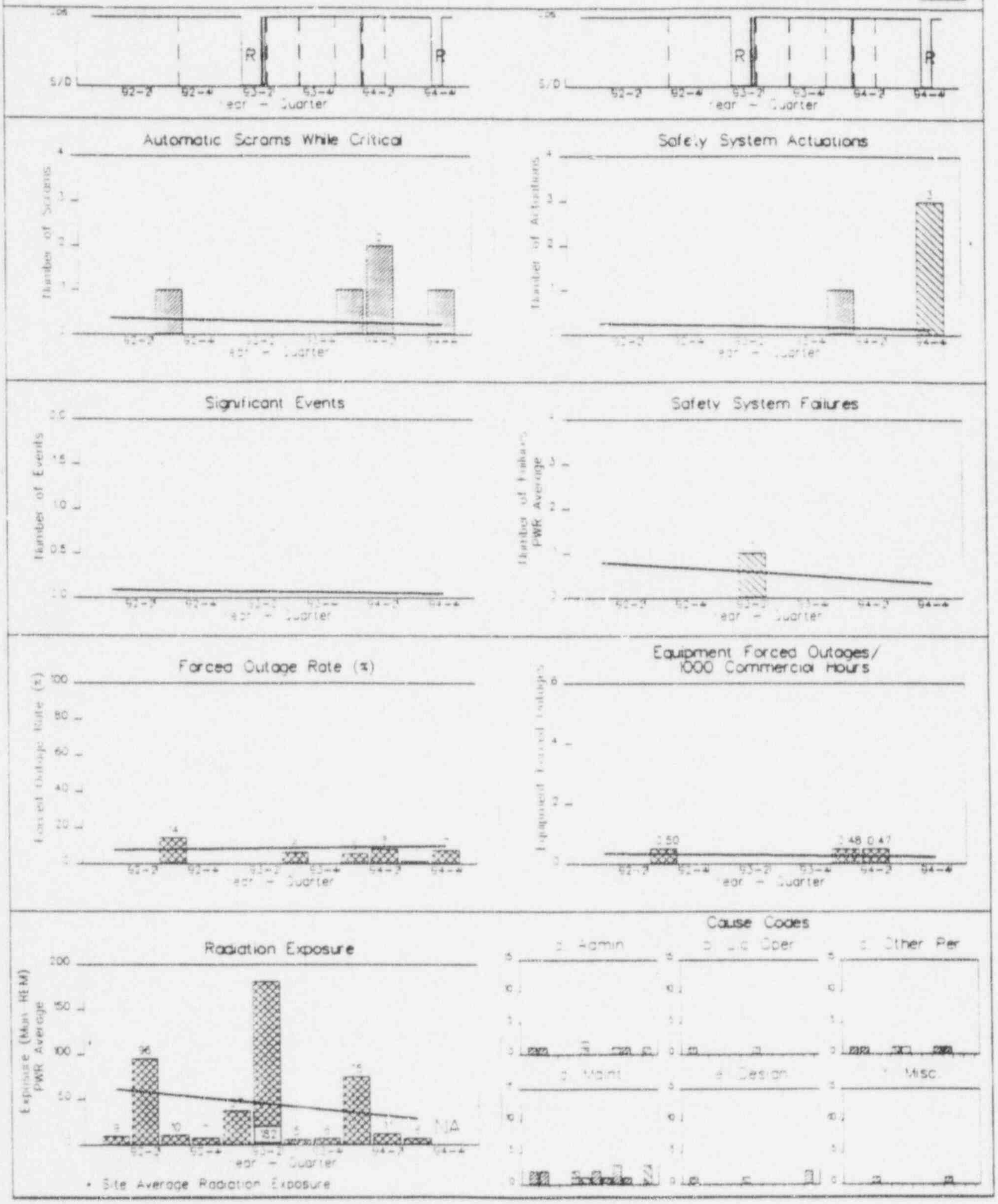
There are no open TMI items.

PREDECISIONAL

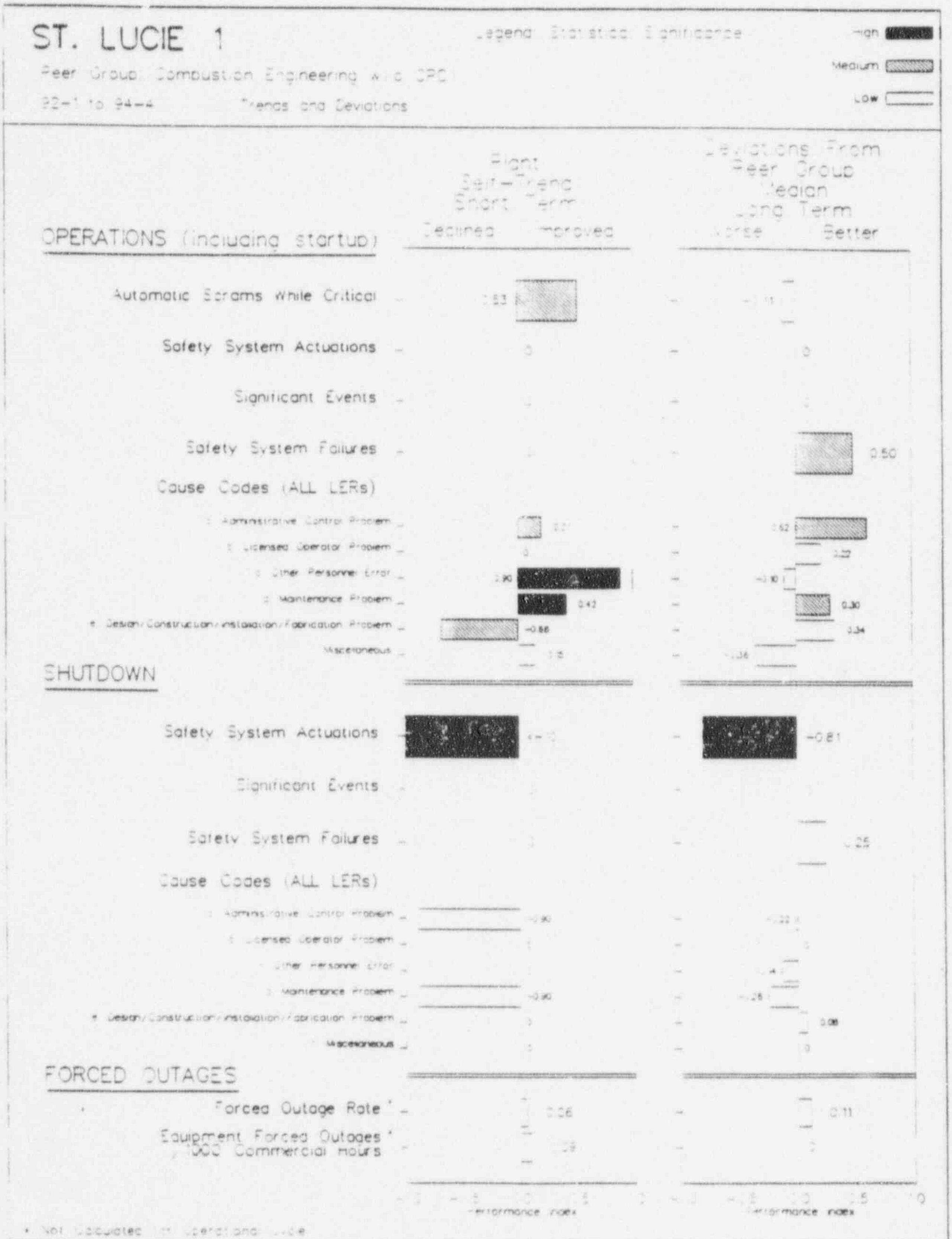
ST. LUCIE 1

92-1 to 94-4 Quarterly Data

Legend
Shutdown > approx 72 hrs
Refueling R
Industry Avg Trend
StartUp
Operation
ShutDown
Not Shown Using Op. Cycle



PREDECISIONAL



ST. LUCIE 1

PI EVENTS FOR 94-1

SSA 01/13/94 LER# 33594002 50.72#: 26605 PWR HIST: POWER OPERATIONS AT 100%
DESC : WHILE TESTING THE UNDERVOLTAGE RELAY, AN INADVERTENT UNDERVOLTAGE SIGNAL INITIATED AN EMERGENCY DIESEL GENERATOR START AND SUBSEQUENT LOADING OF ITS ASSOCIATED VITAL BUS.

SCRAM 03/28/94 LER# 33594003 50.72#: 27006 PWR HIST: POWER OPERATIONS AT 68%
DESC : AN AUTOMATIC REACTOR TRIP OCCURRED F' M THE INADVERTENT OPEN.NG OF THE GENERATOR EXCITER FIELD BREAKER.

PI EVENTS FOR 94-2

SCRAM 04/03/94 LER# 33594004 50.72#: 27035 PWR HIST: POWER OPERATIONS AT 19%
DESC : A REACTOR SCRAM OCCURRED WHILE ATTEMPTING TO ISOLATE A 4KV BUS FOR REPAIR. DUE TO A PROCEDURAL ERROR, AN ELECTRICAL PHASE MISMATCH OCCURRED BETWEEN THE CEDM MG TRAINS THAT RESULTED IN A LOSS OF POWER TO THE CEDM BUS.

SCRAM 06/06/94 LER# 33594005 50.72#: 27359 PWR HIST: POWER OPERATIONS AT 8%
DESC : DURING HIGH WINDS, A PIECE OF ALUMINUM FROM A STORAGE BUILDING WAS BLOWN INTO THE MAIN TRANSFORMER CAUSING A GENERATOR/TURBINE/REACTOR TRIP.

PI EVENTS FOR 94-3

NONE

PI EVENTS FOR 94-4

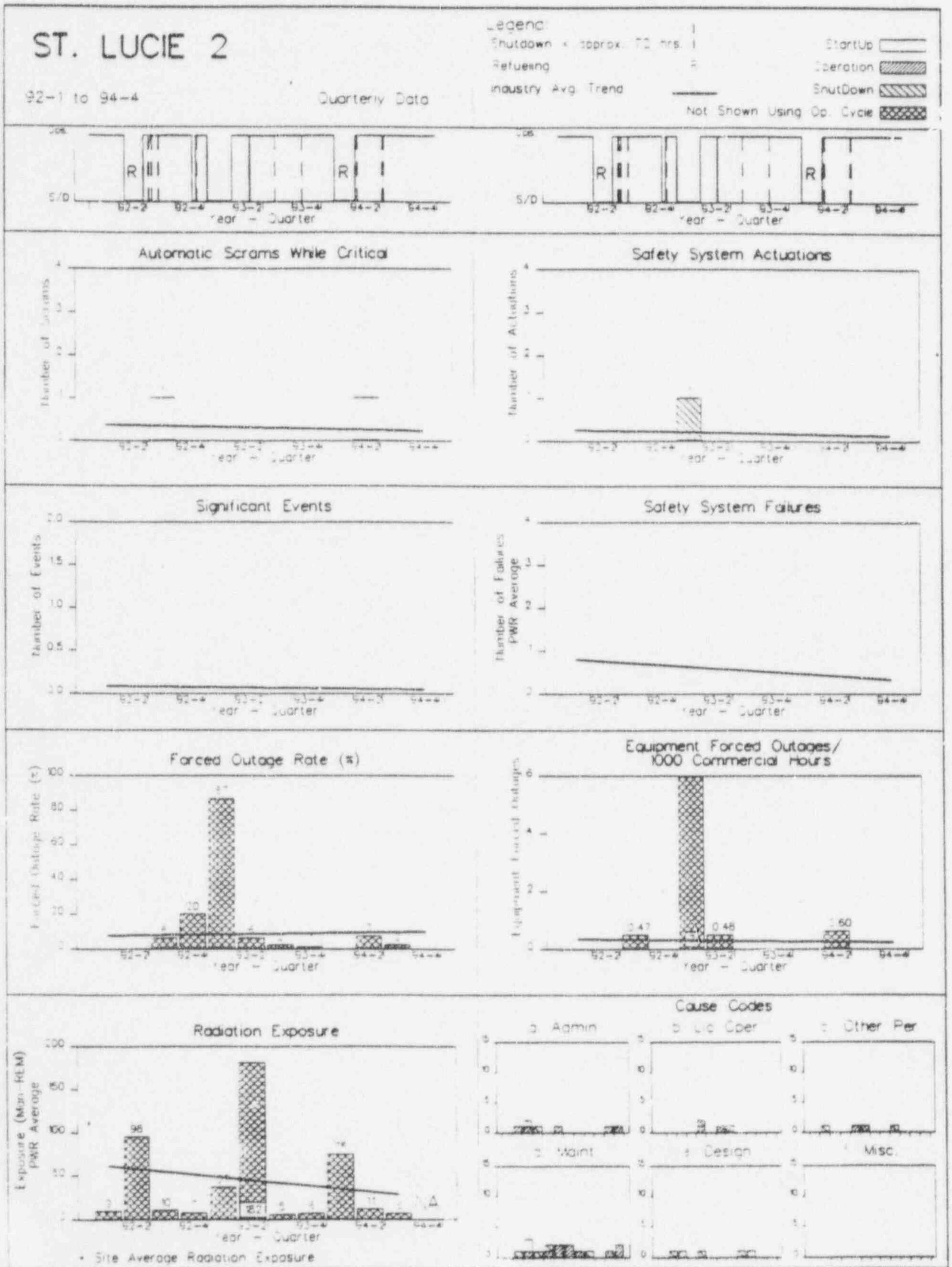
SCRAM 10/26/94 LER# 33594007 50.72#: 27954 PWR HIST: POWER OPERATIONS AT 100%
DESC : A REACTOR TRIP WAS INITIATED WHEN THE MAIN TURBINE TRIPPED AS A RESULT OF A MAIN GENERATOR LOCKOUT CAUSED BY A FAULTED POTENTIAL TRANSFORMER IN THE SWITCH YARD.

SSA 11/22/94 LER# 33594009 50.72#: 28060 PWR HIST: COLD SHUTDOWN
DESC : BOTH EDGS STARTED ON AN SIAS. ONE EDG LOADED ITS BUS WHEN AN ABNORMAL ELECTRICAL LINEUP COMBINED WITH ADDITIONAL LOADING FROM THE SIAS CAUSED THE BUS BREAKER TO OPEN.

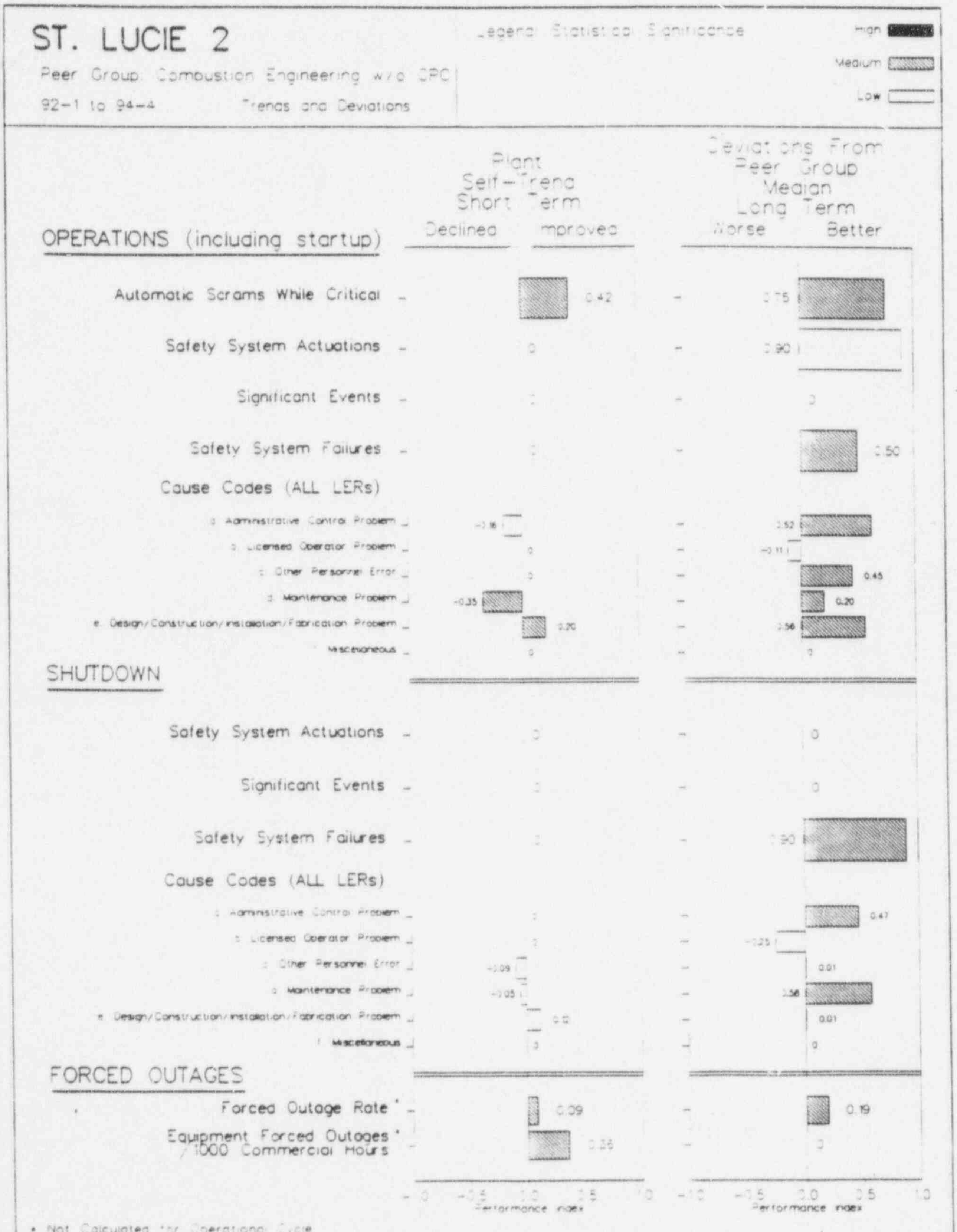
SSA 11/22/94 LER# 33594009 50.72#: 28060 PWR HIST: COLD SHUTDOWN
DESC : AN SIAS OCCURRED WHEN TWO OF FOUR PRESSURIZER PRESSURE TRANSMITTERS DRIFTED HIGH FOR UNKNOWN REASONS. THE CHARGING PUMPS WERE SECURED BEFORE THE LTOP SETPOINT WAS REACHED.

SSA 11/24/94 LER# 33594010 50.72#: PWR HIST: COLD SHUTDOWN
DESC : AN INADVERTENT SAFETY INJECTION ACTUATION SIGNAL OCCURRED DURING REACTOR PROTECTIVE AND ENGINEERED SAFEGUARDS SYSTEM TESTING WHEN A PRESSURIZER PRESSURE BISTABLE TRIPPED.

PREDECISIONAL



PREDECISIONAL



ST. LUCIE 2

PI EVENTS FOR 94-1

NONE

PI EVENTS FOR 94-2

SCRAM 04/23/94 LER# 38994003 50.72#: 27150 PWR HIST: POWER OPERATIONS AT 29%
DESC : DURING A NUCLEAR INSTRUMENTATION CALIBRATION, A REACTOR TRIP OCCURRED DUE TO AN IMPROPERLY WIRED BYPASS CIRCUIT.

PI EVENTS FOR 94-3

NONE

PI EVENTS FOR 94-4

NONE

ST. LUCIE OPEN ALLEGATIONS AS OF 03/21/95

ALLEGATION: RII-94-A-0105 FACILITY: ST LUCIE 1
DATE RCVD: 940520 SUBJECT: WELDING SUPERV RCVD NEGATIVE PERFORMANCE APPRAISAL AND THEN REMOVED FROM A SUPERVISORY POSITION
DUE DATE: 950228
DAYS OPEN: 305 ACTION PNDG: AP:NO SAFETY ISSUE. OI ACTION PNDG

RSP DIV/LCA: EICS
ACTION DUE DATE: DUE: 12/30/94

ALLEGATION: RII-94-A-0119 FACILITY: ST LUCIE 1
DATE RCVD: 940615 SUBJECT: NOT ENOUGH GUARDS, LT HAS DRINGKING PROB, SECURITY OFFICER SMELLS OF ALCOHOL, SEC GUARD STRUCK BY LIGHTNING, WEAPONS,
DUE DATE: 950430
DAYS OPEN: 279 ACTION PNDG: AP: LIC RSP DTD 2/3/95 RCVD. DRSS/NMSS PROVIDE CLOSURE MEMO TO EICS
RSP DIV/LCA: DRSS/NMSS
ACTION DUE DATE: DUE: 03/17/95

ALLEGATION: RII-94-A-0206 FACILITY: ST LUCIE 1
DATE RCVD: 941116 SUBJECT: INADEQUATE EVALUATION OF PIPE SUPPORT BOLTING DISCREPANCIES AS REQUIRED BY GL 79-02 IN AN ATTEMPT TO COVER UP A GENERIC
DUE DATE: 950330
DAYS OPEN: 125 ACTION PNDG: AP: DRS/ENG PROVIDE CLOSURE MEMO TO EICS

RSP DIV/LCA: DRS/ENG;BLAKE
ACTION DUE DATE: DUE: 03/15/95

ALLEGATION: RII-94-A-0220 FACILITY: ST LUCIE 1
DATE RCVD: 941215 SUBJECT: FITNESS FOR DUTY CONCERN. AN INDIVIDUAL WHO HAS WORKED AT NUCLEAR PLANTS FOR MORE THAN 20 YRS CONSUMES SIGNIFICANT AMOUN
DUE DATE: 950528
DAYS OPEN: 96 ACTION PNDG: AP: DRP/PB2 AWAITING LIC RSP. LIC RSP DUE 3/20. DRSS/NMSS REVIEW LICENSEE'S RESPONSE WHEN RECEIVED
RSP DIV/LCA: DRP/PB2
ACTION DUE DATE: DUE: 03/20/95

ST. LUCIE OPEN ALLEGATIONS AS OF 03/21/95

ALLEGATION: RII-95-A-0001 FACILITY: ST LUCIE 1
DATE RCVD: 950103 SUBJECT: ARMS ROOM DOOR LEFT OPEN AND UNATTENDED
DUE DATE: 950322
DAYS OPEN: 77 ACTION PNDG: AP: DRP/PB2 RESIDENTS PERFORM INITIAL CHECK FOR REQUIREMENTS OVERALL RESPONSIBILITY IS ASSIGNED TO DRSS/NMSS
RSP DIV/LCA: DRP.PB2 DRSS/NMSS
ACTION DUE DATE: DUE:

ALLEGATION: RII-95-A-0002 FACILITY: ST LUCIE 1
DATE RCVD: 941222 SUBJECT: CI ALLEGES THAT WELD REPAIRS CONDUCTED, A COUPLE OF YEARS AG O, ON THE TURBINE COOLING WATER AND COMPONENT COOLING WATER
DUE DATE: 950322
DAYS OPEN: 89 ACTION PNDG: AP: DRS/ENG INSPECTION COMPLETED. PROVIDE CLOSURE TO EICS
RSP DIV/LCA: DRS/ENG
ACTION DUE DATE: DUE: 03/15/95

ALLEGATION: RII 95-A-0026 FACILITY: ST LUCIE 1
DATE RCVD: 950227 SUBJECT: OIG REFERRRAL - ALLEGED DISCRIMINATION FOR REPORTING SAFETY CONCERNS
DUE DATE: 950527
DAYS OPEN: 22 ACTION PNDG: AP: OI OPEN CASE
RSP DIV/LCA: EICS OI
ACTION DUE DATE: DUE:

ALLEGATION: RII 95-A-0028 FACILITY: ST LUCIE 1
DATE RCVD: 950308 SUBJECT: ANONYMOUS - WORK BEING CONDUCTED UNDER PWO 69/4185 BY CONTRACTOR IS NOT IN ACCORDANCE WITH SITE'S WEDLING PROGRAM
DUE DATE: 950608
DAYS OPEN: 13 ACTION PNDG: AP: DRP/PB2 RESIDENT INSPECT AND DOCUMENT RESULTS IN IR
RSP DIV/LCA: DRP/PB2
ACTION DUE DATE: DUE:

ST. LUCIE OPEN ALLEGATIONS AS OF 03/21/95

ALLEGATION:	RII-95-A-0033	FACILITY:	ST. LUCIE & TURKEY POINT
DATE RCVD:	950312	SUBJECT:	ANONYMOUS - THE CONTRACTOR WHO WON THE SECURITY AND FIRE WATCH SERVICES IS NOT COMPETENT DUE TO QUESTIONABLE SECURITY
DUE DATE:	950612		
DAYS OPEN:	9	ACTION PNDG:	AP: DRSS/NMSS (TOBIN) INSPECT
		RSP DIV/LCA:	DRSS/NMSS
		ACTION DUE DATE:	DUE:

ATTACHMENT 3

NRR OPERATING REACTOR ASSESSMENT

NRR ASSESSMENT FOR ST. LUCIE

October 1994

CURRENT ISSUES

-Seismic qualification of electrical and mechanical equipment (GL 87-02, USI A-46) issue on Unit 1 is still not resolved. The staff issued a letter in early 1994 providing a general framework of criteria which would resolve this issue. FPL responded in May 1994 restating their previous position and stating that they believe that further NRC requests for work, evaluations, or plant changes would provide no additional safety benefit to their nuclear facilities. The staff is considering performing a backfit analysis to determine the possibility of ordering FPL to implement additional actions or accept the licensees position. A third alternative being evaluated is performance of a site inspection to determine if any safety-significant issues exist in the areas of disagreement.

-Unit 1 will be replacing steam generators in 1997. The licensee is well into planning for the event.

-An alternative approach to the resolution of the Thermo-Lag issue was proposed by FPL, however, the staff did not pursue review of this performance based approach based on Commission direction of this issue. The licensee is scheduled to submit to the staff by early November 1994 a schedule and method for resolution of the Thermo-Lag issue.

-The plant continues to perform well. The latest SALP evaluation had ratings of 1 in all categories.

Contact:

Jan A. Norris
504-1483

March 16, 1995

ST LUCIE

Integrated Plant Performance Review

A. Current Plant Status

Unit 1 has been operating at power since March 8, 1995. The unit was returned to power following a short notice outage for pressurizer code safety valve replacement. The next refueling outage is scheduled for April 4, 1996.

Unit 2 has been operating at power since February 25, 1995. The unit was returned to power following a reactor trip due to low steam generator water level resulting from a level transmitter failure. The next refueling outage is scheduled for September 25, 1995.

B. Management

The current organization has been effective since September 1, 1994:

C. Plant Performance

The units experience an unusually high number of reactor trips (4) between March 94 and June 94. However, during the past nine months, the units have experienced two reactor trips, two unit shutdowns, one unit off-line for maintenance and one loss of shut down cooling event. Operator performance was good during the trips and shutdowns.

July 8, 1994 - Unit 2 was taken off line (Mode 2) when 2B1 RCP lower oil level indication failed, incorrectly showing leak.

July 14, 1994 - Unit 2 was shut down to allow repair of a stuck-closed reactor trip circuit breaker.

October 26,1994 - Automatic trip of Unit 1 due to arc-over from a potential transformer in the switchyard which resulted in a loss of load.

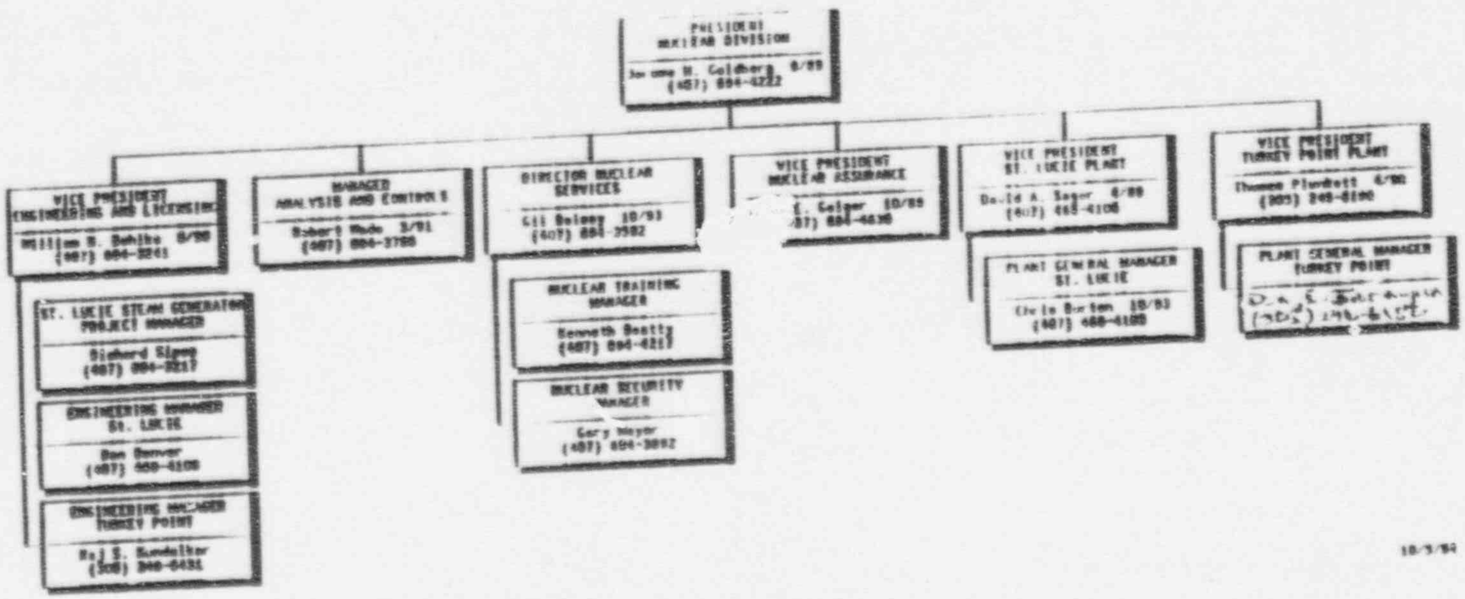
February 21,1995- Automatic trip of Unit 2 when a SG water level transmitter failed high. The failure resulted in a closure of a FRV, starving the SG for water and leading to a trip on SGWL.

February 27,1995- Unit 1 was shut down to replace pressurizer code safety valves, which had been leaking by the seat since restarting from the Unit 1 outage in November.

March 4, 1995 - Unit 1 experienced a loss of shutdown cooling for approximately 14 minutes when a hot leg suction valve to the operating shutdown cooling train closed. Root cause has not been established: however, operator error in manipulating valves is the most likely cause.

DD157

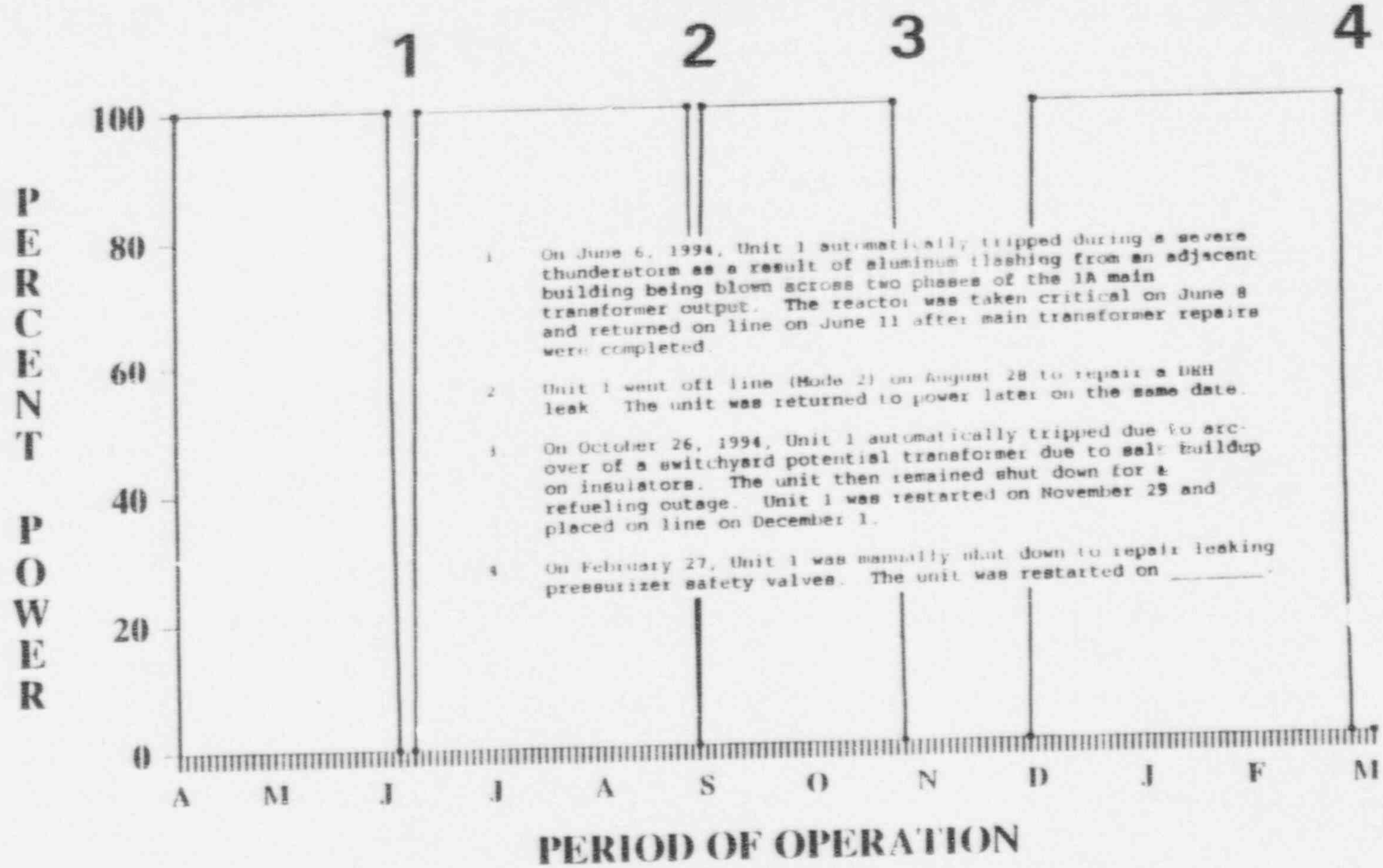
FLORIDA POWER AND LIGHT
MANAGEMENT OVERVIEW



10/3/94

ST. LUCIE 1

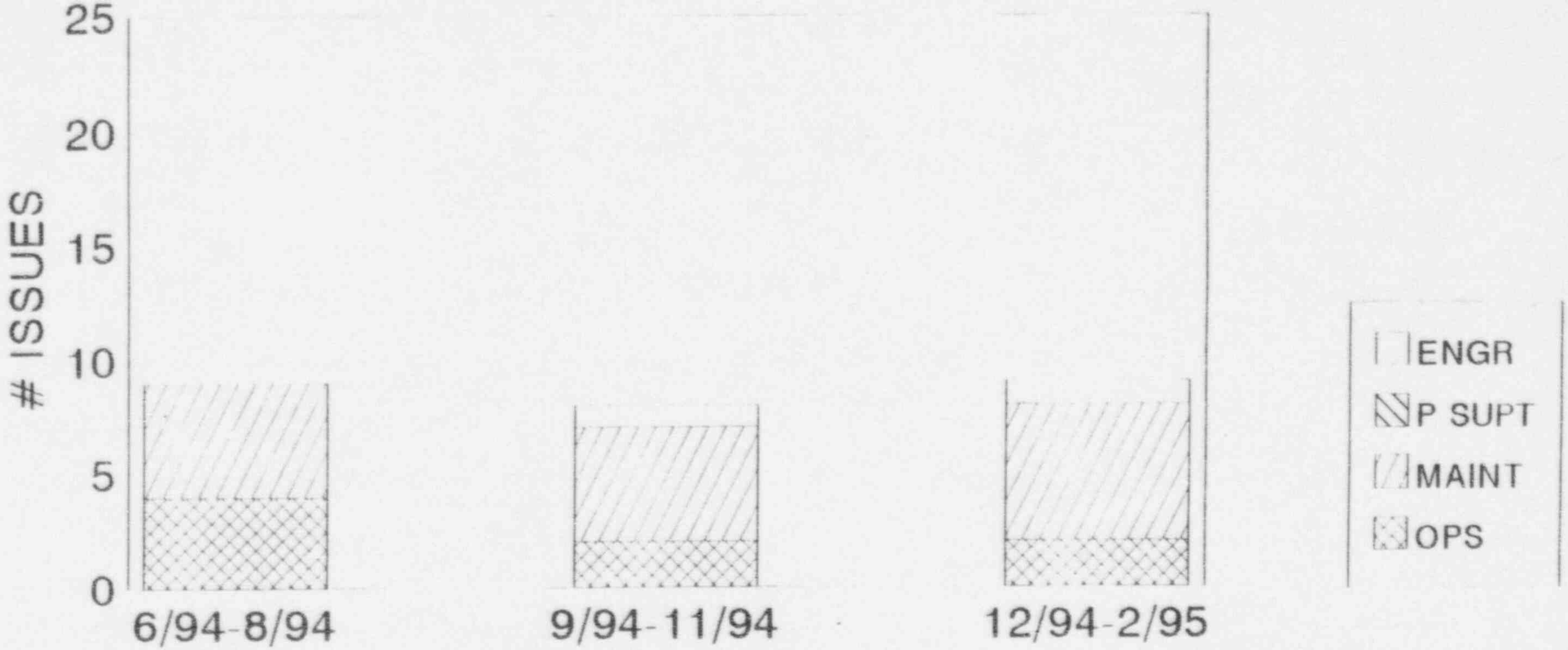
Operational Period April 5, 1994
through March 2, 1995



Graph does not include power reductions
for routine repairs, waterbox cleaning,
or required repairs.

ST LUCIE

of ISSUES vs TIME



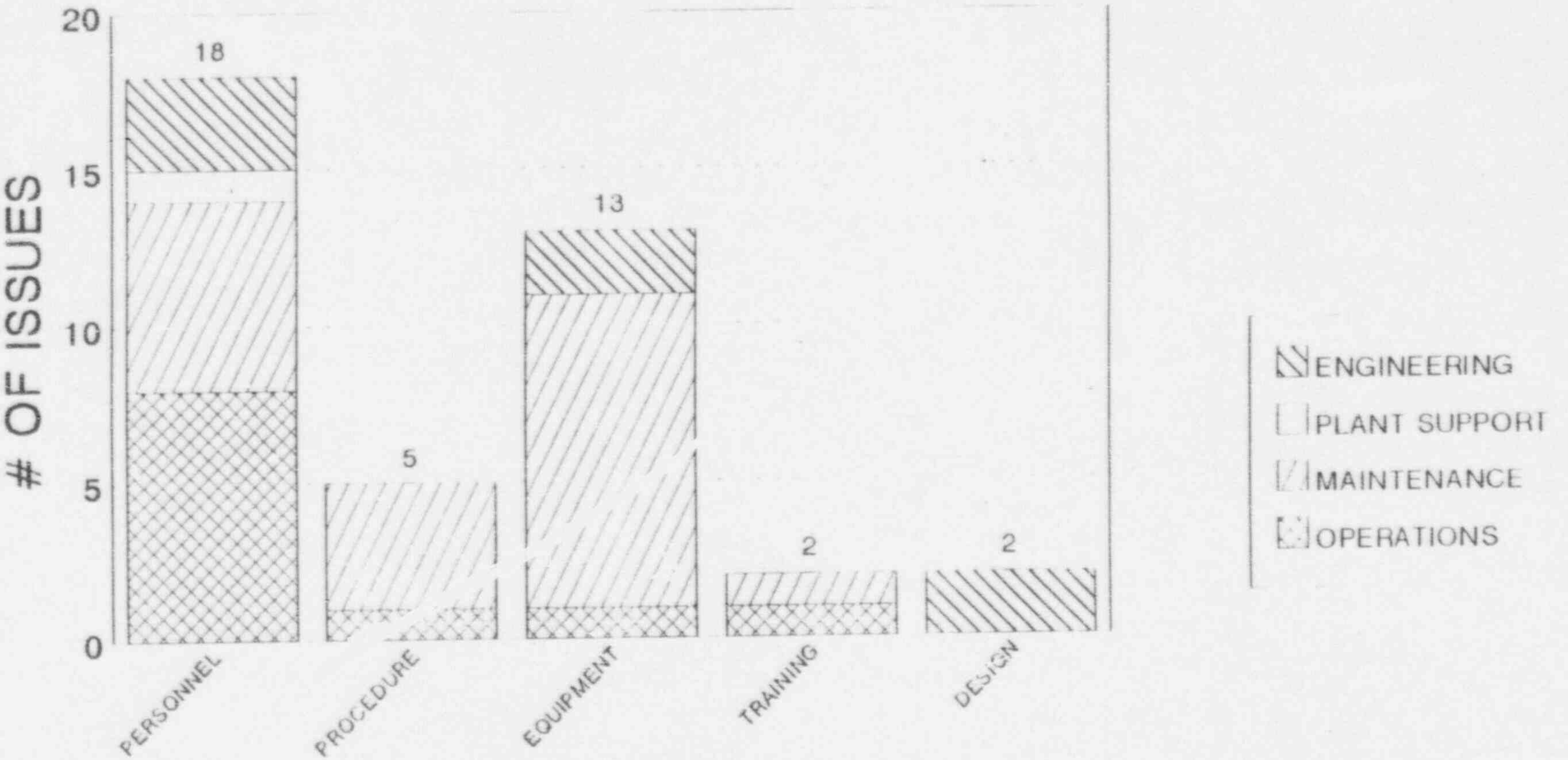
	6/94-8/94	9/94-11/94	12/94-2/95
ENGR	0	1	1
P SUPT	0	0	0
MAINT	5	5	6
OPS	4	2	2

MONTH

6/94 TO 2/95

ST. LUCIE

ISSUES BY ROOT CAUSE AND SALP AREA



	PERSONNEL	PROCEDURE	EQUIPMENT	TRAINING	DESIGN
ENGINEERING	3	0	2	0	2
PLANT SUPPORT	1	0	0	0	0
MAINTENANCE	6	4	10	1	0
OPERATIONS	8	1	1	1	0

3/94 THRU 2/95

3/16/94	Engineering corrective action	NRC	Regional inspector had two Unit 2 SL4 violations: 1) corrective action for an 11/24/92 water hammer event was done without documented instructions or procedures, resulting in operating until 3/94 with five snubbers on the SRV and PORV tailpipes inoperable. 2) Failure to write a nonconformance report for a damaged pipe support in March 1994. (IR 94-08)
3/28/94	Personnel error	Licensee	Unit 1 auto reactor trip. Maintenance foreman opened generator exciter breaker - on wrong unit. Operators had clearance on Unit 2. (IR 94-12, LER U1 94-03)
4/3/94	Operations procedure error (Lack of sufficient depth in review of procedure change)	Licensee	Unit 1 auto reactor trip from 19% power while deenergizing the 4160 Volt non-vital bus for SU Tx output breaker maintenance. With the A emergency bus on the EDG, which was running at a different frequency from the grid, the paralleled CEA MG sets developed circulating currents and tripped several reactor trip circuit breakers. A partial reactor trip tripped the turbine, which tripped the reactor. (IR 94-12, LER U1 94-04)
4/3/94	Surveill. error	Licensee	During testing for Unit 2 modifications the licensee discovered that the 4160 V [AB Bus] swing bus components [C ICW Pump and C CCW Pump] would not strip from the bus upon undervoltage if the bus were aligned to the B bus. A missing wire in the switchgear (from initial construction) was the cause. (SL4, Inadequate Corrective Action for 1992 NRC VIO for inadequate surveillance test - IR 94-12)
4/7/94	Maintenance error	NRC	Contractor personnel made and contractor QC accepted pressurizer nozzle weld prep that did not meet procedural requirements for bevel angle. Licensee engineering had specified overly tight tolerances. (SL4 94-10-01)
4/21/94	Operator inattentive ness	Licensee	Unit 2 reactor power increased from 26 to 31% due to positive MTC and operator inattentiveness. (IR 94-12)

7/14/94	Equipment failure	Licensee	During surveillance test. TCB 5 failed to open. It had stuck shut. A broken piece of bakelite had fallen into the trip mechanism. The unit was restarted and placed on line on July 15. 1994. (IR 94-15. LER U2 94-06)
7/14/94	Operations error	NRC	Operators did not follow Unit 2 Tech Spec LCO time requirements regarding shut down on July 14 to allow repair of a stuck-closed trip circuit breaker. (SL4 94-15-01)
8/12/94	Operations/ Maintenance error	NRC	The licensee was unloading new fuel for Unit 1 with a hoist grapple that was missing the safety latch sleeve locating pin. The safety sleeve functioned by friction only. (IR 94-18)
8/28/94	Equipment failure	Licensee	Unit 1 was taken off line (Mode 2) to repair a DEH leak. The unit was returned on line later the same day. (IR 94-20)
8/29/94	Operations errors	NRC	Operators placed 1A EDG in an electrical lineup for which TS-required surveillance tests had not been performed (with the safety-related swing bus powered from it). Also, related control room log entries appeared to be inaccurate. Inadequate corrective action to NRC violation regarding Surveillance Testing. (SL4 94-22-01) Improper modification of control room logs. (SL4 94-22-02)
9/30/94	Operations, maintenance deficiency	NRC	Plant personnel not trained on IPE and not using it for work planning and scheduling. (IR 94-20)
9/30/94	Operations weakness	NRC	During requal exam, a licensed operator exhibited an apparent disregard for EOPs. (IR 94-19)
9/30/94	Operations error	Licensee	Failure to notify the NRC of changes in status of licensed operators' medical conditions. (NCV 94-19-01)
10/26/94	Storm	Licensee	Unit 1 automatically tripped due to arc-over from a potential transformer due to salt buildup on switchyard insulators. (IR 94-22)

2/16/95	Maintenance Error/ Procedural Weakness	Licensee	Load shed of the 1A3 1E 4160 bus due to inadvertent jumper contact while replacing a degraded voltage relay. (IR 95-04)
2/20/95	Equipment Anomaly	Licensee	2B LPSI pump found air-bound during surveillance testing. The licensee has theorized that the migration of air in the system resulted in the condition as a result of previous surveillance testing. The pumps are not self-venting. (95-04)
2/21/95	Equipment Failure	Licensee	Unit 2 trip due to failure of a SGWL control level transmitter. Transmitter failed high, resulting in closure of the FRV and a subsequent trip on low SGWL. (95-04)
2/27/95	Equipment Failure	Licensee	Unit 1 was shut down for the replacement of 3 pressurizer code safety valves. The valves were leaking by the seat. (IR 95-04)
3/4/95	Apparent Personnel Error	Licensee	Unit 1 experienced an approximate 14 minute loss of shutdown cooling while shifting from one shutdown cooling loop to the other. The apparent root cause is the closing of the wrong SDC suction isolation valve (the valve for the operating, vice idle, pump) on the part of the operator. The operator continues to deny his involvement, although SOER and other data strongly support the conclusion. (IR 95-07 - Pending)

NRC CONCLUSION: The mispositioned valve and water hammer occurred over a year ago. Personnel errors generally reflect inattention to detail. While events in the last year indicated declining performance, the number of events has decreased in the last quarter. While it is too early to conclude that the decline has abated, recent management actions appear to be having positive affects on corrective actions, maintenance, and operations. Further very close inspection and assessment is required.

ROI 2210, REV. 3, ENCLOSURE 5

INSPECTION RESULTS AND SALP INPUT

Summary of Inspection Results

Plant Inspected : St. Lucie Dates: February 7-11,1994

Inspectors - Lead: Fred Wright
Larry Cohen
Bill Sartor
Glen Salyers

Safety Objective: (Provide a brief statement of the safety objective of this inspection) This routine, announced inspection involved the observation and evaluation of the annual emergency preparedness exercise. Emergency organization activation and response were selectively observed in the licensee's Emergency Response Facilities including: the Simulator Control Room; Technical Support Center; Operational Support Center; Joint Information Center and Emergency Operations Facility. The inspection also included a review of the exercise scenario and observation of the licensee's post exercise critique. The exercise was a full participation exercise involving State and County participation. Offsite activities were evaluated by FEMA. The exercise was conducted on February 9, 1994, between the hours of 7:00 a.m. and 3:00 p.m.

Results: In the areas inspected, violations or deviations were not identified. Two Inspector Follow-up Item was identified to: 1.) Review licensee emergency plan implementing procedures and training concerning the definition of containment failure as it relates to emergency classifications and protective action recommendations (Paragraph 10); and 2.) Observe a site accountability drill in 1994 (Paragraph 10). Overall, the licensee demonstrated the capability to implement the Emergency Plan in the event of a radiological emergency.

DD158

ROI 2210, REV. 3, ENCLOSURE 5

SALP EVALUATION

If more than one SALP function area is involved in this inspection, then complete this form for each functional area.

SALP Functional Area Inspected: Emergency Preparedness

Key: 0 - Not Inspected; 1 - Above average; 2 - Average; 3 - Below average

EVALUATION CRITERIA		ASSESSMENT
a.	Assurance of quality, including management involvement and control;	0 1 √ 3
b.	Approach to the identification and resolution of technical issues from a safety standpoint;	0 1 √ 3
c.	Enforcement history;	0 1 √ 3
d.	Operational and construction events (including response to, analysis of, reporting of, and corrective actions for);	√ 1 2 3
e.	Staffing (including Management); and	0 1 √ 3
f.	Effectiveness of training and qualifications program.	0 1 √ 3

COMMENTS: Provide a brief (2-3 sentence) summary of the licensee's performance as observed in this inspection, that can be used in the next SALP Report.

Overall, the exercise demonstrated an effective capability to implement the Emergency Plan and implementing procedures. In the areas inspected, violations, deviations or exercise weaknesses were not identified. See Attachment.

LEAD INSPECTOR: F.N. Wright DATE: November 22, 1993

DISTRIBUTION:
Inspector's Branch Chief W.E. Cline
Inspector's Section Chief K.P. Barr
Project Section Chief (for reactor inspections) K. Landis
DRS Division Director A.F. Gibson
Original (In folder with cover letter)

St. Lucie **Annual EP Exercise 1994**

Exercise Strengths:

- Players worked hard and well as a team throughout the Emergency Response Organization, during the exercise.

- Command and Control in the SCR, TSC and OSC as evidenced by frequent briefings, establishing priorities and noise and attention discipline of staff.

- Licensee improved exercise controls with use of a Scenario control center with radio communications to key exercise controllers.

- Licensee has improved the response capabilities of the licensee's staff reporting to the Emergency Operations Facility.

Areas For Improvement:

50-335, 389/94-04-01, IFI: Review licensee emergency plan implementing procedures and training concerning the definition of containment failure as it relates to emergency classifications and protective action recommendations. (Paragraph 10).

50-335, 389/94-04-02, IFI: Observe a site accountability drill in 1994. (Paragraph 10) Licensee's program for personnel accountability appears to be very weak and the Licensee has not tested it since 1989.

Other areas for improvement:

- Licensee does not have forms for NRC notifications out of the EOF.

- Licensee State Notification Form does not include a review/approval space to indicate message approval by Emergency Coordinator or Recovery Manager.

- Licensee pre-stages licensee media personnel in order to respond to local new agencies during drills. Licensee should attempt in an exercise to provide media information during period when Emergency News Center is responding to EOF.

- Licensee does not have minimum expectations defined for exercise objectives.

- Licensee does not define minimum time requirements for activating ERFs.

- Dose assessment procedures have been waiting for Crystal River implementation of EPA 400, scheduled for March 31, 1994. Licensee procedures should be reviewed and should clearly define all methods and procedures used to determine radiological releases (Manual and Computer) for ERO use on and off-site.

- Licensee Dose Assessors, Emergency Coordinator, and Recovery Manager procedures should address need to consider extended offsite dose projections for periods longer than next 2 hours when controls for radiological releases have not been maintained.

- Licensee needs to improve methods for prompt identification and tracking of Emergency Response Team members.

Action on Previous Inspection Findings (92701)

a. (Closed) IFI 50-335, 389/92-01-02: Calculating radiological release dose projections. (Paragraph 9)

In the 1992 annual Emergency Preparedness exercise inspectors determined that the TSC dose assessment team did not provide useful or timely dose projection estimates to the EC. During the 92 exercise both the TSC and EOF dose assessors had responsibilities to performed offsite dose assessments. The TSC dose assessors were responsible for making all offsite dose assessments until the EOF was activated. Once the EOF was operational it acquired the responsibilities for calculating dose projections for any release and the TSC dose projection staff's responsibility was to perform parallel calculations to validate the EOF staff's calculations. A simulated radiological release began after the TSC and EOF facilities were both activated. The TSC dose assessors completed calculations about 22 minutes after the EOF dose assessors had completed their calculations.

The inspector learned that the TSC dose assessor had keyed in a wrong value into a computer program that had cause a different dose projection estimate than that determined by the EOF. The dose assessor decided to recalculate the dose calculations which caused a delay. Following the exercise the inspector discussed the dose assessment delay with licensee representatives. The licensee agreed to review the event to determine the need for additional training or procedural guidance for the TSC dose assessors and the item was identified as an IFI. To address the problem the licensee developed a training brief to all Chemistry Department (dose assessors) personnel for review TB 9208167-S-01, "Off-Site Dose Calculations-Computer Method Training Brief". The brief provided procedures and guidance for using the computer bases process to derive calculated off-site doses in a manner similar to the procedure for manual calculation.

During the 1993 annual EP exercise the inspector identified additional concerns with dose assessment activities. During the 1993 EP exercise dose assessors did not calculate release rate for a simulated release from containment. The dose assessors utilized a LOCA dose assessment program which used a design bases leakage rate for calculating offsite dose rates. The leak rate was much larger than a design base leak rate. Failure to calculate the release rate for the simulated conditions and factor it into the offsite dose programs resulted in an underestimate of offsite dose rates by about two to three orders of magnitude. To correct the problem identified in 1993 the licensee developed several methods to calculate a burp release and provided "Containment Leakage and Emergency Dose" training on the procedures to staff dose assessors. The inspector reviewed the licensee's procedures and subject training records concerning the issue. The licensee's activates appeared appropriate for improving dose assessment capabilities. The inspector stated that the item would be closed.

b. (Closed) IFI 50-335, 389/93-16-01: <u>Ensuring consistency of scenario technical data.</u>. This issue concerned inconsistencies in scenario technical data during the 1993 EP exercise and licensee efforts to ensure the congruity of scenario data. In the 1993 exercise the offsite dose projections differed from the associated field monitoring values by two or three orders of magnitude.

   To prevent a similar occurrence the licensee assembled a qualified scenario development team which spent more time verifying exercise data than in previous years.

   Inspectors observed that the offsite dose rates measured by offsite field monitoring teams generally agreed with the offsite dose rates calculated by the dose assessment staff during the 1994 exercise. No other significant technical data issues were identified by the inspectors. The inspector stated that the item would be closed.

c. (Closed) IFI 50-335, 389/93-16-02: <u>Reviewing REP and EPIP guidance and requirements related to provision of periodic plant status updated to offsite authorities during an Alert or higher emergency classification.</u> This item concerned licensee's procedure and requirements for making periodic updates of emergency conditions to State and local agencies during an event. Licensee EPIP-3100031E, "Duties and Responsibilities of the Emergency Coordinator" specified that offsite authorities would be updated regarding any significant changes in plant conditions and that appropriate notification forms would be used for all updates. However, during the 1993 exercise the licensee failed to make a notification to offsite agencies that a plant shutdown was made following the Alert classification. State of Florida representatives in the EOF expressed concern that no updates had been provided to the State between the period of 4:12 a.m. and 6:25 a.m.

   In accordance with NRC and industry guidance the licensee's REP required periodic updates. However the EPIPs did not establish any fixed or variable time interval that would implement the commitment. Licensee management committed to review the applicable guidance and requirements, and to discuss the matter with State representatives, in order to ensure at a minimum that all parties clearly understand what was meant by "significant changes" in plant conditions.

   The licensee discussed the periodic notification needs of the State with state representatives and revised EPIP-3100021E to require updates be provided, by notification forms, every 60 minutes or upon any "significant changes" in plant status. Several examples of "significant changes" were also included in the text of the procedure. The procedure allowed for changes in the frequency of updates following agreements by offsite authorities. The inspector stated that the item would be closed.

d. (Closed) IFI 50-335, 389/93-16-03: Evaluating procedural requirements with respect to conveying information to offsite authorities regarding classifiable incidents of lesser severity occurring during an extant emergency classification. The IFI concerned a statement in EPIP- 3100021E:

> "If one unit is in a classification event and the same or the other unit enters into an event where the same or lesser emergency class would apply, a new classification should NOT be declared. The event should be issued as a update at the earliest practical time. No regulatory time limits would apply to the update."

The inspector reported that the last sentence in the procedure guidance referenced above did not appear to be appropriate guidance based upon any specific commitment or specification in the REP. Licensee management committed to evaluate the procedural guidance. The licensee removed the last sentence from the referenced guidance in revision 30 to EPIP-3100021E, dated September 28, 1993. The inspector stated that the item would be closed.

e. (Closed) EW 50-335, 389/93-16-04: Failure to activate the EOF in a timely manner. In the absence of any licensee criteria for timely activation of the EOF the inspector used the guidance in Supplement 1 to NUREG-0737 to formulate acceptance criteria relative to the timeliness of EOF activation. The guidance specified that the EOF is to be staffed by a designated senior licensee manager and appropriate technical staff within one hour (item 8.4.1.1). The EOF was declared operational 109 minutes after the Alert declaration and an exercise weakness identified. In a letter to the NRC dated September 1, 1993 the licensee reported the following corrective actions:

- The current Recovery manager operations Advisors at St. Lucie have been trained to perform as the Interim Recovery Manager until one arrives at the EOF.
- The auto dialer will no longer be used in the "notify" mode for drills.
- An unannounced activation drill was conducted after normal working hours for the initial EOF responders on August 26, 1993.

The licensee's corrective action letter reported that, following the implementation of the above corrective actions, the EOF was staffed in 37 minutes of the decision to staff the facility. In the 1994 exercise, the decision to activate the EOF was made at about 9:15 a.m. following the declaration of an Alert emergency classification at 9:05 a.m. The EOF was minimally staffed by 9:56 a.m., approximately 41 minutes following decision to staff the EOF and 51 minutes following the Alert declaration. The EOF was activated following a turnover, from the EC in the TSC, at 10:28 a.m., approximately 73 minutes following the decision to activate the EOF with initial EOF responders. The inspector reported the observed response during the 1994 exercise was a significant emergency response program improvement and the item would be closed.

ST. LUCIE MAINTENANCE EVALUATION

A. Assessment: Adverse trends were noted in maintenance. The EDG problems indicate a weakness in EDG Maintenance. The number of problems related to personnel errors and procedure problems may indicate possibly attitude problems. Also, Safety Equipment performance has failed to meet the industry average on all safety system. Maintenance performance has declined.

B. Basis:

1. Adverse trends were noted on the Site Integration Matrix.

Recent Equipment Failure:
01/23/96 - Elect. arc during maint. caused loss of 25% of control room annunciators
12/20/95 - Pitting of reactor flange o'ring groove
11/06/95 - Failure of EDG 2A relay sockets
10/05/95 - EDG 1B fuel oil leak at threaded connection
09/20/95 - EDG 1A/1B governor control problems resulted in load oscillations

Recent Personnel Errors:
01/01/96 - ICI wiring error during Rx head installation
08/31/95 - Damaged cy. head on 1B EDG due to loose lash adjustment
08/09/95 - Inoperable Unit 1 PORV due to maintenance error/testing inadequacy

Recent Procedure Problem:
12/09/95 - 2A2 RCP seal destaged due to inadequate or weak procedure
09/15/95 - Failure to have clearance for work on cond. water box
08/25/95 - Failure to sign off procedure steps as work completed

2. Safety Equipment Performance (Availability %) has been below industry a average.

	Actual		Industry Averages
	Unit 1	Unit 2	
AFW	99.5	97.8	99.6 - 99.1
HPSI	96.0	98.8	99.7 - 99.2
EDGs	95.6	99.8	99.1 - 98.6

- AFW wiring error on 2B AFW
- 2C AFW steam admission valve did not open and mechanical trip linkage problem
- HPIC 2B Breaker Failure

3. Numerous equipment failures have Caused power reductions during the last 6

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months.

- 10/95 Unit 1 Heater Level Control
- 10/95 Unit 1 1B Heater Drain Pump
- 11/95 Unit 1 FW Reg. Vlv. Control
- 11/95 Unit 1 1A Main Transformer
- 01/96 Unit 1 FW Vlv. LSV-24-A2
- 08/95 Unit 2 Heater Drain Valve
- 08/95 Unit 2 Heater Drain Pump
- 08/95 Unit 2 Circ. Water Valve
- 08/95 Unit 2 Htr. Drn. Pmp. PCM
- 01/96 Unit 2 Hydrogen Sys. Prob.
- 01/96 Unit 2 MFW Pump

C. Future Inspections: Assist the Resident inspector with the routine Resident Maintenance/Surveillance Inspections program. Conduct Regional Initiative inspection, focus on outage activities BOP and EDG maintenance, procedure adequacy and safety system performance. Perform maintenance rule inspection in September 1996. Conduct the ISI inspection.

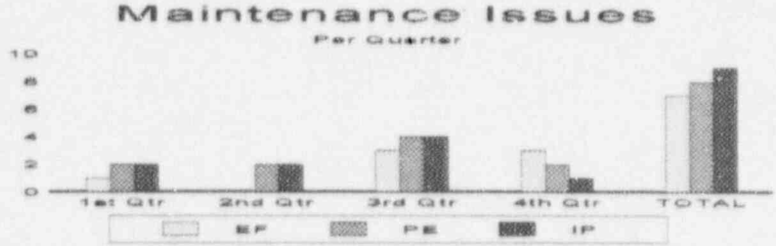
ST. LUCIE MAINTENANCE EVALUATION - February 1996

A. **Assessment:** The following adverse trends related to maintenance were noted for 1995: (1) 9 cases of equipment failure - 3 of the 9 for EDG equipment, (2) with 10 cases of personnel error, and (3) 13 cases failure to follow procedures, inadequate procedures, or weak procedures. The EDG problems may indicate a weakness in EDG Maintenance. The number of problems related to personnel errors and procedure problems indicate weaknesses, possibly attitude problems, in the Maintenance Program. Also, Safety Equipment performance has failed to meet licensee goals for Unit 1 (Numbers provided are averages for 1995).

B. **Basis:**

1. **Last SALP Rating:** Category 2 (½/94 - 1/5/96) **Next Period End:** 04/15/97

2. **Maintenance Trend Charts:** (Site Integration Matrix) (Jan. 1995 - Dec. 1995)



3. **Equipment Failure Examples**
01/23/96 - Elect. arc during maint. caused loss of 25% of control room annunciators
12/20/95 - Pitting of reactor flange o'ring groove
11/06/95 - Failure of EDG 2A relay sockets
10/05/95 - EDG 1B fuel oil leak at threaded connection
09/20/95 - EDG 1A/1B governor control problems resulted in load oscill.
Personnel Error Examples
01/01/95 - ICI wiring error during Rx head installation
08/31/95 - Damaged cy. head on 1B EDG due to loose lash adjustment
08/09/95 - Inoperable Unit 1 PORV due to maintenance error/testing inadeq.
Procedure Problem Examples
12/09/95 - 2A2 RCP seal destaged due to inadequate or weak procedure
09/15/95 - Failure to have clearance for work on cond. water box
08/25/95 - Failure to sign off procedure steps as work completed

4. **Safe' Equipment Performance (Availability %) (1995 Average):**

	Actual		Goal
	Unit 1	Unit 2	
AFW	99.5	97.8	97.9
HPSI	96.0	98.8	97.7
EDGs	95.6	99.8	98.4

AFW - Wiring error on 2BAFW, '2C' AFW steam admission valve did not open and mechanical trip linkage problem.
HPIC - Breaker Failure 2B.

5. **S/G Status:** SG "1A" - 13.3% plugged; SG "1B" - 9.1% plugged; SG "2A" - 3.2% plugged; SG "2B" - 2.4% plugged - A S/G replacement for Unit 1 is planned in the Spring 1998.

6. **Equipment Failures That Caused Power Reduction in the Last 6 Months:**

Unit 1 - 10 plus 14 equipment failures during startup after hurricane
Unit 2 - 10

Date	Unit	Equipment	Date	Unit	Equipment
10/13/95	1	Excore Nuc. Instr.	10/14/95	1	Htr. Level Control
10/15/95	1	Excore Nuc. Instr.	10/15/95	1	Safety Valves
10/17/95	1	1B Htr. Drn. Pmp.	10/23/95	1	ASI Control
11/16/95	1	FW Reg. Vlv. Cont.	11/08/95	1	Water Box Cleaning
11/21/95	1	1A Main Trans.	01/19/96	1	FW Vlv. LSV-24-A2
08/23/95	2	Htr. Drn. Valve	08/23/95	2	Water Box Cleaning
08/25/95	2	Htr. Drn. Pmp.	08/27/95	2	Circ. Water Valve
08/28/95	2	Htr. Drn. Pmp. PCM	09/14/96	2	Water Box Cleaning
09/25/95	2	Water Box Cleaning	01/05/96	2	Hydrogen Sys. Prob.
01/08/96	2	MFW Pump	01/11/96	2	Excore Nuc. Instr.

C. **Future Inspections:** Routine Resident Maintenance/Surveillance Inspections, assist the resident core inspections with one inspection per quarter (2-man weeks). Add 4-man weeks of inspection in the maintenance area (Regional Initiative), focus on outage activities BOP and EDG maintenance (2-man weeks), procedure adequacy and safety system performance (2-man weeks). Perform maintenance rule inspection (September 9-13, 1996). Conduct (1-man week) ISI (core inspection).

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II. Functional Area Assessments

1. Plant Support

A. The last SALP cycle ended 1/6/96. Plant Support was Category 1. The licensee continues to maintain a satisfactory level of performance in the area of Plant Support. Some decline in Radiation Protection has been noted due to the loss of control of contaminated tools and exceeding dose goals. Insufficient information is available at this time to assess the Chemistry, Effluent, Waste, Transportation and Emergency Preparedness programs. Hurricane preparations for hurricane Bertha were conservative. Overall, site security has been adequate. Training and qualification noted as a strength and management observed to be aggressive in pursuing issues, but not aggressive in doing indepth review of events. Implementation of the fire protection program continued to be satisfactory. Fire protection activities were primarily monitored by the resident inspectors during the PPR period.

B. Basis

Radiation Protection

NCV for failure to control contaminated tools used in RCA (96-04, p 45)

Violation (repeat of above NCV) for numerous examples of failure to control contaminated tools. (96-09, p 25)

Internal and external exposures below 10 CFR Part 20 limits. (96-04, p 45 and 96-04, p 23) (1996 dose levels????????)

1995 dose was 412 person-rem. Unplanned maintenance and rework caused 1995 dose goal of 283 person-rem to be exceeded by 129 person-rem. (96-04, p 50)

Rad Techs decreased from 32 to 30 and 2 supervisors lost (96-04, p 48)

Decon staff reduced from 22 to 12 persons. Levels of contaminated equipment and materials increasing.(96-04, p 46)

Good radiological housekeeping and controls. (96-09, p 28)

The total area contaminated was at 250 ft^2. (96-04, p 47)

Licensee accreditation of the FP&L DADs a good example of Radiation Protection staff's technical capabilities. (96-04, p 44)

Emergency Preparedness

Conservative actions taken to prepare for Hurricane Bertha.(96-11, p 3)

Security

Failure to report a confirmed tampering event within one hour, which resulted in a violation.

Two events in prior to the above tampering event were documented as tampered or unauthorized work, but management failed to notify security of these events.

Numerous problems discovered by a QA audit determined the FFD program to be weak.

Fire Protection

A backup fire pump was installed to replace an out of service larger fire pump without an engineering evaluation.

C. Recommended Inspection Effort

Inspections	Rationale
Health Physics	(SALP 1 decline - maintain; watch)
Operational HP(83750)	2-Inspections with focus on procedure compliance; rework doses
Effl/RadWast(84/86750)	3-inspections with focus on accident/process monitor installation & maintenance
TI 133 Rad Waste	Combine with 86750
Emergency Preparedness	
EP Prog (82701)	1-Inspection with focus on Self Assessment results 1-Reg Init. inspection on allegation followup(2 weeks)
Security	
Security Prog (81700)	Core Insp to review security audits, corrective actions, management support and effectiveness, and review protected area detection equipment.
Sec. Prg/FFD (81700/81502)	One regional initiative to followup on tampering and FFD issues.
VBS (TI 2515/132)	Inspection of Vehicle Barrier System TI
Fire Protection	
None	

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Saint Lucie Inspection Activities During The Assessment Period 02/01/96 - 09/30/96

<u>IR 96-01; period 01/07/96 - 02/17/96; issued 03/18/96; IP 71750</u>

Resident Report, Radiological Protection topics (71750) were reviewed by residents.

<u>IR 96-03; period 01/26/96 - 01/30/96; issued 02/22/96</u>

Special inspection of Over Dilution Event of January 22, 1996

<u>IR 96-04; period 02/18/96 - 03/30/96; issued 04/29/96; IPs 71750 and 83750</u>

Resident Report, Emergency Preparedness topics (71750) were reviewed by residents.

PSB Inspection, Radiological Protection (83750) topics were reviewed by Region II inspector

<u>IR 96-05; period 04/30/96 - 05/03/96; issued 05/31/96</u>

Security inspection by Region II inspector

<u>IR 96-06; period 03/31/96 - 05/11/96; issued 06/07/96; IPs 93702</u>

Resident Report, Emergency Preparedness topics (93702) were reviewed by residents.

<u>IR 96-08; period 05/12/96 - 06/08/96; issued 07/08/96; IPs 71750</u>

Resident Report, Radiological Protection topics (71750) were reviewed by residents.

<u>IR 96-09; period 06/09/96 - 07/06/96; issued 08/05/96; IPs 71750 and 83750</u>

Resident Report, Fire Protection topics (71750) were reviewed by residents.

PSB Inspection, Radiological Protection (83750) topics were reviewed by Region II inspector.

<u>IR 96-11; period 07/07/96 - 08/03/96; issued 08/05/96; IP 71707</u>

Resident Report, No Plant Support Section in report, preparations for hurricane Bertha (71707) were reviewed by residents.

<u>IR 96-12; 07/12/96; issued 08/26/96;</u>

Special 50.59 Inspection

St. Lucie Violations
02/01/96 - 09/30/96

During the assessment period three violations were identified.

VIO 96-04-01, Failure to Follow Procedures lead to Unit 1 Containment Particulate-Iodine-Noble Gas Monitor In-operability. This violation resulted in a Technical Specification violation during start-up. (IR 96-04; pages 14-16; paragraph O4.2)

NCV 96-04-05, Improper Health Physics Practices, Failure to follow licensee radiation protection procedures. The poor health physics practices identified as an URI in IR 96-01 later resulted in a NCV 96-04-05. (IR 96-04, pages 39 and 40, paragraph M8.1)

NCV 96-04-06, Failure to Follow Contamination Control Procedures for the Control and Use of Contaminated tools in the RCA. (IR 96-04, pages 45 & 46; paragraph R3.1)

ATTACHMENT

RG II FIRE BARRIER PENETRATION SEALS (IN 88-04 AND 88-56) STATUS

SITE	INSP FOR IN'S	INSP SATISFACTORY?	REMARKS
BROWNS FERRY	YES	YES	LATEST 1992
BRUNSWICK	YES	YES	LATEST 1993
CATAWBA	NO		NO INFO AVAILABLE
CRYSTAL RIVER	NO		PENE SEALS WERE INSPECTED IN 1985
FARLEY	YES	YES	AN URI WAS ISSUED, PROGRAM WAS FOUND SAT
GRAND GULF	NO		TESTING WAS REVIEWED IN 1985
HARRIS	NO		INSP WERE DONE IN 93 & 94 BUT NOT SPECIFIC TO PENE SEALS
HATCH	YES	NO	LACK OF X-REF BETWEEN SEAL & TEST DATA- NO FOLLOWUP WAS CONDUCTED
MCGUIRE	YES	YES	LATEST INSP 1993
NORTH ANNA	YES	NO	LICENSEE COMPLETING PROGRAM IN '94 NEEDS FOLLOWUP
OCONEE	YES	NO	TEST DOCUMENTS WERE INADEQ REPAIRS NEEDED - SCHEDULED TO BE COMPLETE IN '88 NO FOLLOWUP DONE
ROBINSON	YES	YES	FINAL REPAIRS WERE NOT INSPECTED
ST LUCIE	YES	NO	TESTED CONFIG OF PENE WERE NOT REVIEWED

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SEQUOYAH	YES	NO	PROGRAM TO BE COMPLETED 12/94 NO FOLLOW DONE
SUMMER	YES	NC	IN '87 & '88 INSP OF A SAMPLING OF SEALS
SURRY	NO		LICENSEE WALKDOWNS FOUND SOME PROBLEMS NRC HAS INSP(4)
TURKEY POINT	YES	YES	LATEST INSP 1992
VOGTLE	YES	YES	1993 VERIFIED CORRECTIVE ACTIONS

INSPECTION RESULTS AND SALP INPUT

Summary of Inspection Results

Plant Inspected: ST. LUCIE Dates: 17-19 JULY '95

Inspector(s) - Lead: R.P. CARRION
Other(s):

Safety Objective:

This routine, announced inspection was conducted in the areas of confirmatory measurements and the release of potentially radioactively-contaminated materials offsite.

Results:

The licensee demonstrated that an effective Count Room radiochemical analysis program was in place.

The licensee had an effective program in place to control the release of material from the RCA.

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SALP EVALUATION

If more than one SALP functional area is involved in this inspection, then complete this form for each functional area.

SALP Functional Area Inspected: PLANT SUPPORT (RADIATION PROTECTION)

Key: 0 - Not inspected; 1 - Above average; 2 - Average; 3 - Below average

EVALUATION CRITERIA	ASSESSMENT
a. Assurance of quality, including management involvement and control;	0 1 2 3
b. Approach to the identification and resolution of technical issues from a safety standpoint;	0 1 2 3
c. Enforcement history	0 1 2 3
d. Operational and construction events (including response to, analysis of, reporting of, and corrective actions for);	0 1 2 3
e. Staffing (including management); and	0 1 2 3
f. Effectiveness of training and qualifications program.	0 1 2 3

COMMENTS: Provide a brief (2-3 sentence) summary of the licensee's performance as observed in this inspection, that can be used in the next SALP Report.

THE LICENSEE HAD MAINTAINED AN EFFECTIVE PROGRAM TO COLLECT AND ANALYZE PLANT SAMPLES FOR GAMMA RADIATION, REFLECTING EFFECTIVE TRAINING AND QUALIFIED PERSONNEL. ADDITIONALLY THE LICENSEE HAD MAINTAINED AN EFFECTIVE PROGRAM TO RELEASE MATERIAL FROM THE RCA.

NOTE: Please attach additional sheets if needed for comments or for other SALP functional areas.

LEAD INSPECTOR: [illegible] DATE: [illegible]

DISTRIBUTION:
Inspector's Branch Chief
Inspector's Section Chief
Project Section Chief (for reactor inspections)
DRS Division Director
Original (In folder with cover letter)

INSPECTION RESULTS AND SALP INPUT

Summary of Inspection Results

Plant Inspected: St. Lucie Dates: 16-20 Oct '95

Inspector(s) - Lead: R. P. Carrion
Other(s):

Safety Objective:

This routine, announced inspection was conducted in the areas of the organization of the Chemistry Department and Radwaste Group, plant water chemistry, the Radiological Environmental Monitoring Program (REMP), the Post Accident Sampling System (PASS), the Control Room Emergency Ventilation System, radioactive materials handling and transportation documentation, volume reduction of solid radwaste, the status of the Refueling Water Tank (RWT) leak migration, contaminated sludge disposal, and the leaking Unit 2 Spent Fuel Pool (SFP) Ion Exchanger.

Results:

The licensee's organization of its Chemistry Department and Radwaste Group satisfied Technical Specification (TS) requirements.

The licensee's plant water chemistry program continued to be effectively implemented.

The licensee had an effective program in place to analyze radiological effluents, direct radiation, etc. due to plant operations, as evidenced by the Radiological Environmental Operating Report.

The licensee's PASS was capable of fulfilling its intended sampling function and the technicians had maintained their capability to operate the system.

The Control Room Emergency Ventilation System was adequate for its intended function and was being maintained in compliance with the applicable TSs.

The licensee's radwaste processing and shipping was conducted in a competent, professional manner and the radwaste shipping documentation was thorough and in compliance with the applicable regulations.

The licensee continued to make good progress in the reduction of its solid radwaste.

The licensee continued to monitor isotope migration due to the RWT leak.

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The licensee had acted prudently on the issue of contaminated sewage sludge disposal.

The licensee had taken a proactive position in the resolution of the leaking Unit 2 Spent Fuel Pool (SFP) Ion Exchanger.

ROI 2210, REV. 3, ENCLOSURE 5

SALP EVALUATION

If more than one SALP functional area is involved in this inspection, then complete this form for each functional area.

SALP Functional Area Inspected: PLANT SUPPORT

Key: 0 - Not inspected; 1 - Above average; 2 - Average; 3 - Below average

EVALUATION CRITERIA		ASSESSMENT
a.	Assurance of quality, including management involvement and control;	0 1 2 3
b.	Approach to the identification and resolution of technical issues from a safety standpoint;	0 1 2 3
c.	Enforcement history	0 1 2 3
d.	Operational and construction events (including response to, analysis of, reporting of, and corrective actions for);	0 1 2 3
e.	Staffing (including management); and	0 1 2 3
f.	Effectiveness of training and qualifications program.	0 1 2 3

COMMENTS: Provide a brief (2-3 sentence) summary of the licensee's performance as observed in this inspection, that can be used in the next SALP Report.

PLANT WATER CHEMISTRY HAD BEEN EFFECTIVELY MAINTAINED FOR BOTH PRIMARY AND SECONDARY SIDES. THE LICENSEE'S CHEMICAL [illegible] VERIFICATION SYSTEM WAS WELL MAINTAINED. THE [illegible] PLANT OPERATIONS HAD NEGLIGIBLE RADIOLOGICAL IMPACT ON THE ENVIRONMENT AND GENERAL PUBLIC AS EVIDENCED BY THE RESULTS OF [illegible] ANNUAL ENVIRONMENTAL OPERATING REPORT WHICH WAS INDEPENDENTLY VERIFIED BY STATE [illegible] WITH [illegible] MAINTAINED [illegible] AND [illegible] EFFECTIVE

NOTE: Please attach additional sheets if needed for comments or for other SALP functional areas.

LEAD INSPECTOR: [signature] DATE: [illegible] 95

DISTRIBUTION:
Inspector's Branch Chief
Inspector's Section Chief
Project Section Chief (for reactor inspections)
DRS Division Director
Original (In folder with cover letter)

INSPECTION RESULTS AND SALP INPUT

Summary of Inspection Results

Plant Inspected: ST. LUCIE Dates: 3-7 APRIL '95

Inspector(s) - Lead: R.P. CARRION
Other(s):

Safety Objective:

This routine, announced inspection was conducted in the areas of the organization of the Chemistry Department and Radwaste Group, audits, primary water chemistry, the Annual Radioactive Effluent Release Report, Information Notice (IN) 94-81, the leaking Unit 2 Spent Fuel Pool (SFP) Ion Exchanger, monitoring of the Refueling Water Tank (RWT) leak migration, the status of the Unit 1 nitrogen system check valve installation, the Meteorological Monitoring Program, radioactive waste handling and transportation documentation, and contaminated sludge disposal.

Results:

The licensee's organization of its Chemistry Department and Radwaste Group satisfied Technical Specification (TS) requirements.

The licensee's audit process was capable of identifying programmatic weaknesses and making recommendations for corrective action.

The licensee's primary water chemistry continued to be effectively implemented.

The Annual Radioactive Effluent Release Report indicated that the licensee had met the requirements of the TSs and that doses to the public were minimal.

The licensee had taken a very proactive position concerning the issues raised by IN 94-81.

The licensee had taken a proactive position in the resolution of the leaking Unit 2 Spent Fuel Pool (SFP) Ion Exchanger.

The licensee continued to monitor isotope migration due to the RWT leak.

The licensee had completed the installation of the double check valves and completed the upgrade of the Unit 1 nitrogen system to prevent future valve leakby potential.

The licensee's Meteorological Measurement System was capable of fulfilling its required functions.

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The licensee's radwaste processing and shipping was conducted in a competent, professional manner and the radwaste shipping documentation was thorough and in compliance with the applicable regulations.

The licensee had succeeded in its efforts on the issue of contaminated sewage sludge disposal.

ROI 2210, REV. 3, ENCLOSURE 5

SALP EVALUATION

If more than one SALP functional area is involved in this inspection, then complete this form for each functional area.

SALP Functional Area Inspected: PLANT SUPPORT (RAD PROTECTION)

Key: 0 - Not inspected; 1 - Above average; 2 - Average; 3 - Below average

EVALUATION CRITERIA		ASSESSMENT
a.	Assurance of quality, including management involvement and control;	0 1 2 3
b.	Approach to the identification and resolution of technical issues from a safety standpoint;	0 1 2 3
c.	Enforcement history	0 1 2 3
d.	Operational and construction events (including response to, analysis of, reporting of, and corrective actions for);	0 1 2 3
e.	Staffing (including management); and	0 1 2 3
f.	Effectiveness of training and qualifications program.	0 1 2 3

COMMENTS: Provide a brief (2-3 sentence) summary of the licensee's performance as observed in this inspection, that can be used in the next SALP Report.

PLANT WATER CHEMISTRY HAD BEEN EFFECTIVELY MAINTAINED, PLANT EFFLUENTS WERE SMALL FRACTIONS OF ALLOWABLE LIMITS AS WERE DOSES TO MEMBERS OF THE PUBLIC. THE LICENSEE TOOK [illegible] POSITIONS WITH RESPECT TO IN 94-81 AND THE CLEANUP OF RESIN FROM THE U-2 SFP FOR [illegible]. THE RADIOACTIVE MATERIALS MANAGEMENT AND SHIPPING PROGRAMS REMAINED EFFECTIVE.

NOTE: Please attach additional sheets if needed for comments or for other SALP functional areas.

LEAD INSPECTOR: [signature] DATE: [illegible] 95

DISTRIBUTION:
Inspector's Branch Chief
Inspector's Section Chief
Project Section Chief (for reactor inspections)
DRS Division Director
Original (In folder with cover letter)

ROI 2210, REV. 3, ENCLOSURE 5

INSPECTION RESULTS AND SALP INPUT

Summary of Inspection Results

Plant Inspected: ST Lucie Dates: 2/28 - 3/4/94

Inspector(s) - Lead: D. B. Forbes

Other(s): W.H. Rankin (Section Chief)

Safety Objective: (Provide a brief statement of the safety objective of this inspection)

This routine, announced inspection of the Radiation Protection (RP) program included a review of organization and management controls, training, external exposure control, internal exposure control, control of radioactive materials and contamination, surveys and monitoring, and maintaining occupational exposures As Low As Reasonably Achievable (ALARA).

Results:

The RP technician staff appeared knowledgeable and well trained. The licensee continued to implement effective internal and external exposure programs with all exposures less than 10 CFR Part 20 limits. The Audit and Appraisal Program was considered to be adequate in identifying potential issues. Contamination control and overall housekeeping practices were also considered adequate. Licensee efforts in the performance of ALARA initiatives in the area of respirator reduction was determined by the inspector to be a program strength in meeting ALARA goals. Based on records review, plant inspections, and interviews with licensee management, supervision, personnel from station departments, the inspector found the radiation protection program to be adequate in protecting the health and safety of plant employees.

DD/66

ROI 2210, REV. 3, ENCLOSURE 5

SALP EVALUATION

If more than one SALP functional area is involved in this inspection, then complete this form for each functional area.

SALP Functional Area Inspected: Facilities Radiation Protection (Health Physics)

Key: 0 - Not inspected; 1 - Above average; 2 - Average; 3 - Below average

EVALUATION CRITERIA

		ASSESSMENT
a.	Assurance of quality, including management involvement and control;	0 1 2 3
b.	Approach to the identification and resolution of technical issues from a safety standpoint;	0 1 2 3
c.	Enforcement history	0 1 2 3
d.	Operational and construction events (including response to, analysis of, reporting of, and corrective actions for);	0 1 2 3
e.	Staffing (including management); and	0 1 2 3
f.	Effectiveness of training and qualifications program.	0 1 2 3

COMMENTS: Provide a brief (2-3 sentence) summary of the licensee's performance as observed in this inspection, that can be used in the next SALP Report.

The licensee performs well in contamination control and control of airborne radioactivity. Plant doses are average to high because of high doses in unit 1 primarily from the Steam Generators scheduled to be changed out in 1997. The licensee performs well in posting and labelling radioactivity and exercises good work controlls. A stable HP organization exists however the number of HP's (31) is the lowest in the country for a 2 unit site. Backshift coverage is minimal.

NOTE: Please attach additional sheets if needed for comments or for other SALP functional areas.

LEAD INSPECTOR: D. B. Forbes DATE: 3/18/94

DISTRIBUTION:
Inspector's Branch Chief
Inspector's Section Chief
Project Section Chief (for reactor inspections)
DRS Division Director
Original (In folder with cover letter)

DD/67

Operations Department

St. Lucie Nuclear Power Plant

Night Order

DISTRIBUTION: **Unit 1 Control Room** **Unit 2 Control Room**
OPS Support **Work Control Group**
System Specialists **Training**
Simulator

From: Operations Supervisor's Office **Date: August 12,1996**
To: All Operations Personnel

1. NPS, please review with your crew the attached Crew Self Assessment concerning the U.E. on 8/9/96. Take special note on the lessons learned.

2. Unit 1 is currently scheduled to come off-line at 2000 hrs on 8/23/96 for a balance shot. This should reduce the vibration on # 9 bearing.

3. The PM on the 2C AFWP will be performed tonight on Mid-night shift. The surveillance procedure has not been changed for Human Factors as of this date. Therefore, please perform the 2C AFW pump surveillance following the PM.

C Mayer

EE/1

CREW SELF ASSESSMENT

EVENT TIMELINE

8-9-96, 0205

Completed fission gas purging of volume control tank. This had begun on peakshift to increase VCT hydrogen concentration.

8-9-96, 0220

Began routine RCS inventory balance calculation. The starting of this had been delayed due to the VCT fission gas purging and associated VCT level changes.

8-9-96, Sometime during inventory balance.

Board RCO notices that VCT level drop seems more than usual and notifies ANPS.

8-9-96, 0420

Completed RCS inventory balance. Calculated leak rate was .56 gallons per minute. Board RCO notified NPS of results for morning report. Board RCO and NPS note that the higher than usual leak rate may be due to the recent large VCT level changes. Board RCO's VCT level drop observation not mentioned. NPS directs board RCO to begin a second RCS inventory balance using the stop data from the first one as the start data for a second one.

8-9-96, 0530

SNPO completes fuel pool fill and is directed to check charging pumps for leakage.

8-9-96, 0535

SNPO tells ANPS of observed 1A charging pump center plunger leakage.

8-9-96, 0550

RCS inventory balance calculates to 1.5 gallons per minute over a 90 minute duration. Offgoing and oncoming NPS's notified of RCS leak rate results and that it appears that most of the leakage is from the 1A charging pump center plunger leak. The situation is discussed and the leakage was considered identified leakage of less than 10 gallons per minute. ANPS directed to start the 1B charging pump, then stop and isolate the 1A charging pump. This was done to be able to perform another inventory balance with the 1A charging pump isolated.

8-9-96, 0610

Further discussions take place between the offgoing NPS, oncoming NPS and acting Operations Supervisor concerning the need to make an E-plan declaration. Things considered were:

1. The possibility that the RCS leakage may be from an unknown and unidentified source other than the 1A charging pump.
2. It would be better to error conservatively than non-conservatively.

8-9-96, 0615

Offgoing NPS goes to unit 1 control room to declare an unusual event. On the way there he stops to consult with STA. Both the offgoing and oncoming STA disagree with declaration of unusual event. They state their belief that the RCS leakage is identified leakage from the 1A charging pump.

8-9-96, 0622

Offgoing NPS notifies Acting Operations Manager that he is declaring an Unusual Event. Event declared.

CREW ASSESSMENT

Strengths:

1. Delaying of initial RCS inventory balance until VCT purging completed.

2. Immediate initiation of a confirmatory RCS inventory balance due to higher than expected value.

3. Rapid identification of leakage by SNPO after directed to do so by ANPS.

Weaknesses:

1. Failure to begin an immediate search for source of leakage after the higher than expected RCS inventory balance results.

2. Failure to notify NPS of RCO's observed decrease in VCT level during initial RCS leakrate calculation.

3. Failure of offgoing NPS to classify event in a timely manner.

Contributing factors:

1. Belief that large VCT level changes during or immediately preceding RCS leakrate calculation can affect results. This delayed the initial leak search.

2. SNPO was busy performing 1A CCW pump code run and filling the spent fuel pool in response to level alarms during the confirmatory leak rate calculation. This may have delayed dispatching SNPO for leak search.

3. Notification to NPS of confirmatory RCS inventory balance results and that it seemed to be identified as from the 1A charging pump occurred during NPS shift turnover.

4. There was agreement among many experienced crew members that the leakage was identified based on the observed, but still unquantified, leakage from the 1A charging pump.

5. Recent change in our consideration of charging pump leakage as reactor coolant system leakage. In the past we did NOT enter an Unusual Event every time we experienced charging pump leakage. The fact that 5 SRO's and 2 STA's struggled with this determination is evidence that it is not yet clearly understood. PMAI PM96-04-157 discusses this issue.

6. Our most common reason for a greater than usual RCS leakrate at St. Lucie is from charging pump leakage. Due to the configuration of the plunger area drain piping it is not possible to quantify charging pump seal leakage without isolating (and disabling) a charging pump.

Lessons learned:

1. Do NOT delay search for suspected RCS leakage when there is a higher than expected inventory balance calculation.

2. Keep all crew members informed of relevant information (VCT level drop). Earlier identification and isolation of 1A charging pump leakage may have prevented meeting the criteria for E-plan initiation.

3. Do NOT delay a classification of an Emergency when it meets the classification criteria.

Actions taken:

1. NPS performed crew/event assessment and briefed crew about lessons learned and areas for improved crew performance.

2. Initiated condition report to make charging pump leakage more easily quantifiable.

Summary:

1. The operating crew took the correct actions as required by procedures to mitigate the event.

2. Eliminating the self identified weakness by incorporating the lessons learned will improve future crew performance.

Response to Questions Concerning Calc. PSL-1FJM-93-016

Run "75dp10" (Att. 2 to Calc. PSL-1FJM-93-016) provides the accident flow rate through the ICW system based on a 25% degraded ICW pump and having 10 psid with a minimum flow of 8000 gpm across the CCW Heat Exchanger during normal operation. The pump flow is 11104 gpm with a developed head of 112.4 ft of water.

Run "221" (Att. 10 to Calc. PSL-1FJM-93-016) was performed through iterations to determine what "K" for the CCW heat exchanger would produce a flow of 9000 gpm through the heat exchanger at accident conditions. This "K" value was then converted to a pressure differential in psi under normal operating conditions with a flow of 8000 gpm to generate the curve on page 4 of Attachment 10. The pump flow is 9292 gpm with a developed head of 119.6 ft of water.

Since run "221" has a lower flow rate and higher developed head than run "75dp10", the hydraulic grade at node D is higher in run "221".

W. B. Neff — ON PEAKS FOR OUTAGE
5-3-96

EE/2

CALCULATION COVER SHEET

Calculation No: IP3-[illegible]-93-015

Title: INTAKE COOLING WATER (ICW) SYSTEM PERFORMANCE

Rev.	Description	By	Date	Chk/Ver	Date	Appr.	Date
1	Add Addendum #1	[illegible]	8/6/93	W.B. [illegible]	8/19/93	W.B. [illegible]	8/19/93
0	INITIAL ISSUE	[illegible]	5/25/93	W.B. [illegible]	5/26/93	W.B. [illegible]	5/26/93

REVISIONS

Immediate supervisor of the preparer is the verifier based on being the only engineer other than the preparer knowledgeable on the use of Version 4.0 of "Pipe-Flo". The requirements of QAP 6.5 sect. 5.V have been met.

LIST OF EFFECTIVE PAGES

Calculation No. PSL-[illegible]-93-016 Rev. 1

Title ICW SYSTEM PERFORMANCE

Page	Section	Rev.	Page	Section	Rev.
i	COVER	1			
ii	LOEF	1			
iii	CONTENTS	1			
1	1.0, 2.0	0			
2	3.0, 4.0	0			
3	4.0	0			
4	5.0	0			
5	5.0	0			
6	5.0	0			
7	5.0	0			
8	5.0	0			
9	5.0	0			
10	5.0	0			
11	5.0	0			
12	5.0	0			
13	5.0	0			
14	5.0	0			
15	5.0	0			
16	6.0	0			
17	6.0	0			
18	6.0	0			
19	6.0	0			
Att	1 (11 pgs)	0			
Att	2 (4 pgs)	0			
Att	3 (4 pgs)	0			
Att	4 (4 pgs)	0			
Att	5 (4 pgs)	0			
Att	6 (6 pgs)	0			
Att	7 (6 pgs)	0			
Att	8 (12 pgs)	0			
Att	9 (4 pgs)	0			
Att	10 (32 pgs)	1			

1.0 PURPOSE/SCOPE

This calculation is performed to create a St. Lucie Unit 1 Intake Cooling Water (ICW) System Performance Curve. This curve will enable the plant to determine the acceptability of the ICW System at various flowrates and various differential pressures across a CCWHX (Component Cooling Water Heat Exchanger).

2.0 REFERENCES

2.1 Ebasco Calculation #132-73.6000, Rev.1, "ICW System - Pressure Drop Calculations".

2.2 Crane Technical Paper 410, Twenty Second Printing, 1985.

2.3 Drawing #2998-G-644, Rev. 6.

2.4 Drawing #8770-G-125, Sheet CW-F-4, Rev. 7.

2.5 Drawing #8770-G-125, Sheet CW-F-10, Rev. 0.

2.6 Drawing #2998-G-633, Sheet S01, Rev. 5.

2.7 Drawing #2998-G-633, Sheet S05, Rev. 0.

2.8 EMDRAC Drawings #8770-6979, Rev.0; 8770-6980, Rev.0; 8770-6981, Rev.0; "Test Curve & Data - ICW Pumps".

2.9 Calculation #PSL-1FJM-92-056, Rev. 1.

2.10 Non-Conformance Report (NCR) 1-723 (9/8/92).

2.11 PSL-1 FSAR, Amendment #11.

2.12 PSL-1 Off-Normal Operating Procedure, ICW System, #1-0640030, Rev. 15.

2.13 Instruction Manual #8770-3599, Rev. 5.

2.14 Drawing #8770-G-125, Sheet CW-F-16, Rev. 2.

2.15 Drawing #8770-G-125, Sheet CW-F-5, Rev. 3.

2.16 Engineered Software, Inc. - FLO-SERIES, "PIPE-FLO", Version 4.02.

2.17 Safety Evaluation for Updated LOCA Containment Analysis, JPN-PSL-SEMP-93-017, Rev. 0.

3.0 METHODOLOGY

Using a hydraulic model of the ICW System developed for use by the PIPE-FLO computer program, with values obtained from the Reference 2.1 calculation and with other values developed within this calculation, a curve is developed showing the performance of the ICW System. This curve is created by varying the differential pressures (ΔP) across the CCWHX at various ICW flowrates.

4.0 ASSUMPTIONS/BASES

4.1 Based on the test data provided by PSL site (Reference 2.10), an ICW Pump head has been degraded to 84% of its hydraulic performance. An ICW pump is degraded to 75% of its design performance throughout the pumps entire range, to provide some conservatism in this calculation.

4.2 The ICW temperature control valve (TCV) position is 90° (full open), based on Reference 2.1, page 13.

4.3 The ICW flowrate used to determine the CCW strainer K-value and the CCWHX K-values is 8,000 gpm, based on the degraded performance of the pump and based on the lowest expected flow that would be available for the essential (safety-related) header during normal operation (Reference 2.11, Table 9.2-3).

4.4 Based on the results of the verification performed as BASE1 (Attachment #8) being essentially the same as results of the Reference 2.9 (Addendum 1) 341192 run, this version of PIPE-FLO is acceptable for use as a tool to perform this calculation. Slight differences between BASE1 and 341192 are because Version 4.02 of PIPE-FLO uses:

- ♦ slightly different equations/algorithms that result in slightly lower (more conservative) system flows;
- ♦ a pump curve developed with 5 points instead of 3 points, which creates a more realistic pump curve.

4.5 Based on the similarity of the design performance curves of the 1A, the 1B and the 1C ICW pumps (Reference 2.8), this calculation is applicable to and bounds any one of these 3 pumps when operating with system conditions given and with a pump degraded to 75% of its design hydraulic performance.

4.6 To provide a worst case operating condition scenario, the following items are being included in the system model:

- ♦ The non-safety related CW (Circulating Water) pump lube water supply line ruptures, allowing ICW to be lost from the 3" diameter pipe;
- ♦ A non-safety related instrument line ruptures, allowing ICW to be lost from the ¾" diameter pipe;
- ♦ For conservatism, an additional 100 gpm is lost from the ICW system by an opening in the ICW system.

4.0 ASSUMPTIONS/BASES (CONT'D)

4.7 The CCWHX strainer differential pressure of 1.5 psi is used, based on this being the maximum allowed without cleaning by back-flushing. (Reference 2.12)

4.8 To provide realistic, yet conservative values, the model uses the following:

Elevations (page 12 for Reference Dimensions):

- Pump intake =-10.5 ft.(Reference 2.3)
- Intake well water level = -5 ft. (Reference 2.3)
- Pump discharge =+21.08 ft(Reference 2.4)
- CW discharge =+11.51 ft(Reference 2.14)
- Instrument tap discharge =+21 ft. (Reference 2.15)
- Discharge canal water level= 16 ft. (Refs. 2.6 & 2.7)
- Discharge pipe = -1.5 ft (Reference 2.5)

Pipe Roughnesses:

- Absolute roughness (∈) = 0.01 ft, or 0.12 in. [concrete lined pipe] (Reference 2.2)
- Absolute roughness (∈) = 0.00015 ft. or 0.0018 in. [stainless steel pipe] (Reference 2.2)

4.9 To enable a performance curve to be created, various values of ΔP (differential pressure) across the CCWHX are used in the model. The range of the ΔP values is from a ΔP of 1 psi to a ΔP of 12 psi, based on a "normal" ΔP of 3.8 psi. (Reference 2.13)

4.10 All piping between the ICW pump and the discharge canal (with the exception of the points where flow is being lost from the system) is at the same elevation. This is acceptable, based on the system being open-ended and any changes in elevation between the pump and the discharge will cancel out. Also, inputting the actual elevation of the flow loss points will be realistic and conservative.

4.11 The specific gravity (SG) used by the computer is 1.02 (see pages 11 & 12). The SG used in developing the K-values for the CCW Strainer and the CCWHX (PIPE009 and PIPE010, pg 6) is 1.03 (from Reference 2.1). The correct SG is 1.03, but due to this small difference, the results are insignificant and negligible.

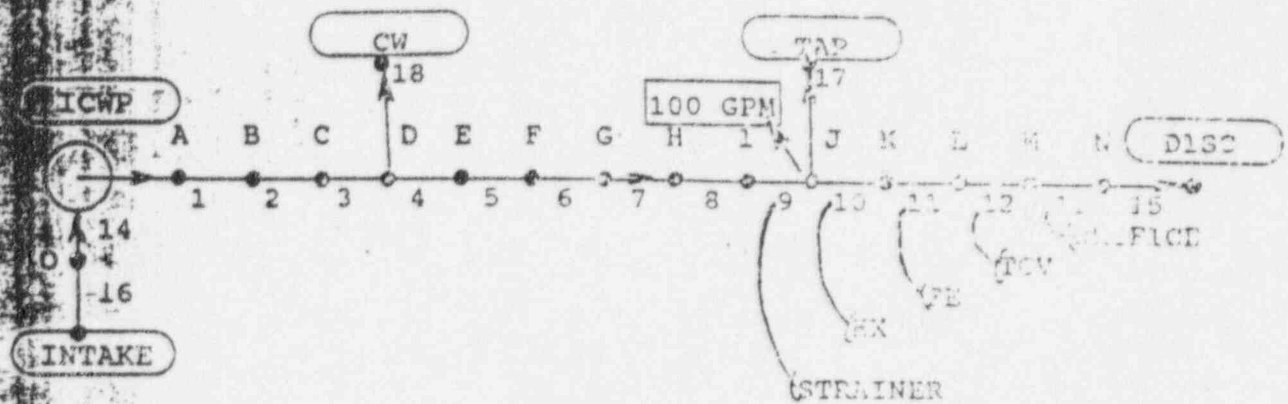
5.0 CALCULATION - SYSTEM COMPONENTS

I.D.	LINE/COMPONENT	H_L (FT)	K-VALUE	[illegible]
PIPE001	I-30"-CW-11	2.39*	3.11	[illegible]
PIPE002	I-36"-CW-13	0.33*	0.91	[illegible]
PIPE003	I-30"-CW-20	0.56*	0.73	[illegible]
PIPE004	I-30"-CW-90	7.37*	9.58	[illegible]
PIPE005	I-30"-CW-79	3.90*	5.07	[illegible]
PIPE006	I-30"-CW-72	1.20*	1.56	235.6
PIPE007	I-30"-CW-77	0.226*	0.31	[illegible]
PIPE008	I-30"-CW-29	3.60*	4.68	706.7
PIPE009	I-SS-21-1B	5.63	24.0	N/A
PIPE010	1B CCWHX	[values vary, see pages 6,8,9]		N/A
PIPE011	FE-21-9B	9.80*	12.7[illegible]	N/A
PIPE012	I-TCV-14-4B	0.23*	0.30	N/A
PIPE013	I-SO-21-1B	N/A	45.5	N/A
PIPE014	PUMP INTAKE TO PUMP DISC. (39.6 FT.)	N/A	N/A	N/A
PIPE015	DISC. CANAL ([illegible]7 FT.)	N/A	N/A	N/A
PIPE016	STARTING POINT PUMP INTAKE (0.0 FT.)	N/A	N/A	N/A
PIPE017	¾" DIA. INSTRUMENT LINE FLOW LOSS	N/A	1.572	N/A
PIPE018	CW PUMP LUBE WATER SUPPLY FLOW LOSS	N/A	345.[illegible]	N/A

* VALUES FROM REFERENCE 2.1, based on a flow of 14,[illegible]00 gpm ([illegible] other values determined within this calculation)

5.0 CALCULATION (CONT'D)

PIPE-FLO COMPUTER MODEL
ICW SYSTEM



ICW-SYS1

5.0 CALC. (CONT'D)

⇒ Determine head loss (H_L) for each system component:

→ PIPE 001 thru 008 and 011 + 012 are listed on page 4, as obtained from Reference 3.1.

→ PIPE 009 (I-SS-21-1(?))

$\Delta P = 2.5$ psid @ [illegible] (Assumptions 4.3 + 4.7)

$H_L = 2.5 \frac{lb}{in^2} \left(\frac{ft^3}{62.??? \, lb}\right)\left(\frac{12 \, in}{1 \, ft}\right)^2 \left([illegible] \right)$

(Ref 2.1) (Ref 2.1)

$H_L = 5.63$ ft.

→ PIPE 010 (1B CCW HX) (See Assumps. 4.3 + 4.9)

for $\Delta P = 1$ psid, $H_L = 1 \left(\frac{1}{62.??}\right)\left(\frac{12}{1}\right)^2\left(\frac{1}{1.03}\right) = 2.3$

= 2	= 2 ( ) = 4.5
= 4	= 4 ( ) = 9.0
= 6	= 6 ( ) = 13.5
= 8	= 8 ( ) = 18.0
= 10	= 10 ( ) = 22.5
= 12	= 12 ( ) = 27.0

BY ______________ DATE __________ SHEET NO. [illegible] OF 3

CHKD. BY ______________ DATE __________ JOB NO. __________

5.0 CALC (CONT'D)

⇒ Determine K-value for each [illegible] component

(Ref 2.1) | Using $K = f\, L/D$; where $f_{cl_{30}} = 0.016$ for 30" conc lined pipe

$$L = \frac{KD}{f}$$

$f_{cl_{36}} = 0.0154$ for 36" conc lined pipe

$f_{ss_{30}} = 0.0117$ for 30" S.S. pipe

Note: The "f" value used here is not any frictional value used in PIPE-FLO, but is used to convert from Ref 2.1 calc to equivalent lengths.

$$L_{cl_{30}} = \frac{K(29\,in)\left(\frac{1\,ft}{12\,in}\right)}{0.016} = 151.0\,K$$

$$L_{cl_{36}} = \frac{K(35)(1/12)}{0.0154} = 189.4\ K$$

$$L_{ss_{30}} = \frac{K(29.5)(1/12)}{0.0117} = 210.1\ K$$

Using $K = \frac{H_L d^4}{0.00259\,Q^2}$ (Ref 2.2, Eq. 3-14)

$$K_{cl_{30}} = \frac{H_L\,(29)^4}{0.00259(14500)^2} = H_L\,([illegible])$$

$$K_{cl_{36}} = \frac{H_L\,(35)^4}{0.00259(14500)^2} = H_L\,([illegible])$$

$$K_{ss_{30}} = \frac{H_L\,(29.5)^4}{0.00259(14500)^2} = H_L\,(1.39)$$

BY ______ DATE ______ SHEET NO 8 of 18

CHKD. BY ______ DATE ______ PROJECT NO ______

5.0 CALC (CONT'D)

For PIPE 001-008, 011 + 012:

$K_1 = H_L(1.30) = 2.39(1.30) = 3.11$

$K_2 = H_L(2.76) = 0.33(2.76) = 0.91$

$K_3 = H_L(1.30) = 0.56(1.30) = 0.73$

$K_4 = H_L(1.30) = 7.37(1.30) = 9.58$

$K_5 = H_L(1.30) = 3.90(1.30) = 5.07$

$K_6 = H_L(1.30) = 1.20(1.30) = 1.56$

$K_7 = H_L(1.39) = 0.226(1.39) = 0.31$

$K_8 = H_L(1.30) = 3.60(1.30) = 4.68$

$K_{11} = H_L(1.30) = 9.80(1.30) = 12.74$

$K_{12} = H_L(1.30) = 0.23(1.30) = 0.30$

For PIPE 009 (I-SS-21-1B):

$$K_9 = \frac{H_L(29)^4}{0.00259(8000)^2} = \frac{5.63(29)^4}{0.00259(8000)^2} = 24.0$$

FOR PIPE 010 (CCW HX), using the range of ΔP + H_L from page 6:

$$K_{10}\ (@\ 1\ psid) = \frac{(2.3)(29)^4}{0.00259(8000)^2} = 2.3(4.267) = 9.8$$

$$K_{10}\ (@\ 2\ psid) = (4.5)(4.267) = 19.2$$

PSC-IF-J? [illegible] Rev. C

BY ______ DATE ______

CHKD. BY ______ DATE ______

SHEET NO 9 of 19

JOB NO ______

5.0 CALC (CONT'D)

K_{10} @ 4 psid = (9.0)(4.267) = 38.4

K_{10} @ 6 psid = (13.5)(4.267) = 57.6

K_{10} @ 8 psid = (18.0)(4.267) = 76.8

K_{10} @ 10 psid = (22.5)(4.267) = 96.0

K_{10} @ 12 psid = (27.0)(4.267) = 115.2

⇒ For PIPE013 (I-50-31-1B), with a 13.7 inch diameter opening (Ref 2.1):

Using $K = \frac{1-\beta^2}{C^2\beta^4}$ where $\beta = d_1/d_2 = \frac{13.7}{29.5} = 0.464$

and C = 0.61 (Ref 2.2, pg A-20)

$$K_{13} = \frac{1-0.464^2}{(0.61)^2(0.464)^4}$$

K_{13} = 45.5

⇒ For PIPE017, K-value developed on "PIPELINE REPORT: PIPE017", using a 3/4 dia Sch 40 line, 6 in long, with a K-value for a sharp edged entrance, a 3/4" ball valve, and a sharp-edged exit (see page 11). [Instrument tap]

⇒ FOR PIPE 018, (orifice with a 0.9 in. dia opening, mounted in a 3 in. dia. Sch 40 line, 0.25 ft long [C to be supply]:

Using $K = \frac{1-\beta^2}{C^2\beta^4}$, where $\beta = \frac{0.9}{3.068} = 0.293$

C = 0.60

K = 344.5

"PIPELINE REPORT: PIPE 018" uses the above K-value, pipe info and a sharp-edged entrance K-value. (see page 12)

Form [illegible] Rev [illegible]

5.0 CALC (CONT'D)

⇒ Determine equivalent lengths, - (ft) for each component (where req'd):

$L_1 = 151(3.11) = 469.6$

$L_2 = 189.4(0.91) = 172.4$

$L_3 = 151(0.73) = 110.2$

$L_4 = 151(9.58) = 1447$

$L_5 = 151(5.07) = 765.6$

$L_6 = 151(1.56) = 235.6$

$L_7 = 210.1(0.31) = 65.1$

$L_8 = 151(4.68) = 706.7$

Company: FPL
Project: PSL
by: MECH/BOP

75dp12
02/24/9

PIPELINE REPORT: PIPE017 rev

LINELIST: 75dp12

PIPING Material: Steel
Schedule: 40
abs roughness: 0.0018 in

Pipe Size: 0.75 in
dia: 0.824 in

Length: 0.5 ft
Elevation in: 0 ft
out: 0 ft

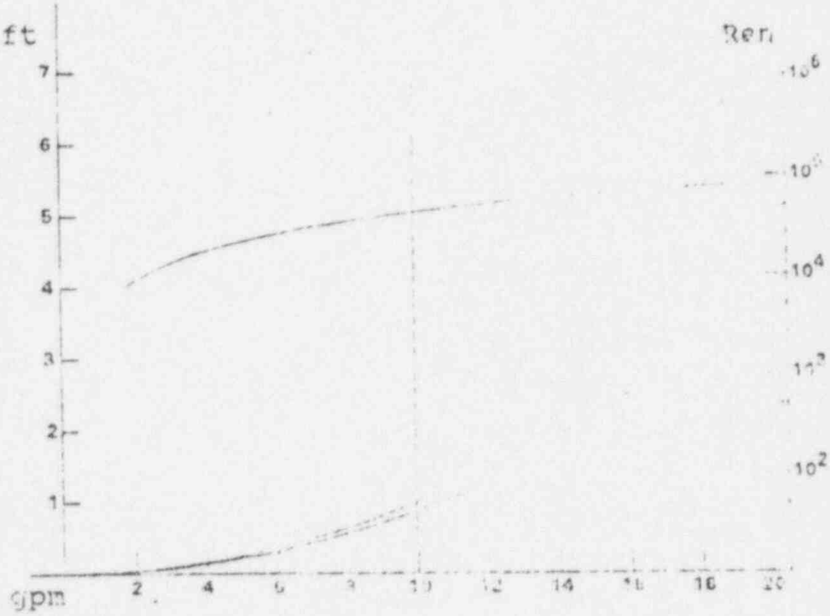
SPECIFICATION:

DESIGN CONDITION Velocity: 6 ft/sec
min: 0
max: 12
Pressure min: 0 psi g
max: 0

FLUID seawater tmp: 95 °F
pres: 0 psi g
den: 63.64 lb/ft³
SG: 1.02
vsc: 0.9242 cpois

PIPELINE RESISTANCE CURVE

FLOW gpm	FFP	VEL ft/sec	HL ft	DP psi
1.661	.0372	1	0.029	0.013
3.322	.0323	2	0.112	0.050
4.982	.0302	3	0.250	0.111
6.643	.0290	4	0.443	0.196
8.304	.0282	5	0.689	0.305
9.965	.0276	6	0.990	0.438
11.63	.0272	7	1.345	0.595
13.29	.0269	8	1.755	0.775
14.95	.0266	9	2.219	0.980
16.61	.0264	10	2.737	1.209
18.27	.0262	11	3.309	1.462
19.93	.0261	12	3.935	1.739



VALVES and FITTINGS

COUNT	DESCRIPTION	K-VALUE	COUNT	DESCRIPTION	K-VALUE
1	Entrance Sharp-Edged	0.5	1	Ball Valve	0.0720
1	Exit Sharp-Edged	1			

FFP: 0.024

TOTAL K: 1.572

Avg Percent of Total Loss: 88 %

PIPE-FLO rev 4.02 PIPE017 K-VALUES

Company: PPL
Project: PSL
by: MECH/BOP

75dp12

PIPELINE REPORT: PIPE01[illegible] 1 /24/93

LINELIST: 75dp12

PIPING Material: Steel
Schedule: 40
abs roughness: 0.0018 in

Pipe Size: 3 in
dia: 3.068 in

Length: 0.23 ft
Elevation in: 0 ft
out: 0 ft

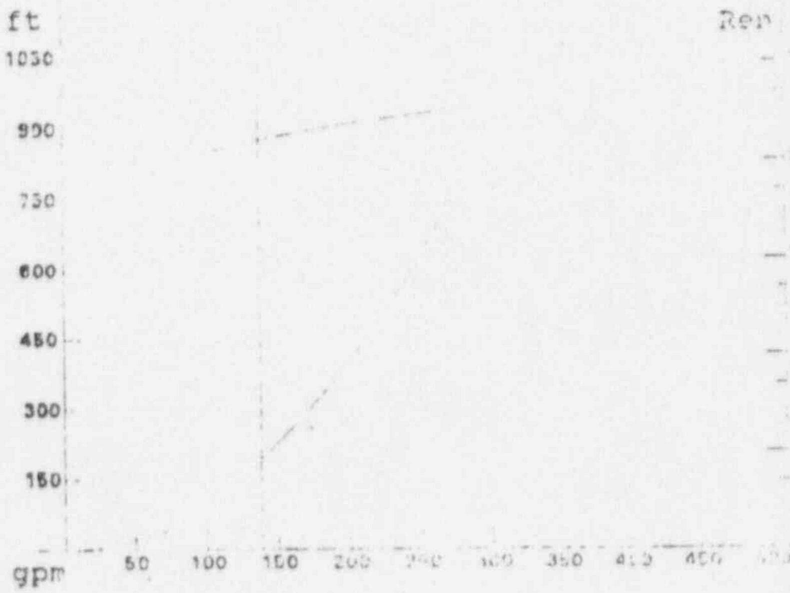
SPECIFICATION: STEEL

DESIGN CONDITION Velocity: 6 ft/sec
min: 0
max: 12
Pressure min: 0 psi g
max: 0

FLUID seawater tmp: 95 °F
pres: 0 psi g
den: 63.64 lb/ft³
SG: 1.02
vsc: 0.9242 cpois

PIPELINE RESISTANCE CURVE

FLOW gpm	FFP	VEL ft/sec	HL ft	DP psi
23.02	.0257	1	5.351	2.365
46.05	.0227	2	21.41	9.459
69.07	.0214	3	48.16	21.28
92.09	.0207	4	85.[illegible]	37.84
11[illegible]1	.0202	5	133.8	59.12
13[illegible]1	.0198	6	192.6	85.13
16[illegible]2	.0195	7	262.2	115.9
18[illegible]2	.0193	8	342.5	151.3
20[illegible]2	.0191	9	433.5	191.5
23[illegible]2	.0190	10	535.1	236.5
25[illegible]3	.0189	11	647.5	286.1
27[illegible]3	.0187	12	770.6	340.5



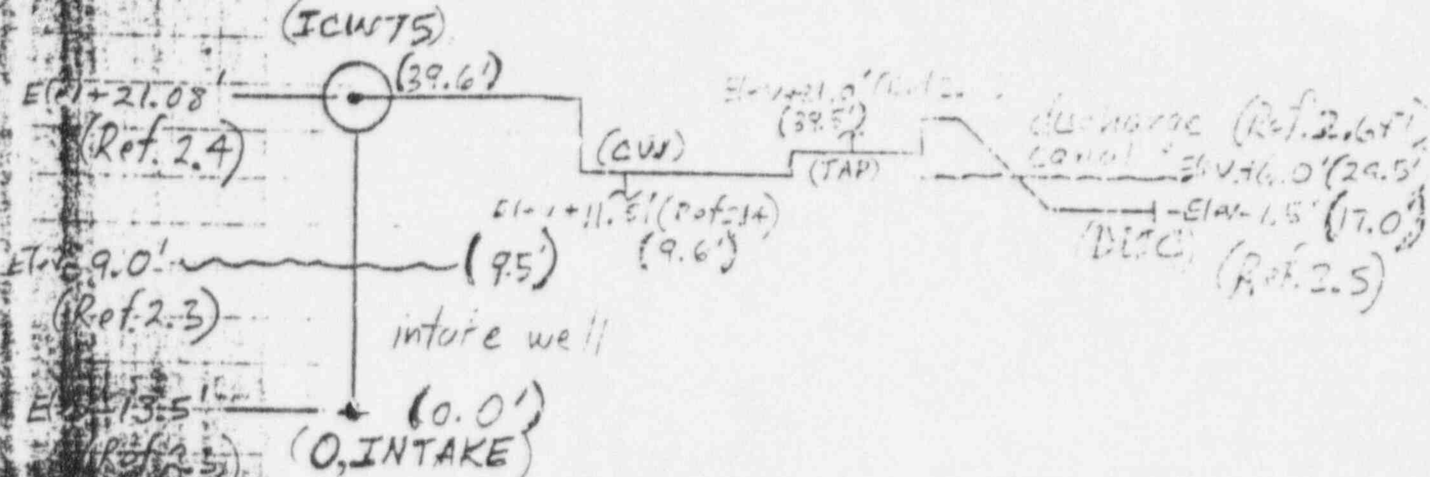
VALVES and FITTINGS

COUNT	DESCRIPTION	K-VALUE	COUNT	DESCRIPTION	K-VAL
1	Fixed K 344.5	344.5	1	Entrance Sharp-Edged	0.5

EFT: K 0.01733 TOTAL K: 345 Avg Percent of Total Loss: 100 %

5.0 CALC (CONT'D)

Elevations/(Reference Dimension)



→ Reference dimension, ICW pump intake (0.0')

→ Distance (height) from ICW Pump intake to pump discharge (39.6').

→ Distance (height) from ICW Pump intake to discharge pipe (17').

→ Determine pressure @ nodes "O-INTAKE" (ICW Pump intake)

$$9.5\,ft\left(\frac{62.078\ lb}{ft^3}\right)\left(\frac{1\,ft}{12\,in}\right)^2(1.03) = \underline{4.2\ psig}$$

→ Determine pressure @ node "DISC"

$$(24.5-17.0)(62.078)\left(\frac{1.03}{144}\right) = \underline{3.3\,psig}$$

5.0 CALC (CONT'D)

At This point, the inputs to the [illegible] program are:

1) length of each pipe, L (ft).

2) K-values for pipes [illegible], [illegible] (with pipe 10 varied for different computer runs.

3) the elevation for each Node (Assumption 4.10).

4) pipe material/size/[illegible] (& [illegible]; see Tables for seawater + pipe - [illegible], [illegible], SS [illegible] #9).

5) pump curve [illegible], "[illegible] 75" (Assumption 4.1)

6) pressure at each open node (INTAKE, CW, TAP, DISC).

7) 100 gpm loss from Node J (Assumption 4.6).

Run "75dp 1" $\underbrace{\text{uses a K-value for PIPE010 representing}}$ ΔP = 1

"75dp 2" = 2

"75dp 4" = 4

"75dp 6" = 6

"75dp 8" = 8

"75dp 10" = 10

"75dp 12" = 12

5.0 CALC (CONT'D)

From Ref. 2.8 (Pump Curve), the values used to reflect a pump with a performance of 75%. (degraded 25% - Assumption 4.1) are as follows:

flow (gpm)	design head (ft)	degraded head (ft)
0	206	154.5
7000	172	129
10 000	154	115.5
14 000	135	101.25
16 000	124	93

The above flow and degraded head values are input into the model as component "ICW 75".

DATE

CHKD. BY DATE

FPL

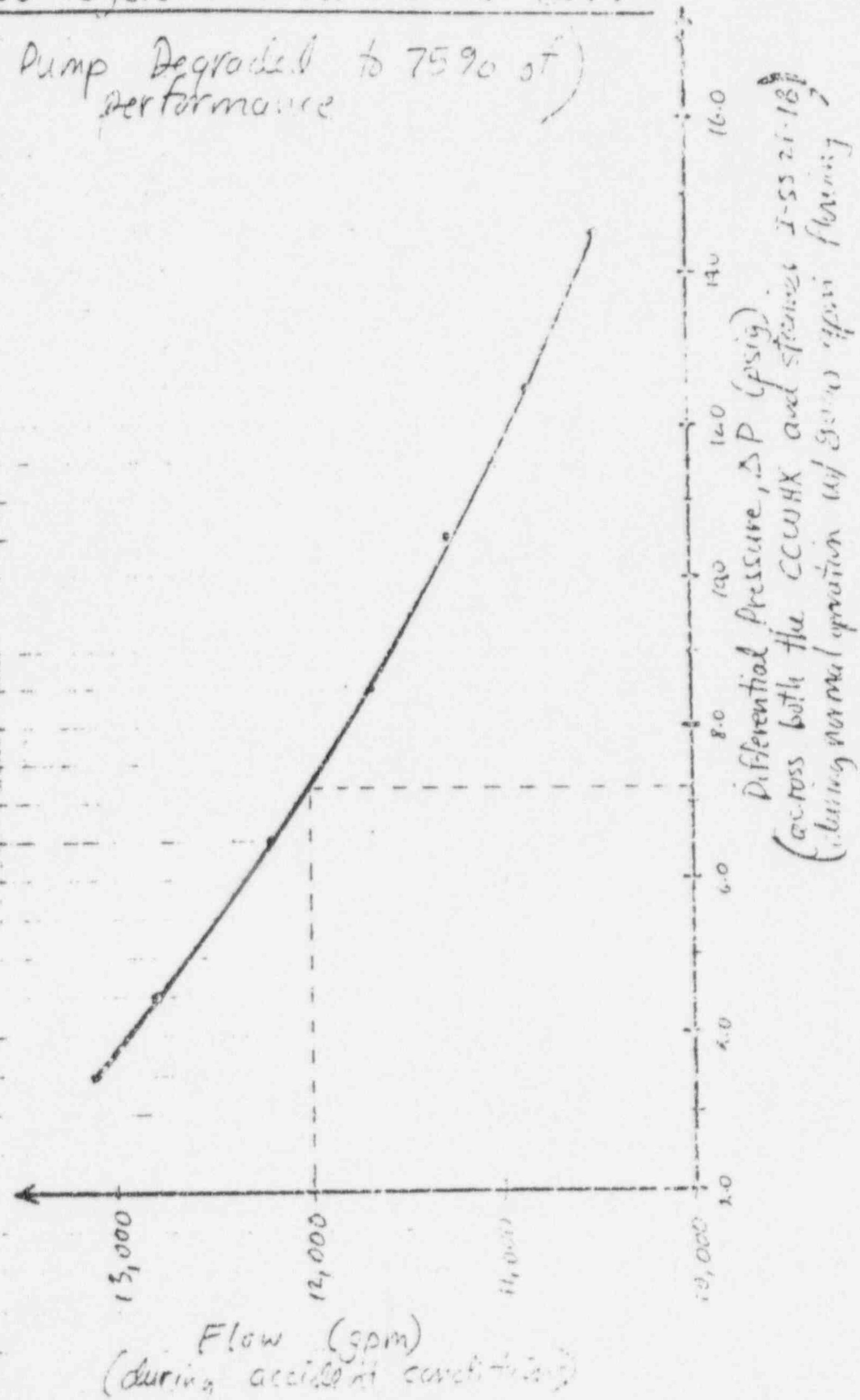
SHEET NO 16 of 19

PROJECT NO

6.0 RESULTS

PSL-1 ICW System Performance Curve

(ICW Pump Degraded to 75% of performance)



6.0 RESULTS (CONT'D)

Reference 2.17 requires an ICW flow of 12,000 gpm at 95°F to support the results of the containment analysis. From the ICW Performance curve on Page 16, it can be seen that the maximum combined allowable ΔP across the CCWHX and the CCW strainer ≈7.2 psid at a flowrate of 8,000 gpm during normal operation. Based on ΔP(psi) being proportional to Q^2(gpm), a curve can be prepared to reflect the allowable combined ΔP across the CCWHX and the CCW strainer at various flows during normal operation.

$$\frac{Q_1^2}{Q_2^2} = \frac{\Delta P_1}{\Delta P_2}$$

$$\frac{8000^2}{Q_2^2} = \frac{7.2}{\Delta P_2}$$

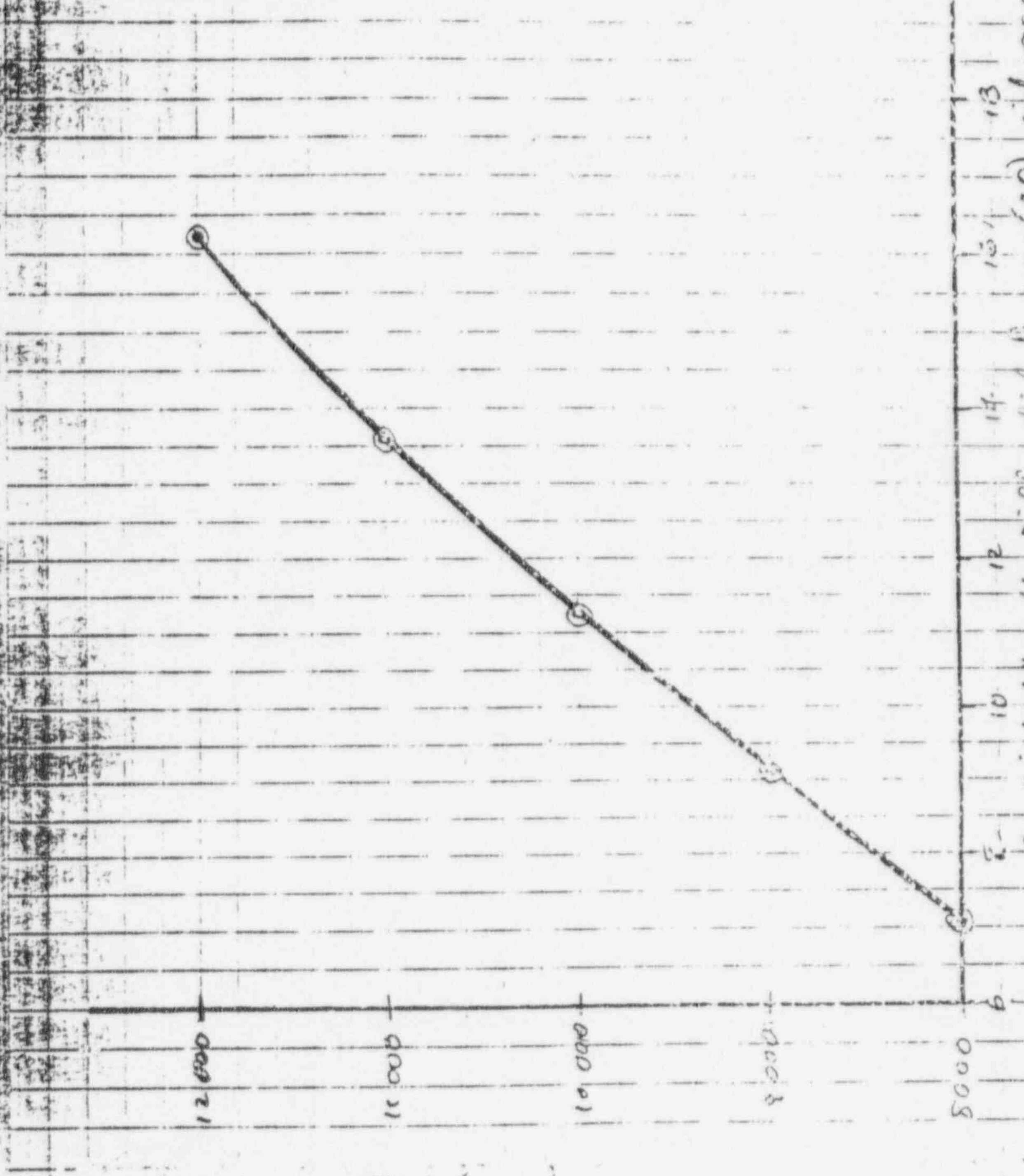
$$\Delta P_2 = \frac{7.2\, Q_2^2}{8000^2}$$

ΔP_2 (psid)	Q_2^2 (gpm)
9.1	9 000
11.25	10 000
13.6	11 000
16.2	12 000

A curve is prepared (see next page, page 18) that plots this resulting curve.

6.0 RESULTS (CONT'D)

PSL-1 ICW Combined Allowable Differential Pressure across a CCW HX and a CCW Strainer



6.0 RESULTS (CONT'D)

6.1 A validation of the PIPE-FLO (version 4.02) computer program was performed by inputting the same data as used in the PSL-1 portion of the Reference 2.9 calculation (341192,Addendum #1). The results, BASE1, are essentially the same and are attached to this calculation as Attachment #8 (See Assumption 4.4).

6.2 Following are the flowrates of the ICW fluid through the CCW HX during accident conditions based on the various differential pressures across the CCW HX (to be combined with 2.5 psid across the strainer) during normal operating conditions, 8,000 gpm flow and an ICW Pump at 75% hydraulic performance:

1 PSID at 13,127 gpm
2 PSID at 12,797 gpm
4 PSID at 12,199 gpm
6 PSID at 11,682 gpm
8 PSID at 11,229 gpm
10 PSID at 10,828 gpm
12 PSID at 10,470 gpm

An "ICW System Performance Curve" (Page 16) has been created by plotting the above points (by adding 2.5 psid to each ΔP value).

Additionally, an "ICW Allowable Differential Pressure Across both a CCWHX and a CCW Strainer" curve (page 18) is provided to show a range of possible ΔP's across a range of possible flowrates, during potential normal operating conditions.

Company: FPL
Project: PSL
by: MECH/BOP

75dp12
05/24/93

LINELIST REPORT

Created: 05/14/93
Design file:
Pipe Specs: 3

Pipes: 18
Nodes: 19
Components: 2

12PSID, ICW PUMP 75%, 2 OPENINGS, 190 GPM LOSS

PROJECT SPECIFICATIONS

SPECIFICATION	PIPE MATERIAL Sch / Roughness in	FLUID Temp / Pres °F psi	VALVE TABLE
01 CONCRETE dated: 05/20/93 Design: 6 ft/sec	CONC LINED STD / 0.12 Limits: 0 - 12 ft/sec 0 - 100 psi	seawater 95 / 0	Standard
03 SS dated: 05/24/93 Design: 6 ft/sec	Steel 40 / 0.0018 Limits: 0 - 12 ft/sec 0 - 100 psi	seawater 95 / 0	Standard
02 STEEL dated: 05/24/93 Design: 6 ft/sec	Steel 40 / 0.0018 Limits: 0 - 12 ft/sec 0 - 100 psi	seawater 95 / 0	Standard

PIPING LINELIST

PIPELINE	SPEC	MATERIAL Size / Sch in	LENGTH ft	/ Pres °F psi	VALVES Total-K
PIPE001	01	CONC LINED 30 / STD	469.6	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	172.4	seawater 95 / 0	0
PIPE003	01	CONC LINED 30 / STD	110.2	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	765.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / 0	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	115.2
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.23	seawater 95 / 0	345

Company: FPL
Project: PSL
by: MECH/BOP

75dp12
05/24/93

MATERIALS REPORT rev: [illegible]

Created: 05/14/93
Design file:
Pipe Specs: 3

Pipes: 18
Nodes: 19
Components: 2

12PSID, ICW PUMP 75%, 2 OPENINGS, 100 GPM LOSS

PIPE MATERIALS LIST

PIPELINE	MATERIAL Size / Sch	LENGTH ft	VALVES & FITTINGS
PIPE001 Spec 01	CONC LINED 30 / STD	469.6	
PIPE002 Spec 01	CONC LINED 36 / STD	172.4	
PIPE003 Spec 01	CONC LINED 30 / STD	110.2	
PIPE004 Spec 01	CONC LINED 30 / STD	1447	
PIPE005 Spec 01	CONC LINED 30 / STD	765.6	
PIPE006 Spec 01	CONC LINED 30 / STD	235.6	
PIPE007 Spec <03>	SS 30 / 5S	65.1	
PIPE008 Spec 01	CONC LINED 30 / STD	706.7	
PIPE009 Spec 01	CONC LINED 30 / STD	1	1-Fixed K 24
PIPE010 Spec 01	CONC LINED 30 / STD	1	1-Fixed K 115.[illegible]
PIPE011 Spec 01	CONC LINED 30 / STD	1	1-Fixed K 12.74
PIPE012 Spec 01	CONC LINED 30 / STD	1	1-Fixed K 0.3
PIPE013 Spec 01	CONC LINED 30 / STD	1	1-Fixed K 45.5
PIPE014 Spec 01	CONC LINED 30 / STD	1	

PIPELINE	MATERIAL Size / Sch	LENGTH ft	VALVES & FITTINGS
PIPE015 Spec 01	CONC LINED 30 / STD	1	
PIPE016 Spec 01	CONC LINED 30 / STD	1	
PIPE017 Spec <02>	Steel 0.75 / 40	0.5	1-Entrance Sharp-Edged 1-Ball Valve 1-Exit Sharp-Edged
PIPE018 Spec <02>	Steel 3 / 40	0.23	1-Fixed K 344.5 1-Entrance Sharp-Edged

of 11

PIPE MATERIALS SUMMARY

PIPE MATERIAL	SCHEDULE	SIZE in	[illegible]
Steel	40	0.75	[illegible]
		3	[illegible]
CONC LINED	STD	30	[illegible]742.7
		36	172.4
SS	5S	30	65.1

VALVE & FITTING SUMMARY

SPECIFICATION	MATERIAL	SCHEDULE	VALVES & FITTINGS
01 CONCRETE	CONC LINED	STD	
	Size: 30 in		1-Fixed K 24
			1-Fixed K 115.2
			1-Fixed K 12.74
			1-Fixed K 0.3
			1-Fixed K 45.5
02 STEEL	Steel	40	
	Size: 0.75 in		1-Entrance Sharp-Edged
			1-Ball Valve
			1-Exit Sharp-Edged
	Size: 3 in		1-Fixed K 344.5
			1-Entrance Sharp-Edged

Company: FPL
Project: PSL
By: MECH/BOP

75dp12
05/24/93

SYSTEM REPORT rev: 05/[illegible]

Created: 05/14/93
Design file:
Pipe Specs: 3

Pipes: 18
Nodes: 19
Components: 2

12PSID, ICW PUMP 75%, 2 OPENINGS, 100 GPM LOSS

SYSTEM NODELIST

NODE	ELEVATION ft	PIPELINES IN	PIPELINES OUT
A	39.6	PIPE014	PIPE001
B	39.6	PIPE001	PIPE002
C	39.6	PIPE002	PIPE003
CW	9.6	PIPE018	
D	39.6	PIPE003	PIPE004 PIPE018
DISC	17	PIPE015	
E	39.6	PIPE004	PIPE005
F	39.6	PIPE005	PIPE006
G	39.6	PIPE006	PIPE007
H	39.6	PIPE007	PIPE008
I	39.6	PIPE008	PIPE009
INTAKE	0		PIPE016
J	39.6	PIPE009	PIPE010 PIPE017
K	39.6	PIPE010	PIPE011
L	39.6	PIPE011	PIPE012
M	39.6	PIPE012	PIPE013
N	17	PIPE013	PIPE015
O	0	PIPE016	PIPE014
TAP	39.5	PIPE017	

SYSTEM LINELIST 75dp12 05/[illegible]

[illegible] 7 of 11

PIPELINE	SPEC	FROM_NODE	TO_	COMPONENT
PIPE001	01	A	B	
PIPE002	01	B	C	
PIPE003	01	C	D	
PIPE004	01	D	E	
PIPE005	01	E	F	
PIPE006	01	F	G	
PIPE007	<03>	G	H	
PIPE008	01	H	I	
PIPE009	01	I	J	
PIPE010	01	J	K	
PIPE011	01	K	L	
PIPE012	01	L	M	
PIPE013	01	M	N	
PIPE014	01	O	A	ICW75
PIPE015	01	N	DISC	
PIPE016	01	INTAKE	O	
PIPE017	<02>	J	TAP	
PIPE018	<02>	D	CW	

SYSTEM COMPONENT 75db12

05/24/93

COMPONENT		PERFORMANCE DATA				
ICW75	gpm:	0	7000	10000	14000	16000
	ft:	154.5	129	11[illegible].5	10[illegible].25	93
IC[illegible]	gpm:	0	7000	10000	14000	16000
	ft:	164.8	137.6	1[illegible]3.2	108	99.2

Attachment [illegible] 75dp12
[illegible]-93-011 05/24/93
2, page [illegible] of [illegible]

Company: FPL
Project: PSL
by: MECH/BOP

LINEUP REPORT rev: 05/24/93

LINELIST: 75dp12
dated: 05/24/93

DEVIATION: 9.78e-005 [illegible]
after: 9 iterations

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS

Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	104.6	<<<	0
DISC	<<<	PIPE015	10470	<<<	3.3
INTAKE	>>>	PIPE016	10749	>>>	4.2
TAP	<<<	PIPE017	74.59	<<<	0

NET FLOWS IN: 100 gpm

Attach. 1

[illegible]-92-016 05/24/92

10 of 11

LINEUP NODES 75dp12

NODE	ELEVATION ft	DEMAND gpm		PRESS psi g	H GRADE ft
A	39.6			36.98	123.3
B	39.6			35.93	120.9
C	39.6			35.78	120.6
CW	9.6		p	0	9.6
D	39.6			35.54	120
DISC	17		p	3.3	24.47
E	39.6			32.37	112.9
F	39.6			30.7	109.1
G	39.6			30.18	107.9
H	39.6			30.12	107.8
I	39.6			28.58	104.3
INTAKE	0		p	4.2	9.504
J	39.6	> 100		24.17	94.29
K	39.6			3.715	48.01
L	39.6			1.451	42.88
M	39.6			1.395	42.76
N	17			3.302	24.47
O	0			4.198	9.499
T	39.5		p	0	39.5

PIPELINE	FROM	TO	FLOW gpm	Vl ft/s	dP psi g	Hl ft
PIPE001	A	B	10749	5.225	1.048	2.372
PIPE002	B	C	10749	3.587	0.143	0.323
PIPE003	C	D	10749	5.225	0.246	0.557
PIPE004	D	E	10644	5.174	3.167	7.168
PIPE005	E	F	10644	5.174	1.676	3.792
PIPE006	F	G	10644	5.174	0.516	1.167
PIPE007	G	H	10644	5	0.057	0.129
PIPE008	H	I	10644	5.174	1.547	3.501
PIPE009	I	J	10644	5.174	4.406	9.971
PIPE010	J	K	10470	5.089	20.45	46.29
PIPE011	K	L	10470	5.089	2.264	5.123
PIPE012	L	M	10470	5.089	0.055	0.125
PIPE013	M	N	10470	5.089	(1.907)	18.28
PIPE014	O	A	10749	5.225	(32.78)	(113.8)
---- ICW75 --- dP: (50.28) --- Hl: (113.8)						
PIPE015	N	DISC	10470	5.089	0.002	0.005
PIPE016	INTAKE	O	10749	5.225	0.002	0.005
PIPE017	J	TAP	74.59	* 44.91	24.17	54.79
PIPE018	D	CW	104.6	4.542	35.54	110.4

PIPING LINELIST

Attachment # 2
BL-IPJAI-... Rev 0
Page 9 of 4

75dp10
05/25/93

PIPELINE	SPEC	MATERIAL - Size / Sch in	LENGTH ft	T °F / Pres psi	VALVES Total-K
PIPE001	01	CONC LINED 30 / STD	469.6	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	172.4	seawater 95 / 0	0
PIPE003	01	CONC LINED 30 / STD	110.2	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	765.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / 0	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	96
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.23	seawater 95 / 0	345

Company: FPL
Project: PSL
by: MECH/BOP

Att. 2
PSL-...
Page ... of 4

75dp10
05/25/93

LINEUP REPORT Rev: 05/25/93

LINELIST: 75dp10
Updated: 05/24/93

DEVIATION: 0.000101 %
after: 9 iterations

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	103.8	<<<	0
DISC	<<<	PIPE015	10828	<<<	3.3
INTAKE	>>>	PIPE016	11104	>>>	4.2
TAP	<<<	PIPE017	72.24	<<<	0

NET FLOWS IN: 100 gpm

LINEUP NODES

2
75op15
??-93-011 05/25/93
100, p ? of 5

NODE	ELEVATION ft	DEMAND gpm		PRESS psi g	H GRADE ft
A	39.6			36.35	121.9
B	39.6			35.23	119.3
C	39.6			35.08	119
[redacted] CW	9.6		p	0	[redacted] 9.6
D	39.6			34.82	118.4
DISC	17		p	3.3	24.47
[illegible]	39.6			31.43	110.7
[illegible]	39.6			29.64	106.7
G	39.6			29.09	105.4
H	39.6			29.03	105.3
I	39.6			27.38	101.6
INTAKE	0		p	4.2	9.504
[illegible]	39.6	> 100		22.67	90.91
[illegible]	39.6			4.439	49.65
[illegible]	39.6			2.018	44.17
[illegible]	39.6			1.958	44.03
N	17			3.302	24.47
O	0			4.198	9.499
TAP	39.5		p	0	39.5

LINEUP PIPELINES

75dp10
05/25/[illegible]

PIPELINE	FROM	TO	FLOW gpm	VEL ft/sec	[illegible] psi g	[illegible] ft
PIPE001	A	B	11104	5.398	1.119	2.531
PIPE002	B	C	11104	3.706	0.152	0.344
PIPE003	C	D	11104	5.398	0.262	0.594
PIPE004	D	E	11000	5.348	3.383	7.655
PIPE005	E	F	11000	5.348	1.79	4.05
PIPE006	F	G	11000	5.343	0.551	1.246
PIPE007	G	H	11000	5.168	0.061	0.138
PIPE008	H	I	11000	5.348	1.652	3.738
PIPE009	I	J	11000	5.348	4.706	10.65
PIPE010	J	K	10828	5.264	[illegible].23	41.26
PIPE011	K	L	10828	5.264	2.[illegible]	5.48
PIPE012	L	M	10828	5.264	0.[illegible]	0.134
PIPE013	M	N	10828	5.264	(1.344)	19.56
PIPE014	O	A	11104	5.398	(32.15)	(112.4)
--- ICW75 --- dP: (49.65) --- Hl: (112.4)						
PIPE015	N	DISC	10828	5.264	0.002	0.005
PIPE016	INTAKE	O	11104	5.398	0.002	0.005
PIPE017	J	TAP	72.24	* 43.5	22.67	51.41
PIPE018	D	CW	103.8	4.509	34.82	108.8

PIPING LINELIST

75dp8
05/25/93

PIPELINE	SPEC	MATERIAL Size / Sch in	LENGTH ft	FLUID Temp / Pres °F psi	VALVES Total-K
PIPE001	01	CONC LINED 30 / STD	460.8	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	172.4	seawater 95 / 0	0
PIPE003	0	CONC LINED 30 / STD	110.2	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	765.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / 0	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	76.8
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.23	seawater 95 / 0	345

Company: FPL
Project: PSL
by: MECH/BOP

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11-93-016 75dpB
05/25/93
page 2 of 4

LINEUP REPORT rev: 05/24/93

LINELIST: 75dpB
dated: 05/24/93

DEVIATION: 0.000102 %
after: 0 iteration

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J[illegible]	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	102.9	<<<	0
DISC	<<<	PIPE015	11229	<<<	3.3
INTAKE	>>>	PIPE016	11502	>>>	4.2
TAP	<<<	PIPE017	69.47	<<<	0

NET FLOWS IN: 100 gpm

Attach. 3 -93-016 3 of 4

LINEUP NODES

NODE	ELEVATION ft	DEMAND gpm		PRESSU psi g	H GRADE ft
A	39.6			35.65	120.3
B	39.6			34.45	117.6
C	39.6			34.28	117.2
CW	9.6		p	0	9.6
D	39.6			34	116.5
DISC	17		p	3.3	24.47
E	39.6			30.37	108.3
F	39.6			28.45	104
G	39.6			27.86	102.6
H	39.6			27.79	102.5
I	39.6			26.02	98.48
INTAKE	0		p	4.2	9.504
J	39.6	> 100		20.97	87.05
K	39.6			5.279	51.55
L	39.6			2.674	45.65
M	39.6			2.611	45.51
N	17			3.302	24.47
O	0			4.197	9.499
TAP	39.5		p	0	39.5

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LINEUP PIPELINES

75dp3
05/25/93

PIPELINE	FROM	TO	FLOW gpm	VEL ft/sec	psi g	Hl ft
PIPE001	A	B	11502	5.591	1.2	2.715
PIPE002	B	C	11502	2.938	0.163	0.369
PIPE003	C	D	11502	5.591	0.282	0.637
PIPE004	D	E	11399	5.541	3.631	8.218
PIPE005	E	F	11399	5.541	1.921	4.343
PIPE006	F	G	11399	5.541	0.591	1.338
PIPE007	G	H	11399	5.255	0.065	0.147
PIPE008	H	I	11399	5.541	1.774	4.013
PIPE009	I	J	11399	5.541	5.053	11.44
PIPE010	J	K	11229	5.459	15.69	35.5
PIPE011	K	L	11229	5.459	2.604	5.894
PIPE012	L	M	11229	5.459	0.064	0.144
PIPE013	M	N	11229	5.459	(0.692)	21.03
PIPE014	O	A	11502	5.591	(31.45)	(110.8)
PU-ICW75 --- dP: (48.95) --- Hl: (110.8)						
PIPE015	N	DISC	11229	5.459	0.002	0.006
PIPE016	INTAKE	O	11502	5.591	0.003	0.006
PIPE017	J	TAP	69.47	* 41.83	20.97	47.55
PIPE018	D	CW	102.9	4.47	34	106.9

PIPING LINELIST 75dn6 05/25/[illegible]

PIPELINE	SPEC	MATERIAL Size / Sch in	LENGTH ft	Temp / Pres °F psi	VALVES Total-K
PIPE001	01	CONC LINED 30 / STD	469.6	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	172.4	seawater 95 / 0	0
PIPE003	01	CONC LINED 30 / STD	110.2	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	765.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / 0	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	57.6
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.23	seawater 95 / 0	345

Company: FPL
Project: PSL
by: MECH/BOP

75dp6
05/25/93

LINEUP REPORT rev: 05/25/93

DEVIATION: 0.000108 %
after: 9 iterations

LINELIST: 75dp6
dated: 05/24/93

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	101.9	<<<	0
DISC	<<<	PIPE015	11682	<<<	3.3
INTAKE	>>>	PIPE016	11950	>>>	4.2
TAP	<<<	PIPE017	66.13	<<<	0

NET FLOWS IN: 100 gpm

NODE	ELEVATION ft	DEMAND gpm	PRESS. psi g		H GRADE ft
A	39.6			34.85	118.5
B	39.6			33.56	115.5
C	39.6			32.38	115.1
CW	9.6		p	0	9.6
D	39.6			33.05	114.5
DISC	17		p	3.3	24.47
E	39.6			29.16	105.6
F	39.6			27.08	100.9
G	39.6			26.44	99.44
H	39.6			26.37	99.28
[illegible]	39.6			24.46	94.94
INTAKE	0		p	4.2	9.504
[illegible]	39.6	> 100		19	82.59
[illegible]	39.6			6.263	53.77
[illegible]	39.6			3.444	47.39
[illegible]	39.6			3.375	47.24
[illegible]	17			3.303	24.47
[illegible]	0			4.197	9.498
TAP	39.5		p	0	39.5

PIPELINE	FROM	TO	FLOW gpm	V[illegible] ft/[illegible]	[illegible] psi g	Hl ft
PIPE001	A	B	11950	5.809	1.295	2.93
PIPE002	B	C	11950	3.988	0.176	0.398
PIPE003	C	D	11950	5.809	0.304	0.688
PIPE004	D	E	11848	5.759	3.923	8.877
PIPE005	E	F	11848	5.759	2.075	4.697
PIPE006	F	G	11848	5.759	0.639	1.445
PIPE007	G	H	11848	5.566	0.070	0.159
PIPE008	H	I	11848	5.759	1.916	4.335
PIPE009	I	J	11848	5.759	5.459	12.35
PIPE010	J	K	11682	5.679	12.73	28.82
PIPE011	K	L	11682	5.679	[illegible]	6.378
PIPE012	L	M	11682	5.679	0.069	0.156
PIPE013	M	N	11682	5.679	0.073	22.76
PIPE014	O	A	11950	5.809	(30.66)	(109)
--- ICW75 --- dP: (48.16) --- Hl: (109)						
PIPE015	N	DISC	11682	5.679	0.003	0.006
PIPE016	INTAKE	O	11950	5.809	0.003	0.006
PIPE017	J	TAP	66.13	* 39.82	19	43.09
PIPE018	D	CW	101.9	4.427	33.08	104.9

PIPING LINELIST

PIPELINE	SPEC	MATERIAL Size / Sch in	LENGTH ft	Temp / Pres °F psi	VALUES Total-K
PIPE001	01	CONC LINED 30 / STD	469.6	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	172.4	seawater 95 / 0	0
PIPE003	01	CONC LINED 30 / STD	110.2	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	765.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / 0	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	38.4
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.23	seawater 95 / 0	345

Company: FPL
Project: PSL
by: MECH/BOP

LINEUP REPORT DATE 05/25/93

DEVIATION: 0.000114 %
after: 3 iterations

LINELIST: 75dp4
dated: 05/25/93

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS

Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	100.7	<<<	0
DISC	<<<	PIPE015	12199	<<<	3.3
INTAKE	>>>	PIPE016	12461	>>>	4.2
TAP	<<<	PIPE017	61.99	<<<	0

NET FLOWS IN: 100 gpm

LINEUP NODES

NODE	ELEVATION ft	DEMAND gpm		PRESS psi g	H GRADE ft
A	39.6			33.92	116.4
B	39.6			32.54	113.2
C	39.6			32.35	112.8
CW	9.6		p	0	9.6
D	39.6			32.02	112.1
DISC	17		p	3.3	24.47
E	39.6			27.75	102.4
F	39.6			25.49	97.28
G	39.6			24.79	95.71
H	39.6			24.72	95.54
I	39.6			22.63	90.32
INTAKE	0		p	4.2	9.504
J	39.6	> 100		16.69	77.37
K	39.6			7.434	56.42
L	39.6			4.36	49.47
M	39.6			4.285	49.3
N	17			3.303	24.47
O	0			4.197	9.498
TAP	39.5		p	0	39.5

LINEUP PIPELINES

PIPELINE	FROM	TO	FLOW gpm	VEL ft/sec	dP psig	Hl ft
PIPE001	A	B	1249[illegible]	6.058	1.408	3.186
PIPE002	B	C	12461	[illegible]	[illegible]	0.433
PIPE003	C	D	12461	6.058	[illegible]	0.748
PIPE004	D	E	12361	6.009	[illegible]	9.66
PIPE005	E	F	12361	6.009	2.253	5.111
PIPE006	F	G	12361	6.009	0.695	1.573
PIPE007	G	H	12361	5.807	0.076	0.172
PIPE008	H	I	12361	6.009	2.035	4.718
PIPE009	I	J	12261	6.009	5.942	13.45
PIPE010	J	K	12199	5.93	9.253	20.95
PIPE011	K	L	12199	5.93	3.073	6.955
PIPE012	L	M	12199	5.93	0.075	0.170
PIPE013	M	N	12199	5.93	9.932	24.82
PIPE014	O	A	12461	6.058	(29.75)	(106.9)
--- ICW75 ---	dP: (47.25)	--- Hl: (106.9)				
PIPE015	[illegible]	DISC	12199	5.93	0.003	0.007
PIPE016	INTAKE	O	12461	6.058	0.003	0.007
PIPE017	J	TAP	61.99	* 37.33	16.69	37.87
PIPE018	D	CW	100.7	4.376	32.02	102.5

PIPELINE	SPEC	MATERIAL Size / Sch in	LENGTH ft	FLUID Temp / Pres °F psi	VALVES Total-K
PIPE001	01	CONC LINED 30 / STD	469.6	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	172.4	seawater 95 / 0	0
PIPE003	01	CONC LINED 30 / STD	110.[illegible]	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	755.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / 0	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	19.2
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.23	seawater 95 / 0	345

Company: FPL
Project: PSL
by: MECH/BOP

[illegible]

LINEUP REPORT [illegible]

LINELIST: 75dp2
dated: 05/25/93

DEVIATION: 0.000127 %
after: 9 iterations

Volumetric flow rates require constant fluid properties in all pipelines.
* Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	99.35	<<<	0
DISC	<<<	PIPE015	12797	<<<	3.3
INTAKE	>>>	PIPE016	13053	>>>	4.2
TAP	<<<	PIPE017	56.68	<<<	0

NET FLOWS IN: 100 gpm

LINE[illegible]

NODE	ELEVATION ft	DEMAND gpm		PRES psig	HGRADE ft
A	39.6			32.9	114
B	39.6			31.25	110.5
C	39.6			31.14	110.1
CW	9.6		p	0	9.6
D	39.6			30.78	109.2
DISC	17		p	3.3	24.47
[illegible]	39.6			26.09	98.64
[illegible]	39.6			23.61	93.03
G	39.6			22.85	91.3
H	39.6			22.76	91.11
I	39.6			20.48	85.93
INTAKE	0		p	4.2	9.504
J	39.6	> 100		13.95	71.17
K	39.6			8.852	59.63
L	39.6			5.471	51.98
M	39.6			5.388	51.79
N	17			3.303	24.47
O	0			4.197	9.497
TAP	39.5		p	0	39.5

PIPELINE	FROM	TO	FLOW gpm		dP psid	Hl ft
PIPE001	A	B	13053	6.345	1.615	3.495
PIPE002	B	C	13053	4.368	0.210	0.475
PIPE003	C	D	13053	6.321	0.362	0.820
PIPE004	D	E	12954	6.297	4.687	10.61
PIPE005	E	F	12954	6.297	2.43	5.617
PIPE006	F	G	12954	6.297	0.763	1.727
PIPE007	G	H	12954	6.085	0.083	0.138
PIPE008	H	I	12954	6.337	2.289	5.181
PIPE009	I	J	12954	6.297	6.526	14.77
PIPE010	J	K	12797	6.221	5.106	11.53
PIPE011	K	L	12797	6.221	[illegible]	7.054
PIPE012	L	M	12797	6.221	[illegible]	0.187
PIPE013	M	N	12797	6.221	2.085	27.32
PIPE014	O	A	13053	6.345	(23.7)	(104.5)
--- ICW75 --- dP: (46.2) --- Hl: (104.6)						
PIPE015	N	DISC	12797	6.221	0.003	0.007
PIPE016	INTAKE	O	13053	6.345	0.003	0.007
PIPE017	J	TAP	56.65	* 34.13	13.95	31.67
PIPE018	D	CW	99.35	4.315	30.78	99.65

PIPING LINELIST

75dpi
05/25/[illegible]

PIPELINE	SPEC	MATERIAL Size / Sch in	LENGTH ft	[illegible] / Pres	VALVES Total K
PIPE001	01	CONC LINED 30 / STD	469.6	seawater 95 / 0	0
PIPE002	01	CONC LINED 36 / STD	372.4	seawater 95 / 0	0
PIPE003	01	CONC LINED 30 / STD	120.2	seawater 95 / 0	0
PIPE004	01	CONC LINED 30 / STD	1447	seawater 95 / 0	0
PIPE005	01	CONC LINED 30 / STD	765.6	seawater 95 / 0	0
PIPE006	01	CONC LINED 30 / STD	235.6	seawater 95 / [illegible]	0
PIPE007	<03>	SS 30 / 5S	65.1	seawater 95 / 0	0
PIPE008	01	CONC LINED 30 / STD	706.7	seawater 95 / 0	0
PIPE009	01	CONC LINED 30 / STD	1	seawater 95 / 0	24
PIPE010	01	CONC LINED 30 / STD	1	seawater 95 / 0	9.8
PIPE011	01	CONC LINED 30 / STD	1	seawater 95 / 0	12.74
PIPE012	01	CONC LINED 30 / STD	1	seawater 95 / 0	0.3
PIPE013	01	CONC LINED 30 / STD	1	seawater 95 / 0	45.5
PIPE014	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE015	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE016	01	CONC LINED 30 / STD	1	seawater 95 / 0	0
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 95 / 0	1.572
PIPE018	<02>	Steel 3 / 40	0.25	seawater 95 / 0	[illegible]45

Company: FPL
Project: PSL
by: MECH/BOP

Page
05/25/9

LINEUP REPORT rev: 05/25/93

LINELIST: 75dp1
dated: 05/25/93

DEVIATION: 0.000123 %
after: 9 iterations

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
J	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	98.57	<<<	0
DISC	<<<	PIPE015	13127	<<<	3.3
INTAKE	>>>	PIPE016	13379	>>>	4.2
TAP	<<<	PIPE017	53.45	<<<	0

NET FLOWS IN: 100 gpm

75dpl
05/25/93

NODE	ELEVATION ft	DEMAND gpm		PRES psi g	H GRADE ft
A	39.6			32.22	112.7
B	39.6			30.66	109.1
C	39.6			30.47	108.6
CW	9.6		p	0	9.6
D	39.6			30.29	107.7
DISC	17		p	3.3	24.47
E	39.6			25.16	96.55
F	39.6			22.56	90.65
G	39.6			21.76	88.83
H	39.6			21.67	88.64
I	39.6			19.26	83.19
INTAKE	0		p	4.2	9.504
J	39.6	> 100		12.4	67.67
K	39.6			9.665	61.47
L	39.6			6.106	53.42
M	39.6			6.019	53.22
N	17			3.302	24.13
O	0			4.197	9.496
TAP	39.5		p	0	39.5

LINEUP PIPELINES 75dp1

PIPELINE	FROM	TO	[illegible]	[illegible]	[illegible]	H1
PIPE001	A	B	13[illegible]	[illegible]	1.02[illegible]	[illegible]
PIPE002	B	C	13370	[illegible]	0.2[illegible]	[illegible]
PIPE003	C	D	13[illegible]	[illegible].564	0.[illegible]	0.[illegible]
PIPE004	D	E	13[illegible]	[illegible].456	4.936	11.15
PIPE005	E	F	13[illegible]	[illegible]	[illegible]	5.398
PIPE006	F	G	13280	[illegible].456	0.862	1.815
PIPE007	G	H	13280	[illegible].239	0.087	0.197
PIPE008	H	I	13280	6.456	2.406	5.445
PIPE009	I	J	13280	[illegible].456	0.[illegible]	15.[illegible]
PIPE010	J	K	13127	[illegible].381	2.7[illegible]	[illegible].197
PIPE011	K	L	13127	[illegible].381	[illegible]	6.054
PIPE012	L	M	13127	[illegible].381	0.087	0.197
PIPE013	M	N	13127	6.381	2.715	28.74
PIPE014	O	A	13379	6.504	(28.12)	(103.2)
--- ICW75 ---	dP: (45.62)	--- H1: (103.2)				
PIPE015	N	DISC	13127	6.381	0.003	0.008
PIPE016	INTAKE	O	13379	6.504	0.003	0.008
PIPE017	J	TAP	53.45	32.19	12.4	28.17
PIPE018	D	CW	98.57	4.281	30.09	98.09

PROCESS SOFTWARE CONTROL

* This attachment not copied

FIGURE 4

Software Verification and Validation Report (SVVR)

SVVR FOR PIPE-FLO VERSION/REVISION [illegible]

DESCRIPTION OF VERIFICATION PERFORMED (or N/A)

Results of the attached "BASE1" computer run was compared to a known computer run "341.92" (from Reference 2.9, Addendum 1) prepared in PIPE-FLO versions 3.91A+3.92. Results are acceptable.

DESCRIPTION OF VALIDATION PERFORMED (or N/A)

N/A

DATE PERFORMED

5/24/93

REASON FOR ~~VALIDATION~~ verification SCHEDULED ____ CONFIGURATION CHANGE ✓

ATTACHED BENCHMARK RUNS, ETC.

"BASE 1" 11 pages

Preparer: [signature] Date: 5/25/93

Verifier: W. B. Neff Date: 5/27/93

Approver: W. B. Neff Date: 5/28/93

ENGINEERED SOFTWARE
May 12, 1993

CONCRETE vers. 1
Standard ref: CRANE 410
Roughness: 3.048 mm

: CONCRETE
: From Data File
Checked by:
Verified by:

Schedule	Size_US	Size_M	I_Diameter (in)	Wall_Thick (in)
STD	30	762	29	0.5
	36	914.4	35	0.5

ENGINEERED SOFTWARE
May 07, 1995

STEEL vers. 1

Standard ref: CRANE Technical Paper 410

Roughness: 0.046 mm

Schedule	Size_US	Size_M	I_Diameter (in)	Wall_Thick (in)
40	0.75	20	0.824	0.113
	1	25	1.049	0.133
	1.25	32	1.38	0.14
	1.5	40	1.61	0.145
	2	50	2.067	0.154
	2.5	65	2.469	0.203
	3	80	3.068	0.216
	3.5	90	3.548	0.226
	4	100	4.026	0.237
	5	125	5.047	0.258
	6	150	6.065	0.28
	8	200	7.981	0.322
	10	250	10.02	0.365
	12	300	11.938	0.406
	14	350	13.124	0.438
	16	400	15	0.5
	18	450	16.876	0.562
	20	500	18.812	0.594
	24	600	22.624	0.688
	32	800	30.624	0.688
	34	850	32.624	0.688
	36	900	34.5	0.75
60	8	200	7.813	0.406
	10	250	9.75	0.5
	12	300	11.626	0.562
	14	350	12.812	0.594
	16	400	14.688	0.656
	18	450	16.5	0.75
	20	500	18.376	0.812
	22	550	20.25	0.875
	24	600	22.062	0.969
80	0.125	4	0.215	0.095
	0.25	6	0.302	0.119
	0.375	10	0.423	0.126
	0.5	15	0.546	0.147
	0.75	20	0.742	0.154
	1	25	0.957	0.179
	1.25	32	1.278	0.191
	1.5	40	1.5	0.2
	2	50	1.939	0.218
	2.5	65	2.323	0.276
	3	80	2.9	0.3
	3.5	90	3.364	0.318
	4	100	3.826	0.337
	5	125	4.813	0.375
	6	150	5.761	0.432
	8	200	7.625	0.5

ENGINEERED SOFTWARE
May 13, 1993

SS vers. 1

Standard ref: MARK'S HANDBOOK

Roughness: 0.046 mm

[illegible]: SS

[illegible] from Data Fil[illegible]

Checked by:

Verified by:

Schedule	Size_US	Size_M	I_Diameter (in)	Wall_Thick (in)
5S[illegible]	30	762	29.5	0.25

ENGINEERED SOFTWARE
May 12, 1993

SWATER vers. 1(liquid range only)
Standard ref: MARK'S HANDBOOK
Critical Pt: 220.55 bars at 373.976 deg-C

COMPRESSED FLUID	Temperature (deg-C)	Vapor Pressure (bars)	Density-1 (kg/m^3)	Viscosity-1 (centi poise)
	0	0.00612	1023.22	1.88547
	20	0.0234	1024.61	1.08257
	40	0.0738	1017.91	0.67142

Critical Pt and vapor pressure is based on water. This is acceptable based on the pressure and temperatures in this calculation are low.

ADDENDUM #1

This Addendum to this calculation is prepared in order to provide a resulting curve that is similar the resulting curve in the PSL-2 "ICW System Performance" calculation #PSL-2FJM-93-017, where combined allowable differential pressure (ΔP) across CCW HX & strainer is plotted vs. ICW inlet temperature.

To achieve this, the point from the combined allowable (ΔP) across CCW HX & strainer vs. ICW flowrate curve on page 16 of 17 of this calculation, where ICW accident flow is 12,000 gpm and ΔP is 7.2 psid (and ICW inlet flow is 95°F), is plotted on a new graph (page 4 of 32) with combined allowable ΔP across CCW HX & strainer vs. ICW inlet temperature.

The accident conditions provided to ABB-CE via JPN-PSL-SENP-93-001, Rev 0, "Input for LOCA Containment Re-Analysis", are as follows:

> **Design UA** = 4.510×10^6 btu/hr-°F.
> **Design CCW flow** = 7305 gpm (@150°F) or 3.585×10^6 lb/hr.
> **Design ICW flow** = 12000 gpm (@95°F) or 5.973×10^6 lb/hr.

ABB-CE's analysis (#007-AS93-C-004, DEDLS Min SI Case 3) resulted in the following outputs:

> **Time** = 5974 seconds (in recirculation mode).
> **CCW HX ICW temp. in** = 151.8°F.
> **CCW HX ICW temp. out** = 116.8°F.
> **Accident heat load** = 35197 btu/sec. (or 126.7×10^6 btu/hr).

To plot another point on the new graph being generated in this calculation at the more realistic (normal operating) condition of **90°F**, the above inputs and output were inserted into our CCW system model in the thermal computer program, PEGISYS. With an ICW **flowrate** of 9,000 gpm, the computer run resulted in CCW HX inlet and outlet temperatures that match the above ABB-CE analysis **results** to within 1°F (see pages 5-11 of 32).

To find the allowable ΔP across the CCW HX (at 9,000 gpm and 90°F) **our model** of the ICW system in the hydraulic computer program, **PIPEFLO**, was used and the K-value for the CCW HX was adjusted (see **pages 12-15** of 32) until the flow through it equated to 9,000 gpm. **A resulting** ΔP value of 23 psid was obtained (see page 2 of 32).

(CONT'D)

BY ______________ DATE ______________

CHKD. BY ______________ DATE ______________

ADDENDUM #1

⇒ From PIPEFLO run "221":
Through an iterative process (not shown here), PIPE 010 (CCW HX) K-value is set at 221;

From page 8 of 19, $K = \frac{H_L (29)^4}{0.00259 (5200)^2}$

or $H_L = \frac{(221)(0.00259)(5200)^2}{(29)^4} = \ .79$ ft.

From page 6 of 19, $H_L = (\Delta P)\left(\frac{1}{62.116}\right)\left(\frac{12}{1}\right)^2\left(\frac{1}{1.03}\right)$

For H_2O density @ 90°F

or $\Delta P = \frac{51.79}{\left(\frac{1}{62.116}\right)\left(\frac{12}{1}\right)^2\left(\frac{1}{1.03}\right)} = 23.0$ psid

∴ Second set of points on curve is 23 + 2.5 =

25.5 psid at 90°F.

ADDENDUM #1 (CONT'D)

Note that on the resulting curve (page 4 of 32), plant operation is not recommended in the shadowed area under the curve where the combined CCW HX and CCW strainer differential pressure is between 12.5 and 25.5 psid, based on tube degradation concerns.

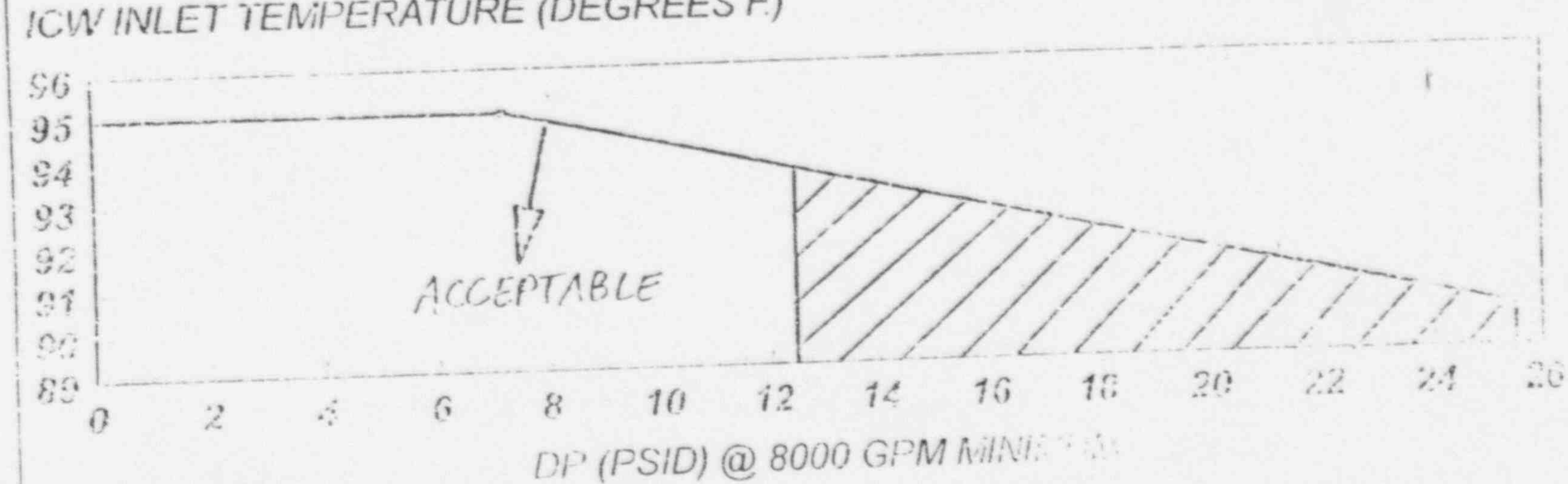
The 2.5 psid basis is as stated in Assumption 4.[illegible] (page 3 of 19) for the CCW strainer and the 10 psid is based on; a) past operating experience that has shown that when the CCW HX ΔP is around 10 psid, excessive marine blockage (i.e. shells) are found on the tubesheets and in the channelheads, and b) not exceeding the tube material velocity limits for tube erosion.

NOTE 1: The PEGISYS program is a Westinghouse program controlled under the Westinghouse QA program, and as such, is acceptable for use in this safety-related application (see pages 16-18 of 32).

NOTE 2: The PIPEFLO, Version 4.06 program was validated as shown on the included pages 19-32 of 32.

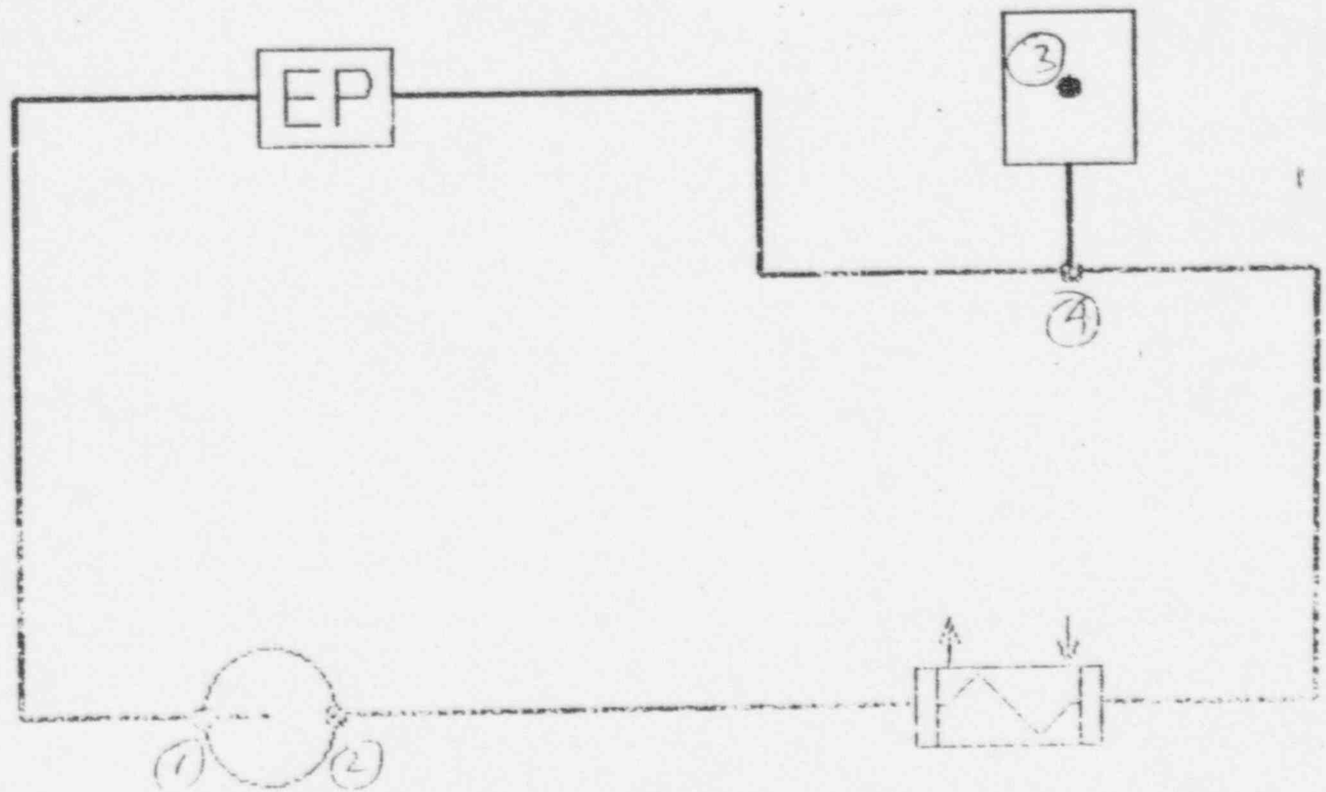
PSL-1 ICW PERFORMANCE CURVE

COMBINED ALLOWABLE DIFFERENTIAL PRESSURE (DP) ACROSS CCW HX & STRAINER



Shaded area represents operating conditions not recommended due to tube degradation concerns.

Fri Jul 23 15:17:30 1993



Name: loop1 Description: psl1 ccw loop abbrv

PEGISYS Analysis package created on Thu Aug [illegible] 1992
by PEGISYS FLOMAP Revision: 3.0
Model: LOOP2 Use Count: 11 Calc_ID: LOOP2
Calc Title: icw 9,000 gpm 90deg f
Fluid: WATER
Calc Type: Non-Isothermal Global Resist Fact = 1.00

From Valve Node Stat	To Node	Resistance ft/(gpm)**2	Flowpath FL/D	Equiv Cv	Flowpath L/D	Resist Reduc Fact	Pipe ID in	Flowpath Heat Load BTU/h
2	4	0.0000e+00	51.54	0.00	0.53	1.00	[illegible]	0.0000e+00
3	4	0.0000e+00	0.00	0.00	0.53	1.00	[illegible]	0.0000e+00
4	1	0.0000e+00	4.54	0.00	0.53	1.00	[illegible]	[illegible]e+08
1	2	0.0000e+00	0.00	0.00	0.00	1.00	0.00	[illegible]e+00

PEGISYS Analysis package created on Thu Aug 5 15:20:[illegible] 19[illegible]
by PEGISYS FLOMAP Revision: 3.0 Page 2
Model: LOOP2 Use Count: 11 Calc_ID: LOOPD
Calc Title: icw 9,000 gpm 90deg f
Fluid: WATER
Calc Type: Non-Isothermal Global Resist Fact = 1.00

The following pumps are running.

Head/flow points for pump from node 1 to node 2.

Flow gpm	Head ft
7304.00	100.00
7305.00	50.00
7306.00	0.00

```
PEGISYS Analysis package created on Thu Aug  5 15:20:20 1993
  by  PEGISYS FLOMAP Revision: 3.0                          Page 3
 Model: LOOP2   Use Count: 11  Calc_ID: LOOP9
 Calc Title: icw 9,000 gpm 90deg f
 Fluid:  WATER
 Calc Type:  Non-Isothermal      Global Resist Fact =  1.00
```

Input parameters for heat exchanger from node 2 to node 4.

```
    Flow orientation: counter flow
    Side 2 Flowrate (lbm/h):        4.484e+06 (9,000 gpm @ 90°F)
    Side 2 Inlet Temperature(F):         (90 °F)
    Side 2 Inlet Pressure(psig):          60
    Design UA(BTU/h-F):             4.51e+06 (u=274.2 ; A=16435 ft²)
    Design Flow Side 1(lbm/h):        3.555e+06 (7,505 gpm @ 150°F)
    Design Flow Side 2(lbm/h):        5.979e+06 (12,000 gpm @ 95°F)
    Side 1 Delta P (psig):            11.7
    Side 2 Delta P (psig):             3.8
    Number of Shell Passes:      1
```

Correct Design flow for ICW should have been 5.973×10⁶ lb/hr @ 95°F — small difference is negligible and insignificant. Result of calc. remains unchanged.

10

PEGISYS Analysis package created on Thu Aug 5 15:20:20 1993
by PEGISYS FLOMAP Revision: 3.0   Page 4
Model: LOOP2   Use Count: 11   Calc_ID: LOOPD
Calc Title: icw 9,000 gpm 90deg f
Fluid: WATER
Calc Type: Non-Isothermal   Global Resist Fact = 1.00

Boundary Nodes--Input Temperature and Pressure

Node Number	Pressure psig	Temperature F
3	0.00	120.00

10

IE-TM-92-016

12 of 32

PEGISYS Analysis package created on Thu Aug 5 15:20:20 1993
by PEGISYS FLOMAP Revision: 3.0 Page 5
Model: LOOP2 Use Count: 11 Calc_ID: LOOP2
Calc Title: icw 9,000 gpm 90deg f
Fluid: WATER
Calc Type: Non-Isothermal Global Resist Fact = 1.00

Case 1 of 1

From Node	To Node	Hydraulic Resistance ft/(gpm)**2	Liquid Flowrate gpm	Mass Flowrate lbm/h	Pump Head ft	Piping Loss ft	Density lbm/cuft	Velocity ft/s
1	2	0.0000e+00	7305.4	3.5830e+06	29.4	0.0	61.15	n/a
2	4	5.0978e-07	7269.2	3.5830e+06	0.0	26.9	61.45	5.80
3	4	5.2460e-09	0.0	0.0000e+00	0.0	0.0	61.71	0.00
4	1	4.4940e-08	7269.3	3.5830e+06	0.0	2.4	61.45	5.80

Heat ex. outlet temp. in path from node 2 to node 4 is 117.2
Deg. F

10
[illegible]-M-02-[illegible]
11 of 22

```
-----------------------------------------------------------------------------------
PEGISYS Analysis package created on Thu Aug  5 15:[illegible] [illegible]
  by  PEGISYS FLOMAP Revision: 3.0                                   Page [illegible]
 Model: LOOP2   Use Count: 11  Calc_ID: LOOPD
 Calc Title: icw 9,000 gpm 90deg f
 Fluid:  WATER
 Calc Type:  Non-Isothermal     Global Rerist Fact =   1.00
-----------------------------------------------------------------------------------
  Case   1  of   1
       Boundary
  Node      Node        Elevation      Pressure      Temperature
                   (ft)            (psig)          (F)
   1        no           0.00         -1.01        152.65
   2        no           0.00         11.50        [illegible]
   3        yes          0.00          0.00        [illegible]0.00
   4        no           0.00          0.00        [illegible]7.15
```

The analysis completed and this is the last page of the output.

PIPING LINELIST

PIPELINE	SPEC	MATERIAL Size / Sch in	[illegible]	[illegible]	VALVES Total-K	
PIPE001	<01>	CONC LINED 30 / STD	40[illegible].5	seawater 90 / 0	0	
PIPE002	<01>	CONC LINED 36 / STD	172.4	seawater 90 / 0	0	
PIPE003	<01>	CONC LINED 30 / STD	110.2	seawater 90 / 0	0	
PIPE004	<01>	CONC LINED 30 / STD	1447	seawater 90 / 0	0	
PIPE005	<01>	CONC LINED 30 / STD	765.6	seawater 90 / 0	0	
PIPE006	<01>	CONC LINED 30 / STD	235.6	seawater 90 / 0	0	
PIPE007	<03>	SS 30 / 5S	65.1	seawater 90 / 0	[illegible]	
PIPE008	<01>	CONC LINED 30 / STD	706.7	seawater 90 / 0	0	
PIPE009	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	24	
PIPE010	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	221	CCW HX
PIPE011	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	12.74	
PIPE012	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	0.3	
PIPE013	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	45.5	
PIPE014	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	0	
PIPE015	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	0	
PIPE016	<01>	CONC LINED 30 / STD	1	seawater 90 / 0	0	
PIPE017	<02>	Steel 0.75 / 40	0.5	seawater 90 / 0	1.572	
PIPE018	<02>	Steel 3 / 40	0.23	seawater 90 / 0	345	

Company: FPL
Project: PSL-1 ICW CURVE
by: MECH/BOP

LINEUP REPORT rev: 08/05/93

LINELIST: 221
dated: 07/27/93

DEVIATION: [illegible]
after 9 iterations

Volumetric flow rates require constant fluid properties in all pipelines.
Fluid properties in the first pipe specification were used.

NODE		DEMAND gpm	NODE	DEMAND gpm
	>>>	100		

NET FLOWS OUT: 100 gpm

PRESSURE CONNECTIONS

Node		Pipeline	FLOW gpm		PRESSURE psi g
CW	<<<	PIPE018	107.7	<<<	0
DISC	<<<	PIPE015	9000	<<<	3.3
INTAKE	>>>	PIPE016	9291	>>>	4.2
TAP	<<<	PIPE017	83.09	<<<	0

NET FLOWS IN: 100 gpm

LINEUP NODES

NODE	ELEVATION ft	DEMAND gpm	PRESSURE psi g	[illegible]
A	39.6		* 30.60	[illegible]
B	39.6		* 3[illegible].75	127.[illegible]
C	39.6		* 38.04	127
CW	9.6		p 0	9.6
D	39.6		* 3[illegible]	126.6
DISC	17		p 3.3	24.47
E	39.6		* 36.1	121.3
F	39.6		* 34.95	[illegible]
G	39.6		* 34.47	117.[illegible]
H	39.6		* 34.43	117.5
I	39.6		* 33.27	114.9
INTAKE	0		p 4.2	9.504
J	39.6	> 100	* 29.99	107.5
K	39.6		* 0.999	41.86
L	39.6		* -0.674	38.02
M	39.6		* -0.715	37.98
N	17		* 3.302	24.47
O	0		* 4.198	9.501
TAP	39.5		p 0	39.5

LINEUP PIPELINES

PIPELINE	FROM	TO	FLOW	VEL	[illegible]	[illegible]
PIPE001	A	B	9291	4.516	[illegible]	[illegible]
PIPE002	B	C	9291	3.101	0.107	[illegible]
PIPE003	C	D	9291	4.516	0.184	[illegible]
PIPE004	D	E	9183	4.464	2.359	5.338
PIPE005	E	F	9183	4.464	1.248	2.825
PIPE006	F	G	9183	4.464	0.384	0.869
PIPE007	G	H	9183	4.314	0.043	0.098
PIPE008	H	I	9183	4.464	1.152	2.607
PIPE009	I	J	9183	4.464	3.28	7.422
PIPE010 (CCW HX)	J	K	9000	4.375	28.99	65.61
PIPE011	K	L	9000	4.375	1.673	[illegible]
PIPE012	L	M	9000	4.375	0.041	[illegible]
PIPE013	M	N	9000	4.375	(4.010)	13.51
PIPE014	O	A	9291	4.516	(35.34)	(119.6)
ICW75 --- dP: (52.84) --- Hl: (119.6)						
PIPE015	N	DISC	9000	4.375	0.002	0.004
PIPE016	INTAKE	O	9291	4.516	0.002	0.004
PIPE017	J	TAP	83.09	* 50.03	29.99	67.97
PIPE018	D	CW	107.7	4.676	38.46	117

JPN-PSLP-93-0504

Westinghouse
Electric Corporation

(407) 624-6457

Mr. Jim Scarola
PSL Engineering Project Manager
Florida Power & Light Company
St. Lucie Nuclear Plant
P.O. Box 128
Ft. Pierce, FL 34954-0128

93-JB-GL-5125
July 28, 1993

Attention: K. K. Mohindroo

FLORIDA POWER AND LIGHT COMPANY
St. Lucie Units 1 and 2
PEGISYS 3.0 Computer Code Access and Training

Reference: NATD Letter Number FSE/SS-FPL-7698
FPL P.O. B90912-90187
FPL DWA 179107
Westinghouse GO-JBD10247

Dear Mr. Scarola:

During July 13-14, 1993 site training was provided on the use of the latest version of the Westinghouse PEGISYS Computer Code. Attending the training sessions from Florida Power and Light were Bill Neff and Joe Hege.

Provided at the training sessions were:

1) Control Copy Number 31 of the PEGISYS User's Manual (Revision 3.0).

2) A copy of the logon procedure to access the PEGISYS computer code on the Westinghouse NATD SUN Computer Network using a personal computer (IBM Model 70 or 386/486 windows compatible) and a modem.

3) A copy of the emulation software packages XVision and XRemote by VisionWare to access the PEGISYS computer code emulating a UNIX X-terminal using a PC and modem.

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17 12

4) The PC-Connect terminal emulation software package with the procedure to download completed PEGISYS calculation output and Plot files from the SUN Workstation to a PC using a modem.

The PEGISYS 3.0 computer code has been generated, verified and validated in accordance with the Westinghouse Nuclear and Advanced Technology Division Quality Assurance Program in WCAP-9565. The controlled copies of the PEGISYS User's Manual provide the necessary information needed to perform a PEGISYS calculation and also have been documented in accordance with WCAP-9565.

Any individual assigned a controlled copy of the PEGISYS User's Manual is responsible for maintaining the assigned manual. Following any future revisions of this manual or of the PEGISYS computer code, all the necessary information and page revisions will be issued to the controlled copy holder. Also attached is a copy of the form used to identify a problem with a Fluid Systems computer code. If there is a possible problem in the PEGISYS computer code, the following actions are to be carried out:

a) The user identifying the possible problem must fill out a copy of the attached form titled "Fluid Systems Computer Code Problem Report Form".

b) After completing the form, the user must send one copy of the form to the code cognizant engineer. The completed form should be sent to Roger Waters, Manager, Safeguard Systems, Mail Stop 4-16 East, P. O. Box 355, Pittsburgh, PA, 15230-0355 who will see that the cognizant engineer receives and acts on the problem notification.

c) The code cognizant engineer will evaluate the problem, determine corrective action, supervise any changes to the codes, and document the results.

d) The cognizant engineer will ensure that a code with an incorrect configuration is not used for future work until corrected and that possible problems are properly considered and evaluated. This step will also be documented.

Mr. Jim Scarola
July 28, 1993
Page 3

With the transmittal of this information, FP&L is considered an authorized user of the PEGISYS computer code (Revision 3.0).

Please complete the two Licensing Agreements and return them to my attention. We will sign the agreement and send one original to you for your records.

If there are any questions, please feel free to contact Marvin R. Wengerd at (412) 374-5926.

Sincerely,

J. S. Wyble
Account Manager

JSW:jad
Enclosure

Attachments 1) Fluid Systems Computer Code Problem Report Form
2) Software Agreement

cc: J. L. Hege 1L,1A1
D. C. Hickory 1L,1A1
K. K. Mohindroo 1L,1A1
W. B. Neff 1L,1A1,1A2

*(Remainder of this attachment has not been copied)

Software Validation and Verification Plan (SVVP)

SVVP FOR PIPEFLO®   VERSION/REVISION 4.06

DESCRIPTION OF VERIFICATION METHOD (or N/A)

In accordance with JPN-QI 7.1 (for Limited Scope purchased computer software), a cursory review of the vendor's (Engineered Software, Inc.) documentation package revealed evidence of verification of PIPEFLO, Version 4.06, and that it demonstrated conformance to acceptable standard engineering practices and methods.

DESCRIPTION OF VALIDATION METHOD (or N/A)

The data for the "hvacfin1" (11/09/92, attached to this SVVP) computer model by Engineered Software, Inc. will be re-entered in its entirety, the problem re-run and the results compared to the original "hvacfin1" computer model verification results. The results should compare exactly, and any differences should be reconciled as part of the validation process.

BENCHMARK DATA TO BE USED

The results (i.e. system flowrates, node pressures, fluid velocities, head values) documented in the validation problem ("hvacfin1") are used as the acceptable results.

EXPECTED VALID RESULTS

The results of another validation problem should be compared to the results of the "hvacfin1" problem and should compare exactly. Any differences noted shall be reconciled as part of the validation process.

RECOMMENDED VALIDATION FREQUENCY OR SCHEDULE

Initial validation to be performed whenever; a) the software is initially loaded; b) a revised version of the validated software is loaded; c) a change is made to the hardware which could affect the program operation; d) a change is made to the operating system.

Periodic validation to be performed prior to each use of the software or every three months, whichever is longer.

Preparer: [signature] Date: 8/3/93

Verifier: W. B. Neff* Date: 8/6/93

Approver: W. B. Neff Date: 8/6/93

*Verification performed by immediate supervisor within the requirements of QI 3.2. Supervisor input consisted of general discussion of task.

Inter-Office Correspondence

FPL

JPN-PSLP-96-0112

To: S. A. Valdes
St. Lucie Plant

Date: 4/26/96

From: D. J. Denver
Nuclear Engineering

Department: JPN/JB

Subject: ST. LUCIE PLANT UNIT 1
REA/PROJECT # SLN-85-081-12
TITLE: EDG VOLTAGE, FREQUENCY
SPEED PERMISSIVE SETPOINTS
PC/M/FILE # 120-194

Attached for your review, approval, and use is the MEP for the subject Plant Change Modification. This package provides the details necessary to document settings for the Unit 1 Emergency Diesel Generator VMR, FMR and SPEED SWITCH devices.

This completes our efforts on REA SLN-85-081-12.

If you have any questions, contact Poul Christiansen at 691-2115 or Rick Raldiris at 691-2104.

DJD/PEC

Attachment

Copies to:

T.M. Gerstner - OM/PSL
~~[illegible]/DCC - CS/PSL (w/Repro)~~
S. Kozlin - JDC/JB (w/ orig dwgs)
C.M. Spalter - JPN/JB
R.L. Kulavich - SCE/PSL
K.K. Mohindroo - JPN/PSL

EE13

ATTACHMENT 2
PC/M REVIEW FORM
(Page 1 of 2)

PC/M Number 96120 **Supplement Number** 0 **Expiration Date** 12/31/96

PC/M Title:
EDG Voltage Frequency Speed Permissive Setpoints

PC/M Classification:

_____ Major Modification or ✓ Minor Modification

Safety Classification:

✓ Safety Related _____ Quality Related
_____ Not Nuclear Safety Related _____ Administrative

PC/M Category:

✓ Normal ____ Either/Or ____ As-Requested Package ____ As-Fail ____ Generic

Does the PC/M contain a Safety Evaluation? ☐ Yes or ☒ No

Is this a proposed change or modification to a u... stem or equipment that affects nuclear safety? ☒ Yes or ☐ No

If either of the above questions is YES, FRG approval is required.

FRG Review Required? ☒ Yes or ☐ No

John Harmon Date: 5/3/96
Configuration Management

[signature] for J. Scarola Date: 5/3/96
Plant General Manager

FRG Number: 96-119 FRG Secretary: Lynne Gedraitis for Johanna Clay Date: 5/3/96

FRG Comments:

ATTACHMENT 2
PC/M REVIEW FORM
(Page 2 of 2)

Implementing Documentation:

Department	ER/NPWO #	W/O #
EM	65/2139	96011514
EM	65/2140	96011511

PC/M Review and Approval: [signature] Configuration Management Date 5/4/96

[signature] Beverley Darrow Quality Control Date 5/4/96

Comments:

Areas Affected:	Yes or No	Description
Operator Training	Yes	As per Training Department Requirements
Operating Procedures	Yes	F - Operations
Surveillance Procedures	Yes	
Maintenance Procedures	Yes	EMP 59.01 + EMP 59.02
Spare Parts	NO	
Drawings/Technical Manuals	Yes	Page 6 SRDs? Y / N
FUSAR Change	NO	
TEDB Change	Yes	Attachment 4
Human Factors (CREDIT)	NO	
Environmental Concerns	NO	
In-Service Inspection	NO	
Maintenance Rule	NO	
Plant Restrictions	NO	
Others	NO	

John Harmon
Configuration Management Date 5/3/96

MINOR ENGINEERING PACKAGE (MEP)

PLANT ST. LUCIE UNIT 1 PC/M NUMBER 120-194 SUPPL 0

ORIGINATING DOCUMENT REA-SLN-85-081-12 EXPIRATION DATE 12-31-96

PC/M CLASSIFICATION X SR ___ QR ___ NNS ___ ADMIN

TITLE EDG VOLTAGE, FREQUENCY AND SPEED PERMISSIVE SETPOINTS

ADDITIONAL REQUIREMENTS/INSTRUCTIONS	YES	NO
AS-BUILDING TO COMMENCE UPON ISSUANCE OF PACKAGE?		X
THIS PACKAGE HAS THE POTENTIAL TO SIGNIFICANTLY IMPACT PERSONNEL RADIATION EXPOSURE (See QI 3.13). IF YES, JPN FORM 72 IS REQUIRED.		X

10CFR50.59 SCREENING	YES	NO
1)DOES THE CHANGE REPRESENT A CHANGE TO THE FACILITY AS DESCRIBED IN THE SAR?		X
2)DOES THE CHANGE REPRESENT A CHANGE TO PROCEDURES AS DESCRIBED IN THE SAR?		X
3)IS THE CHANGE ASSOCIATED WITH A TEST OR EXPERIMENT NOT DESCRIBED IN THE SAR?		X
4)COULD THE CHANGE AFFECT NUCLEAR SAFETY IN A WAY NOT PREVIOUSLY EVALUATED IN THE SAR?		X
5)DOES THE CHANGE REQUIRE A CHANGE TO THE TECHNICAL SPECIFICATIONS?		X

NOTE: IF THE ANSWER TO ANY OF THE ABOVE 10CFR50.59 SCREENING QUESTIONS IS YES, THE MEP CANN BE USED

REVIEW/APPROVAL:

GROUP	INTERFACE TYPE			PREPARED	VERIFIED	APPROVED	FPL APPROVED*
	INPUT	REVIEW	N/A				
MECH			X				
ELECT	X			McChristiansen	G.W. Dodd	[signature]	
I&C			X				
CIVIL			X				
NUC**		X				[signature]	
ESI			X				
NUC FUEL			X				

* For Contractor Evals As Determined By Projects

** Review Interface As A Minimum On All Non-Admin MEPs

FPL PROJECTS APPROVAL: [signature] RDGIL DATE: 4/26/96

ENGINEERING JUSTIFICATION

DESCRIPTION

This MEP documents setpoints and tolerances for EDG permissive control functions. Setpoints and tolerances will be provided for the following permissives:

Voltage Monitoring Relay (VMR): Tag Numbers K48/954 and K48/964
Frequency Monitoring Relay (FMR): Tag Numbers K49/954 and K49/964
Speed Switch: Tag Numbers SPEED SW/959 and SPEED SW/969

The PSL-1 EDGs are required to reach full speed and voltage within 10 seconds after receiving a start signal. The VMR and FMR relays are used as permissives in the automatic starting circuits of the EDGs for closure of the EDG output breakers (FSAR Section 8.3.1.1.7.d). The VMR and FMR relays monitor the EDG voltage and frequency, respectively, and allow EDG output breaker closure when these values are greater than or equal to 90% of rated voltage and frequency (FSAR Figure 8.3-5). The speed switches provide permissives for several functions at three different EDG engine speeds, 50, 200 and 870 rpm (8770-10295 and 8770-11438).

In addition to documenting setpoints as described above, this MEP also corrects miscellaneous documentation errors and makes clarifications to existing documentation.

RATIONALE FOR SAFETY CLASSIFICATION

FSAR Section 8.3.1.1.7 states that the EDGs are needed to achieve safe shutdown of the plant or to mitigated the consequences of a loss of coolant accident in the event of a coincident loss of normal AC power supply. Therefore, the subject devices and this MEP are classified as Safety Related.

10CFR50.59 SCREENING JUSTIFICATION

This PC/M will not change safety related relay and switch settings as described in the FSAR and other controlled permanent plant drawings. This PC/M documents the settings on the relay setting drawings (series 8770-A-452) and provides tolerances for the settings. This PC/M is not a change to the facility or procedures as described in the SAR, is not a test or experiment not described in the SAR, nor does it require a Technical Specification change. This PC/M does not involve an unreviewed safety question. Therefore, this PC/M does not fall under the requirements of 10 CFR 50.59, and it can be processed via the MEP format.

DESIGN BASIS AND ANALYSIS

The settings and tolerances for the FMR relays are documented in PC/M 116-192M (Reference 5), which replaced the originally installed Westinghouse relays with Wilmar Electronics model 20-050X. The setting is 55 ± 0.2 Hz. PC/M 116-192M did not incorporate vendor information into the EDG vendor manual (Reference 4). The vendor information is included in Attachment 2 for completeness, and will be incorporated into the manual upon asbuilding.

The VMR relays are GE model 12PJV11A21, contact code 20 (two normally open contacts) according to Reference 7 and TEDB. FSAR Figure 8.3-5 states that the voltage permissive for EDG output breaker closure is greater than or equal to 90% of rated voltage (4160 Volts), which is 3744 Volts. The 4200:120

potential transformer (PT) reduces this value to 107 Volts. Based upon vendor data (Reference 4, pages 843-852) the repeatability of the relay on pick-up is ± 5% of the setpoint. To ensure that the relay pick-up is at least 107 Volts, the setting must be at least 107/0.95 = 112.6 Volts, which incorporates the 5% repeatability error. Allowing a calibration tolerance of 0.4 Volts, the relay setpoint shall be 113.0 ± 0.4 Volts.

The speed switch is a Synchro-Start model ESSB-3AT according to Reference 8 and TEDB. The speed switch settings are factory set and are listed on the side of the speed switch cover. They are 221, 883 and 3843 Hz (increasing) and correspond to speeds of 50, 200 and 870 rpm, respectively. The three speed switch settings in units of rpm are shown on CWDs 8770-B-327, sheets 959 and 969, and schematics 8770-B-326, sheets 959 and 969 (see included drawings).

To verify the correctness of the speed switch settings, the methodology for determining speed in Hz, using a magnetic pickup for the Hz signal, was applied as follows (see Attachment 3):

$$\text{Speed (Hz)} = \frac{\text{(No. of Gear Teeth)} \times \text{(Engine RPM Setpoint)}}{60}$$

The number of flywheel ring gear teeth, according to Reference 4, page 1043 is 265. Based upon the methodology, the settings are correct.

Based upon vendor documentation (Attachment 3) the error associated with the speed switch settings is 0.8% over the voltage range (100 to 140 V dc) and 0.01% per °F, typical. Conservatively assuming a 100 °F temperature range results in 1.0% error. Using the square root of the sum of the squares method, this results in a 1.28% error. Adding a calibration tolerance of 0.72% results in a total tolerance of 2% of the setpoint. The resulting speed switch settings with tolerances, and the corresponding EDG speed ranges expressed in rpm are as follows:

SWITCH	SETTING	EDG SPEED
SW #1	221 ± 4.4 Hz	49 - 51 rpm
SW #2	883 ± 17.7 Hz	196 - 204 rpm
SW #3	3843 ± 76.9 Hz	853 - 888 rpm

Attachment 3 also states that the automatic reset of the switches is between 80% and 90% of the setpoint. The reset feature is not adjustable.

The EDG vendor manual (Reference 4) contains incorrect information regarding the speed switch. Reference 4, pages 747-758 pertain to Dynalco speed switches which were replaced with Synchro-start switches by PC/M 357-178 (Reference 6). The incorrect information will be replaced with pertinent information from Synchro-start (Attachment 3).

DESIGN INTEGRATION REVIEW

The Passport Safety Evaluation Database, was reviewed on April 5, 1996, to ensure that this modification does not invalidate the conclusions of any active safety evaluations. The "PC/M Log" and the "PSL Affected Drawings" CMS Data Bases were reviewed on April 5, 1996, to determine if other outstanding PC/Ms or designs in progress will be affected by this PC/M. PC/M 030-196 (Reference 12), which replaces the relays in the EDG Idle Start/Stop Panel, and PCM 177-195 (Reference 13), which changes the control logic associated with the 200 rpm speed switch contacts may affect this PCM. A statement regarding the PCM's is included in the Special Instructions Section.

OTHER AFFECTED DOCUMENTS

Document	Proposed Changes
1-EMP-59.01 and 1-EMP-59.01	Incorporate settings into procedures.

SPECIAL INSTRUCTIONS\IMPLEMENTATION REQUIREMENTS

1. Inspect wiring on VMRs, FMRs and Speed Switches to ensure that the wiring is in accordance with controlled drawings. Re-label wire between speed switch (SS) and relay RF from wire number "1060" to "1008A" in the 1A and 1B Idle Start-Stop panels. (See PC/M drawings JPN-120-194-010 and -012.)

2. Calibrate the VMRs (K48/954 and K48/964) in accordance with vendor manual (Reference 4, pages 843 - 852) and PC/M drawings JPN-120-194-001 and JPN-120-194-003.

3. Calibrate the FMRs (K49/954 and K49/964) in accordance with Attachment 2 and PC/M drawings JPN-120-194-001 and JPN-120-194-003.

4. Calibrate the speed switches (SPEED SW/959 and SPEED SW/969) in accordance with Attachment 3 and PC/M drawings JPN-120-194-002 and JPN-120-194-004.

5. Calibrate Tachometers on the EDG Idle Start/Stop Panels (see PC/M drawings JPN-120-194-005 and JPN-120-194-006) in accordance with Attachment 3.

6. Coordinate implementation of this PC[illegible] with PCM 030-196 (Reference 12), which replaces the relays in the ED[illegible] Start/Stop Panel, and PCM 177-195 (Reference 13), which changes the control logic associated with the 200 rpm speed switch contacts may affect this PCM. The drawing corrections and wire number changes shown on PCM drawings JPN-120-194-005 through -012 affect some of the same devices that are affected by PCM 030-196 and 177-195.

POST MODIFICATION TESTING

1. Perform functional testing of affected circuits by starting the EDG (preferably during surveillance testing or other scheduled testing to limit unnecessary starting) and verifying that the permissives allowing EDG output breaker closure (K48 and K50) actuate in less than 10 seconds of receiving a start signal (see 8770-B-327, sheets 953 and 963) The 10 second start criteria is a requirement of Technical Specifications 4.8.1.1.2.e.3.b and 4.8.1.1.2.e.5.b.

AS-BUILDING NOTES

1. The EDG vendor manual (Reference 4) contains incorrect information regarding the Synchro-start speed switches. Reference 4, pages 747-758 pertain to Dynalco speed switches which were replaced with Synchro-start switches by PCM 357-178 (Reference 6). Replace the incorrect information with information from Synchro-start (Attachment 3).

2. Incorporate Attachment 2 (Wilmar frequency relays) into Reference 4.

REFERENCES

1. St. Lucie Unit 1 FSAR, Amendment 14.
2. 1-EMP-59.01, Revision 9, "1A Emergency Diesel Electrical Periodic Maintenance and inspection."
3. 1-EMP-59.02, Revision 9, "1B Emergency Diesel Electrical Periodic Maintenance and inspection."
4. I/M 8770-6703, Revision 10, "Emergency Diesel Generator System."
5. PC/M 116-192M, Revision 0, "1A and 1B EDG Automatic Starting circuit Frequency Relay Replacement."
6. PC/M 357-178, Supplement 1, "Diesel Generator Idle Start Modifications."
7. 8770-2421, Revision 19, "Diesel Generator Material List."
8. 8770-10292, Revision 2, "Diesel Generator Idle Start/Stop Panel Physical Arrangement."
9. 8770-B-327, Sheet 953, Revision 18, "CWD Diesel Generator 1A Breaker."
10. 8770-B-327, Sheet 963, Revision 20, "CWD Diesel Generator 1B Breaker."
11. PSL Unit 1 Technical Specifications, Amendment 141.
12. PCM 030-196, Revision 0, "EDG Relay and Mounting Socket Replacement."
13. PCM 177-195, Revision 0, "DG 1A & 1B Protective Trips Design Change."

ATTACHMENTS

Attach Number	Description/Title	Number of Pages
1	ALARA Checklist	1
2	Wilmar Frequency Sensitive Relay	2
3	Synchro-Start Speed Switch	6
4	TEDB Change Package	6

AFFECTED DRAWINGS

JPN DWG #	SHEET	REV	DESCRIPTION/TITLE	DS	AFFECTED DWG	SHEET	REV	PR	PK RV
EP ATTACHMENT 4		0	TOTAL EQUIPMENT DATABASE		TEDB			1	00
JPN-120-194-001		0	DNR PC/M 120-194 RELAY SETTING	E	8770-A-452	102B	NEW	2	00
JPN-120-194-002		0	DNR PC/M 120-194 RELAY SETTING	E	8770-A-452	103	NEW	2	00
JPN-120-194-003		0	DNR PC/M 120-194 RELAY SETTING	E	8770-A-452	106B	NEW	2	00
JPN-120-194-004		0	DNR PC/M 120-194 RELAY SETTING	E	8770-A-452	107	NEW	2	00
JPN-120-194-005		0	CONTROL WIRING DIAGRAM DIESEL	I	8770-B-327	959	14	1	00
JPN-120-194-006		0	CONTROL WIRING DIAGRAM DIESEL-	I	8770-B-327	969	13	1	00
JPN-120-194-007		0	SCHEMATIC DIAGRAM DIESEL-GENER	I	8770-B-326	959	12	1	00
JPN-120-194-008		0	SCHEMATIC DIAGRAM DIESEL-GENER	I	8770-B-326	969	12	1	00
JPN-120-194-009		0	D.G.1A IDLE START/STOP PNL SCH		8770-10295		2	2	00
JPN-120-194-010		0	D.G.1A IDLE START-STOP PNL-LEF		8770-10298		1	2	00
JPN-120-194-011		0	DIESEL GEN.1B IDLE START-STOP		8770-11438		0	2	00
JPN-120-194-012		0	D.G.1B IDLE START-STOP PNL.LEF		8770-11440		0	2	00

TOTAL AFFECTED DRAWINGS REPORTED --------- 13

AFFECTED VENDOR MANUALS

PLANT DOC NO	SHEET	REV	VENDOR/EQUIP	DISC	REMARKS	PKG REV
8770-6703		~~1~~ 10	EMERGENCY DIESEL GENERATOR SYSTEM - GENERAL DES-	E	SEE ASBUILDING NOTES	00

TOTAL AFFECTED VENDOR MANUALS REPORTED --------- 1

PC/M 120-194

REV. 0

ATTACHMENT 1

ALARA SCREENING

1. Is this PC/M Administrative only, i.e., no plant hardware is changed.

   _X__ yes, Further ALARA screening is not required.

   ____ no, Continue screening.

2. Does this PC/M involve a location in the Radiation Controlled Area (RCA)?

   __X__ yes, Location: Diesel Generator Bldg Continue screening.

   _____ no, Further ALARA screening is not required.

3. Does the implementation of this PC/M involve any of the following? (Cross out all "no" responses)

   a. Movement of radioactive material.

   b. Potential for personnel exposure to a radiation field of $\geq$ 1r/hour as a result of implementation, operation or maintenance (assuming current area dose rates).

   c. A total lifetime estimated dose due to the modification (installation, operation, maintenance, removal) greater than or equal to one (1) man rem.

   d. Diving operations associated with systems containing radioactive material.

   e. Entrance into containment during power operation for maintenance, surveillance, etc.

   f. Movement of, or modifications to, existing permanent radiation shielding.

   g. Modification of systems containing radioactive fluids or resins such that system integrity is affected.

   For items (a) thru (g):

   ____ yes, This PC/M has the potential to significantly impact personnel radiation exposure. Complete Form 72 to ensure total radiation dose is minimized by design.

   __X_ no, This PC/M has little or no impact on personnel radiation exposure. Form 72 not required, however, normal ALARA precepts should be followed to minimize radiation exposure.

______________________ Prepared by

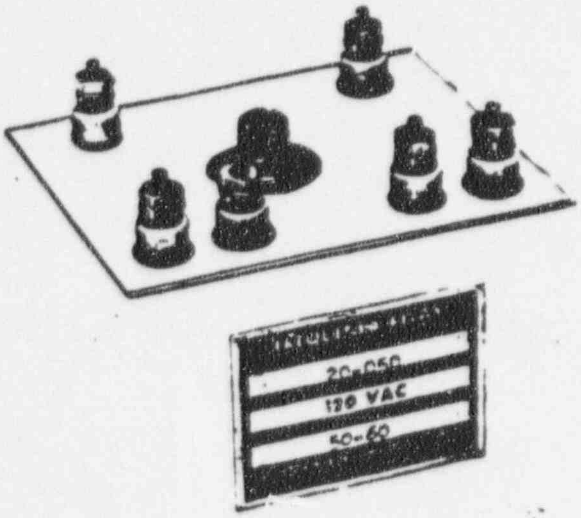
______________________ Reviewed by

Note: If the preparer and reviewer are the same as for the PC/M, duplicate signatures are not required.

FREQUENCY SENSITIVE RELAYS

BULLETIN 20-000

PCM-120-194
ATTACHMENT 2
REV. 0
PAGE 1 OF 2



MODEL	ADJUSTABLE FREQUENCY TRIP RANGE
20-040	40-50 HZ.
20-050	50-60 HZ.
20-060	60-70 HZ.
20-350	350-400 HZ.
20-400	400-450 HZ.

SPECIFICATIONS

LINE VOLTAGE:............ 120VAC ±20%.

NOMINAL FREQUENCY:... 50, 60 and 400HZ.

PICK-UP ADJUST:.......... The frequency trip point is screwdriver adjustable. The adjustment range for the various models is shown in the table above.

TEMPERATURE RANGE:.... -55°C to +85°C.

DIFFERENTIAL:............. The frequency pick-up to drop-out differential is 1% maximum.

TEMPERATURE DRIFT:..... ±1% maximum frequency error over temperature range.

VOLTAGE DRIFT: .... ±1% maximum frequency error for input voltage of 120VAC ±10%.

OUTPUT CONTACTS:...... One set N.O., one set N.C.

CONTACT RATINGS:...... 5Amp. resistive at 28VDC or 120VAC.

CONSTRUCTION:........... Solid state sensor with relay output in a sealed steel can.

OPERATION:................. The normally open contacts close, and the normally closed contacts open, at frequencies above the set point.

WILMAR

WE ELECTRONICS, INC. Phone (213) 326-6668

Revised December 1975

2430 AMSLER STREET TORRANCE, CALIFORNIA 90505

PCM-120-194
ATTACHMENT 2
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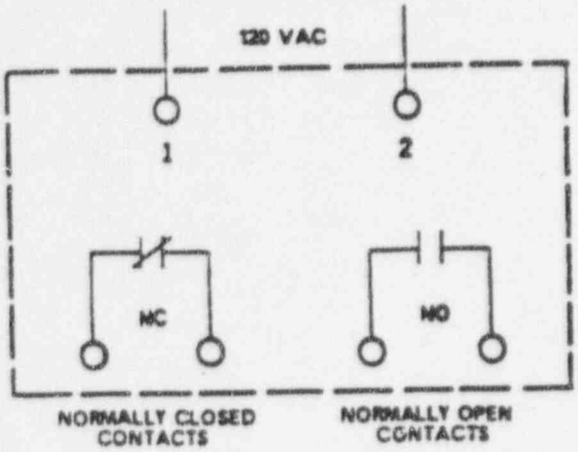
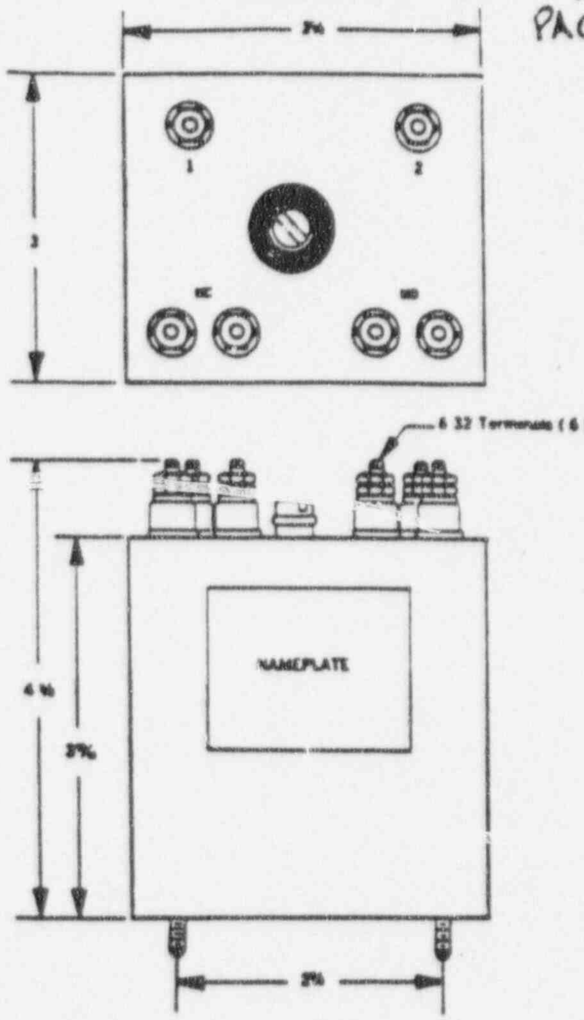
PAGE 2 OF 2

CONNECTIONS



DIMENSIONS



NOTES:

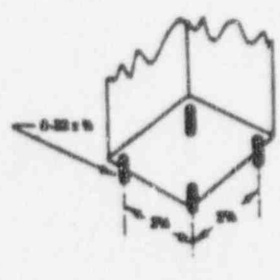
1. Contacts are shown in the de-energized position.
   (Below the trip set point)

2. Remove screw for access to pick-up adjust.

MOUNTING CONFIGURATIONS

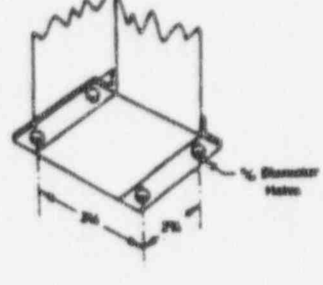
MODELS

20-040
20-050
20-060
20-350
20-400



MODELS

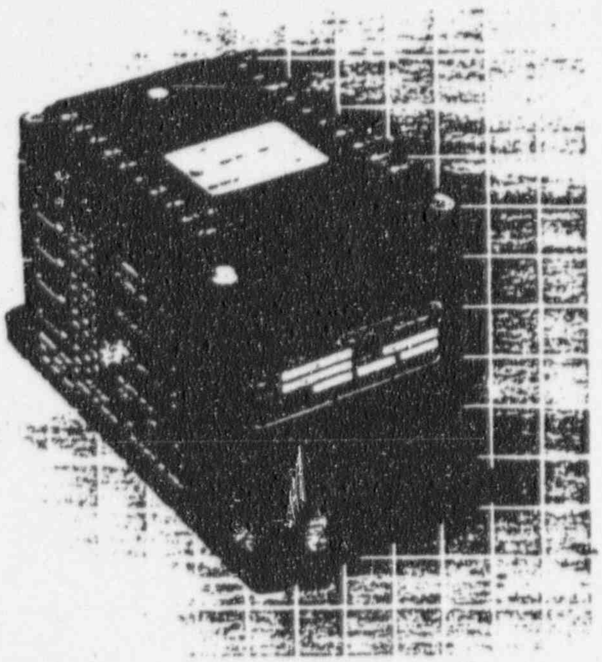
20-040X
20-050X
20-060X
20-350X
20-400X



OTHER WILMAR PRODUCTS

- VOLTAGE SENSITIVE RELAYS
- CURRENT SENSITIVE RELAYS
- PHASE SEQUENCE RELAYS
- PHASE FAILURE RELAYS
- PARALLELING RELAYS
- REVERSE POWER RELAYS
- VOLTAGE REGULATORS
- RELAY TEST SETS

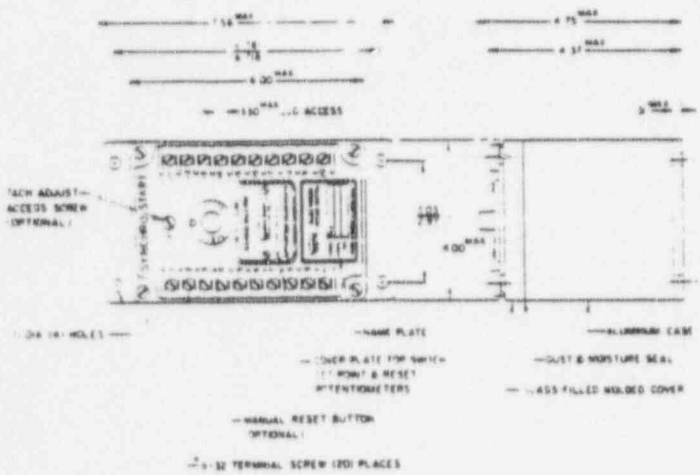
ESSB



FEATURES/OPTIONS

PCM 120-194
ATT 3
REV 0
PAGE 1 OF 6

- Adjustable Switch Points
- Sealed NEMA 4 Enclosure
- Transient and Reverse Polarity Protection
- Precise Repetitive Speed Switch Points
- Automatic, Manual or Remote Manual Reset
- Power Loss Protection
- D.C. Output for Model 30 Tach (1 ma)
- 8-40 VDC; 64 VDC; 100-140 VDC; or 100-130 VAC Power
- Broken Signal Lead Protection
- Standard or Reverse Relay Logic
- Lockwire Seal
- Vibration [illegible]ation Kit
- Conduit Cover



The model ESSB Electronic Speed Switch has many years of proven service. It is engineered to provide a wide variety of features and options including up to four switch points, adjustable reset, a selection of voltage inputs and DC current for tachometers.

The ESSB Speed Switch is molded in a rugged NEMA 4 enclosure which provides protection against the rough environmental conditions associated with diesel engines.

SPECIFICATIONS

ELECTRICAL

- **Power Input**
  8-40 VDC
  64 VDC
  100-140 VDC
  100-130VAC
- **Reverse Polarity Protection**
  1000 VDC
- **Maximum Current**

(2 ch. 8-40 VDC)	12 Volt	24 Volt
Operating	200 ma	220 ma
Standby	50 ma	60 ma

- **Signal Input**
  Minimum— 0.7 VRMS
  Impedance—2K OHMS
- **Relay Contact Ratings**
  Resistance Load—0.1 to 10 amps 28 VDC
  Inductive Load— 0.1 to 8 amps 28 VDC
- **Overspeed Response Time**
  100 Milliseconds Typical
- **Setpoint Reset**
  Automatic— 80% to 90% of Setpoint
  Adjustable—(Variable Automatic)
  50% to 98% of Setpoint
- **Setpoint Stability**
  0.8% over voltage range and 0.01% per °F Typical

MECHANICAL/ENVIRONMENTAL

- **Operating Temperature**
  −40°C to +85°C (−40°F to +185°F)
- **Vibration**
  4g's 9 to 200 Hz
- **Shock**
  4 Foot Drop Test
- **Case**
  NEMA 4 High Impact Molded Enclosure
- **Weight**
  4.5 lb. (2 kg.)

Understanding the Electronic Speed Switch

What is a Speed Switch?
- Electronic device
- Senses rotational motion and speed
- Can be set to switch a load or control device

How does it work?
- Obtains signal from sensor device (mag pickup, Mini-Gen Signal Generator, alternator or ignition coil) in the form of a frequency.
- Frequency is monitored electronically within the switch.
- When the speed or frequency reaches the desired setting or setpoint, the output relay tied into the control circuit is triggered or switched.

PCM 120-19A
ATT 3
REV 0
PAGE 2 OF 6

Selecting a Speed Switch

In selecting the best speed switch for controlling a particular application, the following factors should be considered:

- **Number of Switch Points**
  Most applications require only 1 or 2 switch points (channels). However, several Synchro-Start Switches offer up to 3 or 4 switch points.
- **Frequency Range of Application, Setpoints and Signal Source**
  The frequency range of the application and setpoints are dependent upon the selection of the signal source, which in turn depends upon the operating speed and physical mounting limitations.

The variety of signal sources which may be used with most SSPI Switches include:

- **Magnetic Pickup**—Commonly used for higher speed applications. The output is a function of the "gap" between the pickup and the gear tooth and the peripheral velocity of the gear.
  For a Magnetic Pickup Signal Source:

$$\text{Setpoint Frequency in Hertz} = \frac{\text{No. of Gear Teeth} \times \text{Engine RPM Setpoint}}{60}$$

- **Mini-Gen Signal Generator**—Designed to provide outstanding signal output at speeds as low as 20 RPM. For a Mini-Gen Signal Generator Signal Source:

$$\text{Setpoint Frequency in Hertz} = \frac{\text{Mini-Gen RPM at Engine RPM Setpoint}}{2}$$

- **Alternator Output**—Used in applications unable to accommodate a magnetic pickup or Mini-Gen Signal Generator.
  For Alternator Signal Source:

$$\text{Setpoint Frequency in Hertz} = \frac{\text{Pulley Ratio} \times \text{No. of Alternator Poles} \times \text{Engine RPM Setpoint}}{120}$$

- **Ignition Output**—Commonly used as a source for gasoline and natural gas type engines.
  For Ignition Signal Source:

$$\text{Setpoint Frequency in Hertz} = \frac{\text{No. of Cylinders} \times \text{Engine RPM Setpoint}}{120}$$

Selecting a Speed Switch (cont.)

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Each signal source produces a different Hertz setpoint frequency for identical engine RPM setpoints.

Example: Required crank disconnect 300 RPM and overspeed of 2500 RPM. This 8 cylinder gas engine has an 80 tooth flywheel and 8 pole alternator with a 2:1 pulley ratio.

Signal Source	Crank Disconnect 300 RPM	Overspeed 2500 RPM
Mag Pickup	$\frac{80 \times 300}{60} = 400Hz$	$\frac{80 \times 2500}{60} = 3333Hz$
Mini-Gen	$\frac{300}{2} = 150Hz$	$\frac{2500}{2} = 1250Hz$
Alternator	$\frac{2 \times 8 \times 300}{120} = 40Hz$	$\frac{2 \times 8 \times 2500}{120} = 333Hz$
Ignition	$\frac{8 \times 300}{120} = 20Hz$	$\frac{8 \times 2500}{120} = 166Hz$

Reset Requirements

There are four reset options available for resetting the speed switch:

Automatic Reset—With automatic reset option, the switch will automatically reset if the frequency of the input signal is lowered to 80% to 90% of the setpoint.

EXAMPLE: The setpoint is set to 1000 Hertz. With a 1000 Hertz signal applied, the relay will energize. The unit will automatically reset (relay degenerize) if the input frequency is lowered to 800 Hertz. (The unit may reset anywhere between 800 and 900 Hertz for the automatic reset if specified.)

Electrical Latch—With the electrical latch option, the relay will energize (after the setpoint has been reached) and remain energized even if the input signal frequency has been lowered to 0 Hertz. The only way to reset the unit is to remove power.

Manual Reset—With the manual reset option, the switch is supplied with a reset button. By depressing this button, the unit will be reset.

Adjustable Reset—With the adjustable (automatic) reset option, the switch will automatically reset at the frequency determined by the setting of the supplied reset pot. By adjusting the pot, the reset can be selected anywhere between 25% and 95% of the setpoint on the majority of models.

Relay Operation

Standard Relay Logic—With power applied and a signal below the setpoint, the relay will remain de-energized until the setpoint is reached. At setpoint, the relay will be energized and remain energized until reset by one of the above methods.

Reverse Relay Logic—With power applied and a signal below the setpoint, the relay will be energized and remain energized until the setpoint is reached. At setpoint or interruption of power, the relay will de-energize and remain de-energized until reset by one of the above methods or power is reapplied. Reverse relay logic is commonly used as part of a fail safe system to assure power is applied to the relay during operation.

Both relay operations are shown in the diagram below:

TYPICAL RELAY OPERATION

Condition	Standard Relay Logic	Reverse Relay Logic
Power Off	NO C NC	NO C NC
Power On	NO C NC	NO C NC
At Setpoint	NO C NC	NO C NC
At Reset	NO C NC	NO C NC
Loss of Power to Switch	NO C NC	NO C NC

Power Requirements

Identify the power source variations. Determine the maximum and minimum voltage as well as transients of the power source.

Determine the voltage and current switching requirements of the external control circuit. Consider the inductive or resistive nature of the load. If load currents in excess of 10 amps are expected, interface relays should be used.

Environmental Conditions

Identify the environmental conditions. Determine the maximum and minimum ambient temperatures. Also consider vibration and shock.

Standard Features & Options

Verify or Test Circuit—Standard on many models which enables the testing of the complete system while the engine is operating at a safe speed. When used, the switch will trip at approximately 67% of the setpoint.

Signal Loss—If protection from possible loss of signal is desired, the ESSB offers optional broken signal lead protection by continuously monitoring for an open or high resistance in the signal source circuit.

Power Loss—If protection from "loss of power" to the electronic unit is desired, specify the reverse relay logic option.

Terminal Protection—Conduit covers and terminal protectors are available to eliminate exposed connections and danger from high voltage on select models.

INSTALLATION & ADJUSTMENT INSTRUCTIONS

MODEL ESSB ELECTRONIC SPEED SWITCH

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1. MOUNTING INSTRUCTIONS:

Mounting dimensions are shown on drawing #4562. The unit may be mounted in either a horizontal or vertical position. Install 4 each 1/4" bolts in the .31" diameter mounting holes.

2. ELECTRICAL CONNECTIONS INSTRUCTIONS:

a. General: STUDY the terminal locations and terminal layout markings on the unit. #18AWG, or larger diameter, stranded copper wire must be used for ALL interconnecting wiring.

b. POWER INPUT terminals 19 and 20 are to connected to the power supply. The required power supply voltage and polarity (if D.C.), is marked on the side of the unit. The power supply may be grounded if desired.

c. HZ SIGNAL INPUT terminals 11 and 12 are to be connected to the Hertz signal source. Ungrounded twisted pair cable is recommended. If it is impractical to route the interconnecting wiring away from high current sources and carriers, shielded twisted pair cable should be used. Connect the shield to terminal 14 only. Cable must have an insulating jacket over the shield to prevent grounding of the shield at any other point.

d. SWITCH OUTPUT terminals are to be connected to the electrical devices being controlled using wire sized to carry the required current. Switch output contacts are isolated and rated 10 amperes resistive load (approximately 5 amperes inductive) at either 115V A.C., or 28V D.C. Consult factory for contact ratings at other voltages.

e. REMOTE RESET (Local) (Optional) terminals 17 and 18 are to be connected to the customer furnished momentary contact push button only when this option is supplied. The push button contacts must be normally closed or normally open as indicated by the markings on the side of the unit. These markings also indicate the applicable switch output number. number.

f. MANUAL RESET (Local) (Optional) push button is provided in the unit cover only when this option is supplied. The unit markings indicate the applicable switch output number. STD relay logic requires a jumper across terminals 17 and 18. REV relay logic does not require the jumper. If REMOTE RESET is desired in addition to cover mounted MANUAL RESET, wire as follows: Remove jumper from terminals 17 and 18 on STD logic units and wire to the remote normally closed momentary push button; on REV logic units wire terminals 17 and 18 to the remote normally open momentary push button. Switch relay (STD or REV) is marked on side of unit.

g. REVERSE RELAY LOGIC WITH MANUAL RESET (Local) (Optional) after power up, the manual reset button must be pushed to energize relay for correct operation. On units with reverse relay logic, the relays are energized below set point while with standard relay logic, the relays are energized above set point.

/continued

h. TACH. OUTPUT (Optional) terminals are to be connected to an electronic tachometer only when this option is supplied. Nominal meter rating at full scale must be between 500 micro-amperes and 1 milliampere. For a meter have a nominal rating of 500 micro-amperes, the meter resistance must not exceed 750 ohms. For a meter having a nominal rating of 1 milliampere, the meter resistance must not exceed 400 ohms. Connect terminal 13 to the positive (+) meter terminal, and terminal 14 to the negative (-) meter terminal.

3. ADJUSTMENT INSTRUCTIONS:

a. General Adjustment Instructions: Field adjustments are not recommended unless ACCURATE instrumentation is used. Should authorized adjustments be required, remove the metal plate by unscrewing the 2 #4-40 screws. Before attempting to make any adjustment, carefully study the potentiometer locations on the unit to locate the CORRECT potentiometer. Remove the #8-32 screw over the CORRECT potentiometer which are 20 turn units. If a 'click' is heard and no adjustment affect is observed, rotate the potentiometer the opposite way. Potentiometer adjustments should be done slowly.

After completion of adjustments, replace seal screws and metal plates.

b. SET HZ ADJUSTMENT: The side of the unit is marked to indicate the applicable potentiometer identification letter and factory SET HZ for each switch number. Clockwise rotation of the potentiometer raises the set point Hertz: the reset Hertz will also be raised.

c. RESET HZ ADJUSTMENT: (Optional) If this option is supplied, the side of the unit is marked to indicate the applicable potentiometer identification letter and the factory RESET HZ for each switch number. Clockwise rotation of the potentiometer lowers the reset point Hertz (increases differential); the set point Hertz will also be lowered to a small degree. Cycle through both the set point and reset point several times to verify that settings are correct.

d. ELECTRONIC TACHOMETER CALIBRATION: (Optional) The TACH OUTPUT potentiometer is included when the TACH Output circuit is supplied. To obtain access to this potentiometer, remove the #8-32 seal screw over hole 'J'. The potentiometer should be adjusted so that tachometer indicates the correct speed when the proper Hertz signal is applied to terminals 11 and 12. Adjustment is usually made at the speed requiring the most accurate meter reading. Clockwise rotation of the potentiometer increases the speed indicated by the meter.

4. HERTZ SIGNAL SOURCE

The Hertz signal source must have a minimum output of 1.4 volts Peak-to-Peak for suitable operation above 100 Hertz. The signal must be a minimum of 3 volts Peak-to-Peak if either the set point or reset point is in the 60 to 100 Hertz range. The approximate input impedance is 4.5K ohms at 1 KHZ and 3K ohms at 3 KHZ. Suggested signal source are: a) Synchro-Start Signal Generator or, b) Magnetic Pickup of suitable output.

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ADJUSTABLE RANGES FOR

MODEL ESSB ELECTRONIC SPEED SWITCH

RANGE NO. 1	70 HZ to 240 HZ
RANGE NO. 2	230 HZ to 825 HZ
RANGE NO. 3	625 HZ to 2125 HZ
RANGE NO. 4	1300 HZ to 4650 HZ
RANGE NO. 5	2350 HZ to 8400 HZ

SIGNAL GENERATOR USED for HERTZ SIGNAL

"MINI-GEN" SIGNAL GENERATOR OUTPUT HERTZ = 1/2 "MINI-GEN" RPM

The following chart indicates the applicable Hertz settings to provide fifteen percent overspeed protection:

RATIO OF TACH. TAKEOFF: ENGINE	RATED SPEED OF ENGINE				
	900 RPM	1000 RPM	1200 RPM	1500 RPM	1800 RPM
.5: 1	258 HZ	287 HZ	345 HZ	431 HZ	517 HZ
1: 1	517 HZ	575 HZ	690 HZ	862 HZ	1035 HZ
2: 1	1035 HZ	1150 HZ	1380 HZ	1725 HZ	2070 HZ

The following chart indicates the applicable Hertz settings for cranking motor (starter) disconnect:

RATIO OF TACH. TAKEOFF: ENGINE	STARTER DISCONNECT SPEED		
	500 RPM	600 RPM	700 RPM
.5: 1	125 HZ	150 HZ	175 HZ
1: 1	250 HZ	300 HZ	350 HZ
2: 1	500 HZ	600 HZ	700 HZ

MAGNETIC PICKUP used for HERTZ SIGNAL

If a magnetic pickup is used to monitor the flywheel ring gear teeth, use the following formula to determine the applicable Hertz setting:

$$\text{HERTZ} = \frac{\text{No. of Gear Teeth} \times \text{Engine RPM Setpoint}}{60}$$

BATTERY CHARGING ALTERNATOR used for HERTZ SOURCE

Usually two wires can be connected to a battery charging alternator system to obtain single phase A.C. or half wave rectified single phase.

Use the following formula to determine the applicable Hertz setting. "P" designates the number of alternator Poles (Example: 14) "P.R." designates the Pulley Ratio (Example: 2.4).

$$\text{HERTZ} = \frac{\text{PULLEY RATIO} \times \text{NO. OF ALTERNATOR POLES} \times \text{ENGINE RPM SETPOINT}}{120}$$

Engine Management Systems & Controls

SYNCHRO-START PRODUCTS, INC.
6250 West Howard Street, Niles, IL 60714-3433
Telephone: 708/967-7730 Fax: 708/967-7832

Facility PSL Unit 1
PC/M or DCR No. 120-194
Attachment No. 4
Revision No. 0
Page 1 of 7

TOTAL EQUIPMENT DATA BASE CHANGE PACKAGE COVER SHEET

Description of Change:

UPDATED REFERENCES FOR AFFECTED COMPONENTS.

Basis for Change:

ADDED RELAY SETTING DRAWINGS.

References:

Engineering

Prepared by PEChristensen Date 11/8/94

Verified by A. R. Dodd Date 11/8/94

Approved by [signature] Date 4/26/96
(Discipline Supv/Lead Engineer)

Configuration Management

Reviewed by: ____________ Date: ________

Data Entry by: ____________ Date: ________

Data Entry Verified by: ____________ Date: ________

For instructions, see QI 2.8-1

Facility: PSL Unit: 01 LMD: _ Component: K49/954 Associate: ________________ Date Printed: 11/07/94	PCM 120-194 Att: 4 Rev: 0 Page 2 of 7

TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: ___ Eng Ref: ______________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: RL Sub Type: ___ Safety Channel: ___ Pcm: 116-292

Name: FREQUENCY RELAY FOR DIESEL GENERATOR 1A RELAYING & METERING

Locn Code: DGB/DG 1A CNTL PNL Startup System: 053

Locn Desc: ______________________________

Instl MFG #: WILM WILMAR ELECTRONICS INC. Engineering Verified: Y

Instl Model: 20-050X Rev: 000 Orig Po: NY-422253

Comp Group: ________________ NPRDS: N Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: _______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _

Drawing:	Sheet:
8770-2421	
8770-B-327	954
8770-G-388	
8770-2417	
8770-2419	
8770-A-452	102B

Tech Manuals:
8770-6703

Procedures:
1-2200062
1-EMP-59.01

Notes:
PCM/DCR HISTORY: DCR-SLE-92-253 PCM 120-194
M&S #652-05540-9

Approved Alternate

Mfg:	Description:	Model:	Rev.	Instl.	Eng Ver.
WES	WESTINGHOUSE ELECT.	N/F	000	_	Y
WES	WESTINGHOUSE ELECT.	117C717G03	000	_	Y

delete

Parameter
Name: Value: UOM:

Facility: PSL Unit: 01 LMD: _
Component: K49/964
Associate: ________________

Date Printed: 11/07/94

PCM 120-194

Att: 4
Rev: 0
Page 3 of 7

TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: ___ Eng Ref: ______________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: RL Sub Type: ___ Safety Channel: ___ Pcm: 116-292

Name: FREQUENCY RELAY FOR DIESEL GENERATOR 1B RELAYING & METERING

Locn Code: DGB/DG 1B CNTL PNL Startup System: 053

Locn Desc: ____

Instl MFG #: WILM WILMAR ELECTRONICS INC. Engineering Verified: Y

Instl Model: 20-050X Rev: 000 Orig Po: NY-422253

Comp Group: ________________ NPRDS: N Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: _______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _

Drawing:	Sheet:
8770-2421	
8770-B-327	964
8770-G-388	
8770-2417	
8770-2419	
8770-A-452	106B

Tech Manuals:
8770-6703

Procedures:
~~1-2200063~~
1-EMP-59.02

Notes:
PCM/DCR HISTORY: DCR-SLE-92-253 PCM 120-194
M&S #652-05540-9

Approved Alternate

Mfg:	Description:	Model:	Rev.	Instl.	Eng Ver.
WES	WESTINGHOUSE ELECT.	N/F	000	_	Y
WES	WESTINGHOUSE ELECT.	117C717G03	000	_	Y

delete

Parameter
Name: Value: UOM:

Facility: PSL Unit: 01 LMD: _ Component: K48/964 Associate: ________________ Date Printed: 11/07/94	PCM 120-194 Att: 4 Rev: 0 Page 1 of 7

TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: ___ Eng Ref: ____________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: AN Sub Type: ___ Safety Channel: ___ Pcm: ______

Name: VOLTAGE RELAY FOR DIESEL GENERATOR 1B RELAYING & METERING

Locn Code: DGB/DG 1B CNTL PNL Startup System: 053

Locn Desc: ________________________________

Instl MFG #: GEN GENERAL ELECTRIC CO. Engineering Verified: Y

Instl Model: 12PJV11A21 Rev: 000 Orig Po: NY-422253

Comp Group: ______________ NPRDS: N Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: ______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _

Drawing:	Sheet:
8770-2421	______
8770-B-327	964
8770-G-388	______
8770-2417	______
8770-2419	______
8770-A-452	106B

Tech Manuals:
8770-6703

Procedures:
1-EMP-59.02

Notes:
PCM/DCR HISTORY: DCR-SLE-92-253 PCM 120-194

Approved Alternate

Mfg:	Description:	Model:	Rev.	Instl.	Eng Ver.
GEN	GENERAL ELECTRIC CO.	N/F	000	_	Y
GEN	GENERAL ELECTRIC CO.	12PJV11A1	000	E	Y

Parameter
Name: Value: UOM:

Facility: PSL Unit: 01 LMD: _ Component: K48/954 Associate: ________________ Date Printed: 11/07/94

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TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: ___ Eng Ref: ______________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: AN Sub Type: ___ Safety Channel: ___ Pcm: ______

Name: VOLTAGE RELAY FOR DIESEL GENERATOR 1A RELAYING & METERING

Locn Code: DGB/DG 1A CNTL PNL Startup System: 053

Locn Desc: ____

Instl MFG #: GEN GENERAL ELECTRIC CO. Engineering Verified: Y

Instl Model: 12PJV11A21 Rev: 000 Orig Po: NY-422253

Comp Group: ________________ NPRDS: N Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: _______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _

Drawing:	Sheet:
8770-2421	______
8770-B-327	954
8770-G-388	______
8770-2417	______
~~8770-2419~~	
8770-A-452	102B

Tech Manuals:
8770-6703

Procedures:
1-EMP-59.01

Notes:
PCM 120-194

Approved Alternate

Mfg:	Description:	Model:	Rev.	Instl.	Eng Ver.
GEN	GENERAL ELECTRIC CO.	N/F	000	_	Y
GEN	GENERAL ELECTRIC CO.	12PJV11A1	000	E	Y

Parameter
Name: Value: UOM:

Facility: PSL Unit: 01 LMD: _
Component: SPEED SW/969
Associate: ____________

Date Printed: 11/07/94

PCM 120-194

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Rev: 0
Page 6 of 7

TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: ___ Eng Ref: ____________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: CK Sub Type: ___ Safety Channel: ___ Pcm: ______

Name: SPEED SWITCH FOR DIESEL GENERATOR 1B START

Locn Code: DGB/DG 1B IDLE PNL Startup System: 053

Locn Desc: ____________

Instl MFG #: SYN SYNCHRO-START PROD, INC Engineering Verified: Y

Instl Model: ESSB-3AT Rev: 000 Orig Po: 59169-59746B

Comp Group: ____________ NPRDS: Y Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: ______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _ _

Drawing:	Sheet:
8770-B-327	969
8770-10292	
8770-11438	
8770-11440	
8770-11441	
8770-11579	
8770-A-452	103

Tech Manuals:
8770-6703

Procedures:
1-EMP-59.02

Notes:
PCM/DCR HISTORY: DCR-SLE-92-253
PCM 120-194

Approved Alternate
Mfg: Description: Model: Rev. Instl. Eng Ver.

Parameter Name:	Value:	UOM:
VENDOR COMPARTMENT		N/A
BREAKER RATING		AMPS
BREAKER FRAME		N/A
BREAKER COIL		N/A
BREAKER SENSOR TAP		N/A
BREAKER TRIP		AMPS
BREAKER TYPE		N/A
I.T. PHASE		AMPS
S.T.T. PHASE		AMPS
L.T.T. PHASE		AMPS
L.T.A. PHASE		AMPS
STARTER TYPE		N/A
STARTER SIZE		N/A
STARTER WIRING FIG.		N/A
REMOTE STARTER TYPE		N/A
REMOTE STARTER SIZE		N/A
CABLE SIZE		N/A

Facility: PSL Unit: 01 LMD: _ Component: SPEED SW/959 Associate: ____________ Date Printed: 11/07/94	PCM 120-194 Att: 4 Rev: 0 Page 7 of 7

TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: ___ Eng Ref: ____________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: CK Sub Type: ___ Safety Channel: ___ Pcm: ______

Name: SPEED SWITCH FOR DIESEL GENERATOR 1A START

Locn Code: DGB/DG 1A IDLE PNL Startup System: 053

Locn Desc: ______________________________

Instl MFG #: SYN SYNCHRO-START PROD, INC Engineering Verified: Y

Instl Model: ESSB-3AT Rev: 000 Orig Po: 59169-59746B

Comp Group: ____________ NPRDS: Y Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: ______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _

Drawing:	Sheet:
8770-B-327	959
8770-10292	______
8770-10295	______
8770-10297	______
8770-10298	______
8770-10299	______
8770-A-452	107

Tech Manuals:
8770-6703

Procedures:
1-EMP-59.01

Notes:
PCM/DCR HISTORY: DCR-SLE-92-253
PCM 120-194

Approved Alternate
Mfg: Description: Model: Rev. Instl. Eng Ver.

Parameter Name:	Value:	UOM:
VENDOR COMPARTMENT	______	N/A
BREAKER RATING	______	AMPS
BREAKER FRAME	______	N/A
BREAKER COIL	______	N/A
BREAKER SENSOR TAP	______	N/A
BREAKER TRIP	______	AMPS
BREAKER TYPE	______	N/A
I.T. PHASE	______	AMPS
S.T.T. PHASE	______	AMPS
L.T.T. PHASE	______	AMPS
L.T.A. PHASE	______	AMPS
STARTER TYPE	______	N/A
STARTER SIZE	______	N/A
STARTER WIRING FIG.	______	N/A
REMOTE STARTER TYPE	______	N/A

FPL OUTAGE Inter-Office Correspondence

JPN-PSLP-96-0110

To:	S. A. Valdes St. Lucie Plant	Date:	APR 24 1996
From:	D. J. Denver Nuclear Engineering	Department:	JPN/JB

Subject: ST. LUCIE PLANT UNIT 1
REA/PROJECT # STAR 2-951391
TITLE: DELETION OF EDG AUTOMATIC START ON CIAS AND CSAS
PC/M/FILE # 96064

Attached for your review, approval, and use is Engineering Package 96064 for the subject Plant Change Modification.

This package provides the details necessary for the disconnection of the CIAS and CSAS contacts which provide automatic start signals for the EDG. Performing this modification eliminates the possibility of running the EDGs in parallel with offsite power with the nonessential EDG trips blocked. A SIAS trips the EDG breaker, and a bus undervoltage signal trips the 4160V bus supply breaker; in both cases the EDG is separated from offsite power. This modification also makes the EDG starting logic consistent with that of Unit 2. EDG automatic start on SIAS and undervoltage are not affected by this modification.

By copy of this letter, Document Control is requested to distribute this package to the normal distribution.

If you have any questions, please contact A. R. Dodd at 691-2171 or Rick Raldiris at 691-2104.

DJD/ARD

Attachment

Copies to:

T.M. Gerstner - OM/PSL
H.L. Fagley/DCC - CS/PSL (w/Repro)
S. Kozlin - JDC/JB (orig dwgs)
K.K. Mohindroo - JPN/PSL
C.L. Schaeffer - JMC/JB
C.M. Spalter - JPN/JB
Others: ______________________

F:\WIS\FORMS\PSL\FORM.009

EE/14

Form 1008 (Stocked) Rev. 2/89

ATTACHMENT 2
PC/M REVIEW FORM
(Page 1 of 2)

PC/M Number 96064 **Supplement Number** 0 **Expiration Date** 12/31/96

PC/M Title: DELETION OF EDG AUTOMATIC START ON CIAS AND CSAS

PC/M Classification:

____ Major Modification or ✓ Minor Modification

Safety Classification:

✓ Safety Related
____ Not Nuclear Safety Related
____ Quality Related
____ Administrative

PC/M Category:

✓ Normal ____ Either/Or ____ As-Requested Package ____ As-Fail ____ Generic

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Does the PC/M contain a Safety Evaluation? ☑ Yes or ☐ No

Is this a proposed change or modification to a unit/system or equipment that affects nuclear safety? ☑ Yes or ☐ No

If either of the above questions is YES, FRG approval is required.

FRG Review Required? ☑ Yes or ☐ No

[signature] Date: 5/3/96
Configuration Management

[signature] Date: 5/4/96
Plant General Manager

FRG Number: 96-121 FRG Secretary: Lynne Gldrates Date: 5/4/96
for Johanna Clay

FRG Comments:

ATTACHMENT 2
PC/M REVIEW FORM
(Page 2 of 2)

Implementing Documentation:

Department	ER/NPWO #	W/O #
IC	63 5391	96010654
IC	63 5481	96011491

PC/M Review and Approval: M. Williams — Configuration Management — Date 5, 3, 96

QL-A — Quality Control — Date 5, 3, 96

Comments:

Areas Affected:	Yes or No	Description
Operator Training	Yes	As per Training Department Requirements
Operating Procedures	YES	OP 1-0400050 (see pg. 27 of PCM)
Surveillance Procedures	YES	(OPS)
Maintenance Procedures	YES	(EM) (I&C)
Spare Parts	NO	
Drawings/Technical Manuals	YES	SRDs? Y / N
FUSAR Change	YES	
TEDB Change	YES	
Human Factors (CREDIT)	NO	
Environmental Concerns	NO	
In-Service Inspection	NO	
Maintenance Rule	YES	
Plant Restrictions	one EDG AT A TIME - IN MODES 5, 6, OR DEFUELED.	
Others	NONE	

M. Williams
Configuration Management — Date 5, 3, 96

FPL NUCLEAR ENGINEERING

ENGINEERING PACKAGE

PC/M NO: 96064 REV: 0 SUPPL: 0

PLANT: St. Lucie UNIT: 1

TITLE: Deletion of EDG Automatic Start on CIAS and CSAS

REVISION DESCRIPTION: Issued for Use

LEAD DISCIPLINE: Electrical EXPIRATION DATE: 12/31/96

REA NO: STAR 2-951391 DWA NO:

PC/M CLASSIFICATION: SR XX QR ____ NNS ____

DESIGN ORGANIZATION: JPN/PSL/PEG DISC CHIEF REVIEW REQD? YES ___ NO X

EXTERNAL INTERFACES: None DISC CHIEF SIGNATURE:

REVIEW/APPROVAL:

GROUP	INTERFACE TYPE			PREPARED	VERIFIED	APPROVED	FPL APPROVED*
	INPUT	REVIEW	N/A				
MECH			X	N/A	N/A	N/A	N/A
ELECT	X			A. R. Dodd	W [illegible]	[illegible]	N/A
I&C		X		N/A	N/A	[illegible]	N/A
CIVIL			X	N/A	N/A	N/A	N/A
NUC**	~~X~~ and	X		N/A and	N/A and	[illegible]	N/A
ESI			X	N/A	N/A	N/A	N/A
NUC FUEL		~~X~~ [illegible]	X	N/A	N/A	N/A	N/A

* For Contractor Prepared EPs As Determined By Projects ** Review Interface As A Minimum On All EPs

FPL PROJECTS APPROVAL: [illegible] RDGN DATE: 4/29/96

LIST OF EFFECTIVE PAGES

ABSTRACT

While operating Emergency Diesel Generator (EDG) 2A in parallel with the offsite source during the 1995 Unit 2 refueling outage, Containment Isolation Actuation Signal (CIAS)-A was manually actuated as part of the ESFAS (Engineered Safety Features Actuation System) testing per procedure OP 2-0400050 (Ref. 5.13). Upon resetting CIAS-A, the EDG tripped due to actuation of the reverse power relay. Subsequent investigation has revealed that the EDG ran with the generator in a reverse power condition (i.e. generator motoring) for approximately 45 seconds. The reverse power occurred immediately upon initiation of CIAS-A; however, the trip function of the reverse power relay was blocked. When the CIAS-A signal was reset, the relay trip block was removed and the EDG tripped. Subsequent to the event, the EDG was successfully tested under load and examined during performance of the 18-month preventive maintenance. No evidence of damage was found.

A review of the Unit 2 EDG circuits showed that initiation of CIAS-A caused the EDG governor to change from one frequency preset value to a second preset value. The second preset value for EDG 2A was less than the offsite source frequency; therefore, the fuel racks acted to reduce fuel to the engines and slow down the EDG. When the EDG frequency tried to drop below the offsite source frequency, the generator started to act as a synchronous motor to maintain the speed of the EDG. The direction of power flow changed from out of the generator to into the generator. This actuated the reverse power relay, which was unable to trip the EDG due to the block enabled when CIAS is present.

The control circuits of the Unit 2 EDGs were modified by PC/M 156-295 to delete the automatic EDG start and block of EDG non-essential trips on CIAS or CSAS.

The EDGs supply reliable power to those electrical loads which are needed to achieve safe shutdown or to mitigate the consequences of a design basis accident in the event that the preferred ac power source is interrupted. Presently, actuation of a Safety Injection Actuation Signal (SIAS), Containment Spray Actuation Signal (CSAS) or CIAS automatically starts the Unit 1 EDGs and blocks all protective trips except for overspeed and generator current differential. Actuation of a SIAS also opens the EDG output circuit breaker if the EDG was running either in parallel with the offsite source during testing prior to SIAS or during a Loss of Offsite Power (LOOP). With either the EDG breaker or the 4160V bus feeder breaker open, the EDG runs completely separated from offsite power and there is no possibility of a reverse power condition for the generator.

Automatic actuation of a CSAS requires a SIAS; therefore, the CSAS automatic start of the EDGs is redundant to the SIAS start and the EDG breaker would open and prevent the reverse power condition. However, a CSAS without SIAS, due to a spurious actuation of the CSAS relay, would not open the EDG circuit breaker. This could result in the EDG remaining paralleled to the offsite source with most of the protective trips blocked, increasing the potential for EDG damage.

Similarly, a CIAS without SIAS also does not open the EDG circuit breaker, which could result in the EDG remaining paralleled to the offsite source with the protective trips blocked. CIAS is generated from high containment pressure and high containment radiation. The high containment pressure setpoint is the same as that for initiation of SIAS. Any of the FSAR Chapter 15 analyzed accidents which would generate a CIAS in Modes 1 through 4 would also generate an approximately concurrent SIAS. CIAS is not required for Mode 5. During Mode 6, the high radiation setpoint for CIAS is decreased in order to monitor for a fuel handling accident. Therefore, during Modes 1 through 4, a CIAS would not occur without a SIAS, but during Mode 6 a CIAS could occur without SIAS. A CIAS without SIAS could also occur due to a spurious actuation of the CIAS relay. Under the circumstances of an EDG running in parallel to the offsite source and a CIAS without SIAS, the EDG would be exposed to an increased potential for damage.

The scope of this modification is to delete the CIAS and CSAS EDG start and non-essential EDG trip block signals. Following the modification, the EDGs will automatically start and the non-essential EDG trips will be blocked only for SIAS or for a loss of offsite power. In either case, the EDG would be disconnected from the offsite source. This would eliminate any possibility of running the EDG in parallel with the offsite power with the protective trips blocked. Due to the differences between the Unit 2 and Unit 1 EDG control circuit design, a reverse power incident similar to what occurred on Unit 2 could not occur on Unit 1. However, the Unit 1 EDG logic is being changed in order to provide increased protection against other potentially damaging situations which may arise when the EDG is paralleled with offsite power and the EDG trips are blocked. Sufficient post-modification testing is incorporated to ensure that CIAS and CSAS no longer start the EDGs and that the automatic EDG start on SIAS remains functional. The design analysis ensures that there are no adverse effects to any other component or system required for mitigation of a CIAS without SIAS event.

The EDGs provide backup AC power in the event of a loss of offsite power to those components and systems necessary for a safe shutdown of the plant and accident mitigation and are therefore considered nuclear safety related. This modification affects the starting circuits of the EDGs and is therefore classified as nuclear safety related.

A review of the changes to be implemented by this PC/M was performed in accordance with the requirements of 10CFR50.59. As indicated in the Safety Evaluation (Section II), this PC/M does not involve an unreviewed safety question, nor does it require a revision to the Plant Technical Specifications. This modification will have no effect on plant safety and operation. Prior NRC approval is therefore not required for the implementation of this PC/M.

I. DESIGN

1. Structure, System, or Component (SSC) Involved:

This modification affects the St. Lucie Unit 1 EDGs, which are part of the Class 1E 4160V ac electrical system, and the ESC-SA and ESC-SB Panels, which are part of the Engineered Safety Features Actuation System.

2. SSC Purpose/Function/Design Basis

2.1 Class 1E 4160V ac electrical system

The Class 1E 4160V ac system distributes power to its connected safety related loads which are required to achieve and maintain the reactor in a safe shutdown condition and to mitigate or monitor the consequences of a design basis accident.

2.2 Emergency Diesel Generators (EDGs)

2.2.1 The EDGs supply reliable power to those electrical loads which are needed to achieve safe shutdown or to mitigate the consequences of a design basis accident in the event that the preferred ac power source is interrupted.

2.2.2 The design basis for the EDG starting system is to automatically start and load the EDG for a loss of offsite power by itself or coincident with an ESFAS signal and to automatically start in standby for an ESFAS signal with offsite power available.

2.3 Engineered Safety Features Actuation System (ESFAS)

2.3.1 The ESFAS automatically initiates safety injection, containment isolation and containment heat removal systems in the event of a design basis accident. It is comprised of Safety Injection Actuation Signal (SIAS), Containment Spray Actuation Signal (CSAS), Containment Isolation Actuation Signal (CIAS), Recirculation Actuation Signal (RAS) and Main Steam Isolation Signal (MSIS). The present ESFAS design also starts the EDGs on SIAS, CIAS and CSAS in order to provide rapid availability of an emergency power source for the ESF equipment in the event of a coincidental or subsequent loss of offsite power.

2.3.2 The design basis for the ESFAS is to actuate those components necessary for mitigation of a Design Basis Accident as analyzed in Chapter 15 of the FSAR. The response times for the various system components is required to support the maximum system response time, as determined in the Design Basis Accident analysis. This response time must include sufficient time to reestablish power from the EDGs and sequence on the loads in the event of a loss of offsite power for those components dependent upon ac power.

3. Safety Classification: SR X QR ______ NNS ______

4. Reason for Design Change

Testing of the EDGs require that the EDG under test be manually synchronized and loaded in parallel with offsite power. During this time, all protective trips, such as reverse power, of the EDG should remain operable. Actuation of CIAS or CSAS without SIAS, either manually or by spurious actuation of the relay, results in blocking most of the protective trips and does not open the EDG circuit breaker. This would result in the EDG running in parallel with offsite power with most of the protective trips blocked. Should an abnormal condition develop, the EDG would be unable to trip with the resultant possibility of damage. Deletion of the CIAS and CSAS automatic EDG start and the protective trip blocks for CIAS and CSAS will eliminate any possibility of running the EDG in parallel with offsite power with the protective trips blocked. The SIAS automatic start and block of most of the protective trips of the EDGs is not changed by this modification.

5. Design Change Description

The design change consists of removing from the EDG logic circuits the CIAS and CSAS relay contacts which initiate EDG start and block non-essential EDG trips.

5.1 Panel ESC-SA (Unit 1 control room)

Permanently disconnect two cables, remove three jumpers, and remove and reconnect the wire of one cable.

5.2 Panel ESC-SB (Unit 1 control room)

Permanently disconnect two cables, remove three jumpers, and remove and reconnect the wire of one cable.

5.3 DG 1A Control Panel (Unit 1 EDG building)

Permanently disconnect two cables

5.4 DG 1B Control Panel (Unit 1 EDG building)

Permanently disconnect two cables

6. Design Change Checklist

Does the Design Change involve/impact/require justification of:

	YES	NO	REFERENCE
Internal/External Flooding		X	
Heavy Load Handling		X	
Tornado/Internal Missiles		X	
Single Failure Criteria		X	
Human Factors		X	
Paging System Audibility		X	
Masonry Block Wall Interaction		X	
Environmental Criteria		X	
Plant Security Capability		X	
HELBA Criteria/Analyses		X	
Seismic Qualification		X	
Seismic Interaction		X	
Electrical Separation Criteria		X	
Accessibility/Laydown/Clearance Requirements		X	
Loads Applied to Existing Structures (+ buried)		X	
EDG/Battery Loading/Load Sequencing	X		Para. 8.1
Hydrogen Generation In Containment		X	
Heat Sinks in Containment		X	
Emergency Plant Operating Procedures (EOPs/ONOPs)		X	
ASME Code		X	
Emergency Lighting Criteria		X	
Snubber Criteria		X	
Material Compatibility/Hazardous Materials		X	
Electrical Equipment Grounding		X	
Cable Tray Seismic Loading		X	
Instrument Setpoints		X	
Hurricane/Tornado Wind Loading		X	
Thermal/Hydraulic Performance		X	
Coatings Inside Containment		X	
Emergency Response Data System (ERDS)		X	
Emergency Planning		X	
NML Property Insurance Requirements		X	
Environmental Qualification		X	Att. 4.2
Fire Protection Capability		X	Att. 4.1
Safe/Alternate Shutdown Capability		X	Att. 4.1
ALARA Exposure Criteria		X	Att. 4.3

Forms 3E, 3F, and 71 shall be attached to justify the conclusion for these items.

7. Design Evaluation/Justification

7.1 EDG Control Circuits

7.1.1 Control Circuit Description

The EDG automatic start circuit is presently actuated by CIAS, CSAS, SIAS, or a 27Z relay contact, which is actuated when there is an undervoltage condition on the 4160V bus via a 27X-11 (Train A) or 27X-1 (Train B) relay, or if the 4160V bus feeder breaker opens (CWDs 957 & 967, Ref. 5.3 & 5.4). These inputs energize relays ASR, K16 (operate coil) and K16X/O. Contacts from both the ASR and K16X/O relays actuate relay ESR which, in turn, actuates the air start solenoid valves to start the EDG. A contact from relay K16 actuates the air start solenoid valves directly, in parallel with the contact from relay ESR. Contacts from relay ASR also release or block the idle start relays and block the normal shutdown relays. Separate SIAS, CSAS and CIAS contacts from panels ESC-SA and ESC-SB are used to block the nonessential EDG trips, such as high jacket water temperature, low oil pressure, reverse power, and overcurrent (CWDs 956 & 966, Ref. 5.5 & 5.6). A separate SIAS contact trips the EDG circuit breaker upon actuation of SIAS.

The governor is switched from droop (paralleled with another power source) to isochronous (operating separate from other power sources) mode by contacts from the 4160V Bus 1A3 incoming feeder breaker from Bus 1A2 and the 4160V Bus 1B3 incoming feeder breaker from Bus 1B2 (CWDs 957 & 967 and 8770-2417 & 8770 -11447, Ref. 5.3, 5.4, 5.7 & 5.8). These contacts switch out the load sensor, insert a droop adjust resistance in the frequency sensor circuit, and cause the governor to control only on the frequency sensor circuit.

The modification deletes the CIAS and CSAS start contacts from the EDG automatic start and protective relay block circuits. All other control functions remain the same.

7.1.2 EDG Operation

Presently, the Unit 1 EDGs automatically start on CIAS, CSAS, SIAS or 4160V bus undervoltage. The governor is switched from droop to isochronous mode only when the 4160V bus feeder breaker opens. If the EDG circuit breaker was closed, it would be tripped on SIAS only. This is done to place the EDG in standby condition if it were running in parallel with offsite power before the SIAS or to load shed and sequentially load the safety loads if there had been a LOOP prior to the SIAS.

After modifying the circuit, the Unit 1 EDGs will automatically start on SIAS or 4160V bus undervoltage only. The governor and voltage regulator operation will not be affected. The EDG circuit breaker will trip on SIAS as before.

7.1.3 Essential Equipment List/Safe Shutdown Analysis

The equipment being modified is on the Essential Equipment List (Ref. 5.12); however, no equipment is being deleted or modified in such a way that the Essential Equipment List is affected. Four cables (CIAS and CSAS start signals to EDG 1A and 1B), which are currently essential cables, are being made spare. Following a review of the Appendix "R" Safe Shutdown Analysis, it was determined that the only change is to delete the "B" train cables (10967E-SB & 10967G-SB) from the listed cables in fire zone FZ-57. See Attachment 4.9.

7.2 Other Components

An evaluation was performed to determine the effect of this modification on other components actuated by CIAS or CSAS. The results of this evaluation are given in Attachment 4.4 and are discussed in Section II.2.7. No components were found that affected EDG operation.

8. Evaluation of any "YES" responses in Design Change Checklist

8.1 **EDG/Battery Loading/Load Sequencing**

The automatic start of the EDGs for CIAS and CSAS are being deleted by this PC/M. This modification does not add any new loads or remove any existing loads from the EDGs, nor does it change any of the load block times. Therefore, EDG loading and load sequencing are not affected by this modification. Battery loading is slightly reduced by the disabling of two control relays in each DG Control Panel; however, the change is not significant and does not affect the battery loading calculation (Ref. 5.9).

9. Design Verification Statement

The assumptions required to develop the design criteria were adequately described, reasonably and appropriately identified for subsequent reverification if required. The design inputs were correctly selected and incorporated and applied operating and construction experience were considered.

The drawings and documents used in the design were checked to assure the latest revisions were utilized. The codes, standards and regulatory requirements were properly identified and the modifications were shown to meet those requirements in addition to the FSAR commitments (FSAR description of automatic EDG start on ESFAS signals required a revision due to the design change). Interface commitments were shown to be satisfied. Periodic and special test requirements were verified to be correct.

The output provided by this design was reasonable when compared to the input. The acceptance criteria for the modification were adequately incorporated into the design documents to allow verification that the design requirements have been satisfactorily accomplished. The design verification has also shown that the EP has been correctly classified as "Safety Related".

II. SAFETY

1. Description and Purpose

This engineering package provides the details necessary to delete the Unit 1 CIAS and CSAS EDG start signals such that the EDGs start automatically only for SIAS or a LOOP. The purpose of this modification is to eliminate any possibility of damage to the EDGs, due to spurious actuation of CIAS or CSAS relays, which may result from operating in parallel to offsite power with the protective relay functions blocked.

2. Analysis of Effects on Safety

2.1 Safety Classification

The modification considered in this EP is classified as Safety Related because it affects the ESC panels and the starting of the EDGs, each of which perform a safety related function. Deletion of automatic EDG start on CIAS and CSAS represents a change in the EDG control logic and a physical change in the ESC and DG Control Panels.

2.2 Effect on Existing Evaluations and Designs in Progress

A design integration was performed to assure that the modifications do not affect any other designs in progress or any active Safety Evaluations. In performing this review, the following documents were utilized:

2.2.1 St. Lucie Affected Drawing and Document Index Computer data base was accessed on 2/17/96.

Four designs in progress were noted as affecting the drawings included in this package:

a) PC/M 120-194; documents setpoints and tolerances for EDG permissive control functions. No effect on EDG start modification.

b) PC/M 177-195; modification to make existing DG mechanical trips active during the 10 minute idle cooldown period. No effect on EDG start modification.

c) PC/M 180-195; modification to annunciator system to prevent DG Fire Control Panel alarm or failure from blocking other subsequent DG alarms from being given in Control Room. No effect on EDG start modification.

d) PC/M 030-196; replaces sockets & relays in DG Idle Start/Stop Panels. No effect on EDG start modification.

2.2.2 St. Lucie Active Safety Evaluation List data base accessed on 4/17/96. No safety evaluations were listed under the EDG system (system 59) which are affected or which could affect this modification.

2.3 Actuation Logic

CSAS automatically actuates the Containment Spray System (CSS). CSAS is initiated by a coincident 2/4 high-high containment pressure signals and a simultaneous SIAS.

SIAS automatically actuates the Safety Injection System (SIS). SIAS is initiated by either a coincident 2/4 low pressurizer pressure signals or a coincident 2/4 high containment pressure signals.

CIAS automatically actuates the Containment Isolation System (CIS). CIAS is initiated by a coincident 2/4 high containment pressure signals, or a coincident 2/4 high containment radiation signals , or on SIAS actuation.

2.4 Technical Specification Applicability

CSAS is required by Technical Specification 3.3.2, Table 3.3-3, to be OPERABLE in MODES 1-3 for the High-High Containment Pressure Function (≤ 10 psig) and MODES 1-4 for the Manual Actuation Logic. In addition, the CSS is required by Technical Specification 3.6.2.1 to be OPERABLE in MODES 1 & 2 and MODE 3 with pressurizer pressure ≥ 1750 psia.

SIAS is required by Technical Specification 3.3.2, Table 3.3-3, to be OPERABLE in MODES 1-3 for the High Containment Pressure Function (≤ 5 psig) and the Low Pressurizer Pressure Function (≥ 1600 psia) and MODES 1-4 for the Manual Actuation Logic. In addition, the SIS is required by Technical Specifications 3.5.2 and 3.5.3 to be OPERABLE in MODES 1-4.

CIAS is required by Technical Specification 3.3.2, Table 3.3-3, to be OPERABLE in MODES 1-3 for the High Containment Pressure Function (≤ 5 psig) and the High Containment Radiation Function (≤ 10 R/hr) and MODES 1-4 for the Manual Actuation Logic and for the SIAS Actuation Logic. Additionally, the High Containment Radiation Function (≤ 90 mR/hr) of CIAS is required by Technical Specification 3.3.3.1, Table 3.3-6, to be OPERABLE in MODE 6 to automatically close the containment purge valves when high containment radiation is detected while in MODE 6 to limit offsite dose in the event of a fuel handling accident. The CIS is required by Technical Specification 3.6.3, Table 3.6-2, to be OPERABLE in MODES 1-4. The CIS is also required by Technical Specification 3.9.9 to be OPERABLE during MODE 6.

Two independent Shield Building Ventilation Systems are required by Technical Specification 3.6.6.1 to be OPERABLE in MODES 1, 2, 3, and 4.

Two independent control room emergency air cleanup systems are required by Technical Specification 3.7.7.1 to be OPERABLE in MODES 1, 2, 3, and 4.

There is no applicable Technical Specification for the Fuel Handling Building Ventilation System.

2.5 Applicable ESFAS Design Functions

Automatically initiate containment heat removal systems, when conditions indicative of a major high energy line break inside containment are detected, to prevent overpressurization and potential loss of containment pressure boundary integrity.

Automatically initiate the safety injection systems, when conditions indicative of a LOCA are detected, to limit the extent of fuel cladding damage.

Automatically initiate containment isolation and the shield building ventilation system, when conditions indicative of a LOCA are detected, to limit the uncontrolled release of radioactivity.

Automatically start the diesel generators, when conditions indicative of a LOCA are detected, to provide rapid availability of an emergency power source for the ESF equipment in the event of a coincidental or subsequent loss of offsite power.

Automatically align the control room ventilation system for emergency operation, when conditions indicative of a LOCA are detected, to maintain control room habitability.

Automatically close the containment purge valves, when high containment radiation is detected while in Mode 6, to limit site dose in the event of a fuel handling accident.

2.6 Applicable System Design Functions

Containment Spray System (CSS) - Provide, in conjunction with the containment fan coolers, sufficient heat removal to prevent the containment pressure and temperature from exceeding analyzed design values following a LOCA, CEA ejection event, or Main Steam Line Break (MSLB) inside containment, assuming a single failure coincident with a LOOP.

High Pressure Safety Injection System (HPSI) - Automatically inject sufficient borated water into the Reactor Coolant System (RCS) to recover the core in the event of a LOCA. Inject borated water into the RCS during excess heat removal events (e.g. steam line breaks) and CEA ejection.

Containment Isolation System (CIS) - Isolate fluid systems that pass through containment penetrations such that any radioactivity that may be released into the containment atmosphere following a postulated Design Basis Accident (DBA) is confined. The containment isolation system is designed such that no single active failure in conjunction with a LOOP could result in offsite doses or doses to the operators in the control room in excess of 10CFR100 or GDC 19, respectively.

Shield Building Ventilation System (SBVS) - Limit the pressure rise in the Shield Building annulus following a **LOCA** so as not to exceed the Shield Building internal design pressure, assuming a single active failure, and controlling and collecting leakage from the containment penetrations. Establish and maintain a subatmospheric pressure in the Shield Building annulus following a **LOCA**, assuming a single active failure, and to resist the maximum potential for exfiltration under all wind loading conditions characteristic of the site. Provide means of reducing offsite doses resulting from post accident leakage by evacuating air from the annulus and routing through the SBVS filtration units, assuming a single active failure. Provide means of reducing offsite doses by providing fission product removal capability while evacuating air from the Fuel Handling Building during a **fuel handling accident** (FHA), assuming a single active failure.

Control Room Emergency Cleanup System - Assure that no single active failure coincident with a **LOOP** can result in loss of functional performance. Maintain the control room envelope at an average positive pressure above that of the surroundings following a **LOCA**. Provide means to limit the introduction of airborne radioactivity, smoke, toxic gases, or steam to the control room envelope. Provide air cleaning for the control room envelope atmosphere so that airborne radiological doses, experienced by control room personnel following a DBA, do not exceed the limits imposed by GDC 19. Assure that makeup air brought in during an event that has resulted in control room isolation does not bypass the air cleaning process before mixing with the control room envelope air.

2.7 Evaluation

The Containment Spray System (CSS) actuates on a Containment Spray Actuation Signal (CSAS). The CSAS will not actuate the CSS without a concurrent Safety Injection Actuation Signal (SIAS). The Emergency Diesel Generators (EDGs) automatically start on receipt of a SIAS. As such, EDG auto-start on a CSAS is unnecessarily redundant. Any initiation of the CSS will be preceded by or concurrent with a SIAS initiation and auto-start of the EDGs. Thus, the auto-start of the EDGs will occur without any time delay associated with removal of the CSAS EDG auto-start function. Therefore, removal of the EDG auto-start function on CSAS is acceptable.

Similarly, the Containment Isolation System (CIS) actuates on a Containment Isolation Actuation Signal (CIAS). The CIAS will actuate the CIS on high containment pressure, the same signal and setpoint which will actuate the SIAS. The CIAS will also actuate the CIS on receipt of a SIAS signal. Since the EDGs automatically start on receipt of a SIAS, two of the three CIAS actuation conditions result in a concurrent SIAS actuation and EDG start. Thus, the auto-start of the EDGs will occur without any time delay associated with the CIAS EDG auto-start function for **two of the three CIAS actuation logics**.

The only CIAS actuation condition which would not result in a concurrent SIAS (and EDG auto-start) is the "high containment radiation" signal. Upon completion of this modification, such a CIAS would result in initiation of CIS **without** a concurrent EDG auto-start. Such a situation will result in a delay, of up to 10 seconds, in emergency AC power being available should a LOOP occur subsequent to the CIAS.

For MODES 1-4, the only possible accident scenario for which the plant could receive a high radiation signal prior to a SIAS would be a small break LOCA (SBLOCA) which could possibly initiate the high radiation signal without a concurrent or subsequent high containment pressure signal and thus a concurrent SIAS. In this scenario, the break in question may or may not cause a loss of coolant in excess of makeup pump capacity.

If the loss of coolant is within the makeup capacity of the charging pumps, the operator would begin an orderly shutdown of the plant without the need for EDGs. Should a LOOP occur during this shutdown (due to the manual reactor trip), the additional 10 seconds required for the EDGs to come up to speed would be of no consequence since the break is relatively small when compared to the makeup capacity. Thus, there is no need for a CIAS EDG auto-start for this scenario and the SBLOCA spectrum analysis bounds this event.

If the loss of inventory was not within the makeup capacity of the charging pumps, a reactor trip would occur on Low Pressurizer Pressure. Further reduction in pressure would generate a SIAS and subsequent EDG auto-start. Although the EDGs would possibly be operating sooner if actuated by a CIAS auto-start (i.e., high radiation signal initiates CIAS before low pressurizer pressure trips reactor and initiates SIAS), the St. Lucie Small Break LOCA Analysis (FSAR Section 15.6.6.2.2) conservatively assumes that offsite power is lost upon reactor trip and that the safety injection pumps must await a 30 second delay for diesel startup and load sequencing following the SIAS. In essence, no credit is taken for an early start of the EDGs due to receipt of the CIAS prior to the SIAS. Therefore, no benefit is derived from a CIAS-initiated EDG auto-start in this scenario.

For MODE 5, CIAS is not required to be OPERABLE. Therefore, this modification will have no effect on plant operation in MODE 5.

For MODE 6, CIAS is required to function on high containment radiation only, since there is no capability to generate a high containment pressure signal in this mode. In MODE 6, the CIAS safety function is to provide containment isolation (close the containment purge valves on a high radiation signal) in the event of a fuel handling accident inside containment. Per Attachment 4.4, the containment purge valves do not require AC power to perform their safety function. In addition, the FHA as described in the FSAR is bounding for this event. It assumes that no isolation functions occur which require EDG auto start on CIAS. Therefore, removal of the EDG auto-start function on CIAS for MODE 6 will have no adverse effect on plant safety.

Finally, to further validate that there is no effect on CIAS/CIS actuated components (and thus the applicable accident analyses) as a result of removing the EDG auto-start capability on receipt of a CIAS, a review was performed of the components that are actuated on CIAS. Per Attachment 4.4, only the following CIAS actuated components require EDG AC power:

- Shield Bldg Vent Exh Fans HVE-6A & 6B
  (Design Req'mt. LOCA; Assumes LOOP)

- Control Room Emerg Filtration Fans HVE-13A & 13B
  (Design Req'mt. LOCA; Assumes LOOP)

- Control Room Isol Valves FCV-25-14,15,16,17,18,19, 24, & 25
  (Design Req'mt. **LOCA**; Assumes **LOOP**)

- Control Room Emerg Filtration Dampers D-18 & 19
  (Design Req'mt **LOCA**; Assumes **LOOP**)

- Primary Water Isol Valve MV-15-1
  (Design Req'mt. **LOCA**; Assumes **LOOP**)

- Instrument Air Isol Valve MV-18-1
  (Design Req'mt. **LOCA**; Assumes **LOOP**)

As stated in Section 2.6, each of these systems/components' design basis assumes these components are capable of performing their safety function in the event of a **LOCA** and/or a **LOOP**. The EDGs will continue to auto-start on either a **LOCA** or **LOOP** after this modification. Therefore, no loss of safety function will occur as a result of this modification for any of these components actuated by CIAS. Since the remaining components actuated by CIAS do not require EDG AC power, this modification will have no adverse impact on their safety function.

No components are being added or removed from the ESC or DG Control Panels. Therefore, the seismic characteristics and qualifications of the ESC-SA, ESC-SB and EDG 1A and 1B Control Panels are not affected by this modification.

3. Failure Modes and Effects Analysis (FMEA)

The contacts of the CIAS and CSAS logic output relays used to start the EDGs and block the EDG lockout relays are being disconnected in the ESC-SA and ESC-SB Panels and the DG-1A and -1B Control Panels by this modification. The associated auxiliary relays in the EDG-1A and -1B Control Panels and two diodes in each of the EDG Idle Start/Stop Panels and associated wires are being abandoned in place. No new components or systems are being added. An evaluation of all components actuated by CIAS and CSAS has been performed, as discussed above and documented in Attachment 4.4, with the result that no other systems or components are affected by this modification. Therefore, the failure modes and effects of the EDG, Containment Isolation System, and Containment Spray System are not affected by this PC/M. There are no new failure modes created by this modification.

4. Effect on Technical Specifications

The Technical Specifications were reviewed for potential effects associated with this modification. The applicable Technical Specifications (for ESFAS, Emergency Diesel Generators (AC Power), and those components actuated by CIAS and CSAS) were identified and a determination was made that this modification will have no effect on the PSL-1 Technical Specifications. A review was performed on MODE applicability, as documented in Section 2.4, to ensure that plant operation, in the MODES for which CIAS and CSAS are required, also remains unaffected.

5. Unreviewed Safety Question (USQ) Determination

The Code of Federal Regulations, specifically 10CFR50.59, states that the holder of a license authorizing operation of a production or utilization facility may (i) make changes in the facility as described in the Safety Analysis Report (SAR), (ii) make changes in the procedures as described in the SAR, and (3) conduct tests or experiments not described in the SAR, without prior NRC approval, provided the proposed change, test, or experiment does not involve a change in the Technical Specifications or pose an Unreviewed Safety Question (USQ). A proposed change, test, or experiment shall be deemed to involve a USQ (i) if the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the SAR may be increased; or (ii) if a possibility for an accident or malfunction of a different type than any previously evaluated in the SAR may be created; or (iii) if the margin of safety as defined in the Basis for any Technical Specification is reduced.

NSAC-125, "Guidelines for 10CFR50.59 Safety Evaluations," prepared by the Nuclear Management and Resources Council and the Nuclear Safety Analysis Center of the Electric Power Research Institute (EPRI), is used as a guidance document to determine whether an Unreviewed Safety Question is involved in the activities associated with this modification.

5.1 Does the proposed activity increase the probability of occurrence of an accident previously evaluated in the SAR?

The probability of occurrence of an accident previously evaluated in the SAR has not been increased. The applicable accident analyses, LOCA and FHA, were reviewed and it was determined that these analyses are bounding for the new plant configuration. The CSAS and CIAS are not accident initiators. Therefore, they can have no effect on the probability of occurrence of an accident.

5.2 Does the proposed activity increase the consequences of an accident previously evaluated in the SAR?

The consequences of an accident previously evaluated in the SAR have not been increased. The CSAS and CIAS are used for accident mitigation for LOCA, HELB inside containment, and FHA.

As stated previously, elimination of the EDG auto-start function on actuation of CSAS will have no effect on the capability of CSAS to perform its mitigative functions. Actuation of CSAS cannot occur without prior or concurrent SIAS. Since EDG auto-start occurs on SIAS, no reduction occurs in the mitigative ability of CSAS by elimination of the EDG auto-start function on CSAS actuation.

Similarly, elimination of the EDG auto-start function on actuation of CIAS will have no effect on the capability of CIAS to perform its mitigative functions. As stated previously, in MODES 1-4, the only condition which could result in a CIAS without a concurrent SIAS is a SBLOCA where a high radiation signal could be generated prior to a high containment pressure signal. In this event, CIAS would actuate prior to SIAS and no EDG auto-start would occur until the subsequent SIAS . However, this event is bounded by the SBLOCA spectrum analyses, where a LOOP is assumed on reactor trip and the safety injection pumps are assumed to await a 30 second delay for diesel startup and load sequencing following a safety injection signal. For MODE 6, the removal of the EDG auto-start capability from CIAS is bounded by the FHA previously analyzed. No credit is taken for the CIAS EDG auto-start function.

5.3 Does the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the SAR?

The probability of occurrence of a malfunction of equipment important to safety has not been increased. The purpose of this modification is to **prevent** the possible occurrence of a malfunction of equipment important to safety, namely the EDGs. This modification will **delete** EDG start and lockout relay block on CIAS and CSAS such that the EDGs start automatically and the lockout relay will be blocked only for SIAS and LOOP. This will eliminate any possibility of running the EDGs in parallel with offsite power with the protective trips blocked. This modification will create no new system interactions or failure modes. The EDGs will continue to perform as assumed in the FSAR accident analyses. The FSAR accident analyses remain bounding for the applicable equipment configuration. The evaluation of components actuated by CIAS and CSAS, as documented in Attachment 4.4 and discussed in Section 2.7, has determined that no components other than those described in this PC/M are affected by this modification.

5.4 Does the proposed activity increase the consequences of a malfunction of equipment important to safety previously evaluated in the SAR?

The consequences of a malfunction of equipment important to safety previously evaluated in the SAR have not been increased. As stated above, no equipment important to safety will be adversely impacted by this modification. This modification removes a potentially adverse equipment configuration which, if uncorrected, could cause damage to the emergency diesel generators. No new failure modes or system interactions are being introduced. The EDGs will continue to function as assumed in the FSAR accident analyses. The FSAR accident analyses remain bounding for the applicable configuration. Since there will be no increase in the probability of a malfunction of the EDGs or CIAS and CSAS, and no components other than those described in this PC/M are affected, there can be no increase in the consequences associated with such a malfunction.

5.5 Does the proposed activity create the possibility of an accident of a different type than any previously evaluated in the SAR?

The possibility of an accident of a different type than any previously evaluated in the SAR has not been created. This modification does not degrade the reliability of the EDGs or the ESFAS components. All equipment will continue to function as assumed in the FSAR accident analyses. This modification removes an unnecessarily redundant ESFAS function. While the accident design function of the CIAS and CSAS logic will be modified slightly, the plant will continue to operate as before. The FSAR analysis for SBLOCA and FHA will continue to remain bounding for the new configuration, since no credit is taken in the analysis for EDG start on CIAS.

5.6 Does the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in the SAR?

The possibility of a different type of malfunction of equipment important to safety than any previously evaluated in the SAR has not been created. No new equipment interfaces or interactions have been established. This modification will have no adverse impact on equipment important to safety. All affected equipment will continue to perform its safety function as assumed in the NRC-approved FSAR accident analyses. While the specific design of the ESFAS logic has been modified slightly, the overall design function and operational characteristics assumed in the accident analyses remains unchanged.

5.7 Does the proposed activity reduce the margin of safety as defined in the basis for any Technical Specification?

The proposed modification does not reduce the margin of safety as defined in the basis for any Technical Specification. The operability of the ESFAS System, the components and/or systems actuated by CIAS and CSAS, and the Emergency AC Electrical Power System is not impacted by this change. The safety functions of the ESFAS System, CIAS/CSAS-actuated components and systems, and the EDGs, as defined in the bases of the Technical Specifications, are not affected by the deletion of the EDG auto-start signal from the CSAS and CIAS actuation logic.

6. Plant Restrictions

This modification must be done on one EDG at a time with Unit 1 in modes 5, 6 or defueled with the opposite EDG operable. The EDG under modification must be blocked from starting.

7. Conclusions

The foregoing constitutes, per 10 CFR 50/59 (b), the written safety evaluation which provides the basis that this change does not involve an unreviewed safety question nor a change to Technical Specifications and, therefore, the modification may be implemented without prior NRC approval.

III. CONFIGURATION

1. Affected Document Checklist

	YES	NO	Reference
FSAR	X		Attachment 4.5
Technical Specifications		X	
TEDB	x		Attachment 4.7
Security Plan		X	
DBDs	X		Attachment 4.6
Snubber List		X	
ISI/IST Program (If "Yes", ESI review is required)		X	
Code Stress Reports		X	

2. Affected Drawings

PC/M Dwg	Rev	Description/Title	Disc	Affected Dwgs	Rev	Pr*	EP Rev
JPN-96064-001	0	Schem. Dia-EDG 1A Lockout Relay	I	8770-B-326 Sh.956	011	1	0
JPN-96064-002	0	Schem. Dia-EDG 1A Start Ckts.	I	8770-B-326 Sh.957	008	1	0
JPN-96064-003	0	Schem. Dia-EDG 1B Lockout Relay	I	8770-B-326 Sh.966	012	1	0
JPN-96064-004	0	Schem. Dia-EDG 1B Start Ckts.	I	8770-B-326 Sh.967	010	1	0
JPN-96064-005	0	CWD-EDG 1A Lockout Relay - Before	I	8770-B-327 Sh.956	018	1	0
JPN-96064-006	0	CWD-EDG 1A Lockout Relay - After	I	8770-B-327 Sh.956	018	1	0
JPN-96064-007	0	CWD-EDG 1A Start Ckts. - Before	I	8770-B-327 Sh.957	013	1	0
JPN-96064-008	0	CWD-EDG 1A Start Ckts. - After	I	8770-B-327 Sh.957	013	1	0
JPN-96064-009	0	CWD-EDG 1B Lockout Relay - Before	I	8770-B-327 Sh.966	017	1	0
JPN-96064-010	0	CWD-EDG 1B Lockout Relay - After	I	8770-B-327 Sh.966	017	1	0
JPN-96064-011	0	CWD-EDG 1B Start Ckts. - Before	I	8770-B-327 Sh.967	017	1	0
JPN-96064-012	0	CWD-EDG 1B Start Ckts. - After	I	8770-B-327 Sh.967	017	1	0

PC/M Dwg	Rev	Description/Title	Disc	Affected Dwgs	Rev	Pr*	EP Rev
JPN-96064-013	0	Station Auxiliaries A Annunciator B Sh. 2 RTGB-101	I	8770-B-327 Sh.1021	017	1	0
JPN-96064-014	0	Station Auxiliaries B Annunciator B Sh. 2 RTGB-101	I	8770-B-327 Sh.1023	017	1	0
JPN-96064-015	0	DG 1A D.C. Schematic Sh. 1 of 2	I	8770-2412 8770-6703	010 010	2 2	0 0
JPN-96064-016	0	DG 1A D.C. Schematic Sh. 2 of 2	I	8770-2413 8770-6703	009 010	2 2	0 0
JPN-96064-017	0	DG 1B D.C. Schematic Sh. 2 of 2	I	8770-11444 8770-6703	001 010	2 2	0 0
JPN-96064-018	0	DG 1B D.C. Schematic Sh. 1 of 2	I	8770-11573 8770-6703	004 010	2 2	0 0
JPN-96064-019	0	DG 1A D.C. Interconn. Dia.	I	8770-2414 8770-6703	009 010	2 2	0 0
JPN-96064-020	0	DG 1B Connection Dia.	I	8770-11574 8770-6703	003 010	2 2	0 0
JPN-96064-021	0	DG 1A Pnl Wiring Dia - Front Pnl	I	8770-7158 8770-6703	006 010	2 2	0 0
JPN-96064-022	0	DG 1B Pnl Wiring Dia - Front Pnl	I	8770-11577 8770-6703	003 010	2 2	0 0
JPN-96064-023	0	System Conn. Drwg. Sheet 9	I	8770-6739	003	2	0
JPN-96064-024	0	System Conn. Drwg. Sheet 10	I	8770-6740	003	2	0
JPN-96064-025	0	System Conn. Drwg. Sheet 17	I	8770-6747	003	2	0
JPN-96064-026	0	System Conn. Drwg. Sheet 18	I	8770-6748	002	2	0
JPN-96064-027	0	System Conn. Drwg. Sheet 5	I	8770-6735	003	2	0
JPN-96064-028	0	System Conn. Drwg. Sheet 13	I	8770-6743	003	2	0
JPN-96064-029	0	Elec. Schematic-SFAS SA Sheet 2 of 4	I	8770-5525 8770-8688	019 009	2 2	0 0
JPN-96064-030	0	Elec. Schematic-SFAS SA Sheet 2 of 4	I	8770-5525 8770-8688	019 009	2 2	0 0

PC/M Dwg	Rev	Description/Title	Disc	Affected Dwgs	Rev	Pr*	EP Rev
JPN-96064-031	0	Elec. Schematic-SFAS SA Sheet 1 of 4	I	8770-5521 8770-8688	017 009	2 2	0 0
JPN-96064-032	0	Elec. Schematic-SFAS SB Sheet 1 of 4	I	8770-5522 8770-8688	018 009	2 2	0 0
JPN-96064-033	0	Elec. Schematic-SFAS SB Sheet 2 of 4	I	8770-5524 8770-8688	019 009	2 2	0 0
JPN-96064-034	0	Elec. Schematic-SFAS SB Sheet 2 of 4	I	8770-5524 8770-8688	019 009	2 2	0 0
Attachment 4.8	0	Cable and Conduit List	E	8770-B-328	038	2	0
Attachment 4.9	0	Appendix "R" Safe Shutdown Analysis	E	8770-B-048	002	2	0

3. Affected Vendor Manuals

Plant Doc No	Rev	Vendor/Equip	Disc	Remarks	EP Rev
8770-6703	010	Emergency Diesel Gen. Sys.		Included Dwgs are affected	0
8770-8688	009	ESC-SA and ESC-SB Panels		Included Dwgs are affected	0

4. Attachments

		Number of Pages	EP Rev.
4.1	Fire Protection Review Checklist	3	0
4.2	Environmental Qualification (EQ) Checklist.	1	0
4.3	ALARA Screening	1	0
4.4	CIAS & CSAS Actuated Components and Functions.	5	0
4.5	FSAR Change Package.	9	0
4.6	Emergency Diesel Generator System DBD Change Package	8	0
4.7	TEDB Change Package.	1	0
4.8	Cable & Conduit Change Package	2	0
4.9	Appendix "R" Safe Shutdown Analysis Change	1	0

5. References

5.1 St. Lucie Unit 1 FSAR Amendment 14.

5.2 St. Lucie Unit 1 Technical Specifications through Amendment 141.

5.3 FPL Drawing 8770-B-327, Sh. 957; "Control Wiring Diagram, Diesel Gen. 1A Start Ckts, Sh. 1;" Rev. 13.

5.4 FPL Drawing 8770-B-327, Sh. 967; "Control Wiring Diagram, Diesel Gen. 1B Start Ckts, Sh. 1;" Rev. 17.

5.5 FPL Drawing 8770-B-327, Sh. 956; "Control Wiring Diagram, Diesel Gen. 1A Lockout Relay;" Rev. 18.

5.6 FPL Drawing 8770-B-327, Sh. 966; "Control Wiring Diagram, Diesel Gen. 1B Lockout Relay;" Rev. 17.

5.7 Drawing 8770-2417; "Diesel Generator 1A Governor Control Schematic;" Rev. 008.

5.8 Drawing 8770-11447; "Diesel Generator 1B Governor Control Schematic;" Rev. 001.

5.9 FPL Calculation PSL-1-F-J-E-90-0015; "Safety Related Batteries 1A & 1B;" Rev. 0.

5.10 Vendor Manual 8770-6703; "I/M for Diesel Generators;" Rev. 10.

5.11 Vendor Manual 8770-8688; "Safety Features Actuation System (SFAS);" Rev. 9.

5.12 8770-B-048; "Appendix "R" Safe Shutdown Analysis;" Rev. 2.

5.13 Plant Procedure 2-040050; "Periodic Test of the Engineered Safety Features;" Rev. 17.

IV. **MATERIAL**

1. Equipment and Material

None required.

2. Spare Parts

None required.

V. **IMPLEMENTATION**

1. Implementation Instructions/Specifications

1.1 This modification must be performed on one EDG at a time when the plant is in mode 5, 6 or defueled with the other EDG operable.

1.2 Automatic start of the EDG being modified must be blocked to prevent accidental start.

1.3 Care must be taken to ensure that adjacent components and wiring in Panels ESC-SA and ESC-SB, the EDG Control Panels and the EDG Idle Start/Stop Panels are not disturbed when performing the modification.

1.4 A pre-implementation visual inspection shall be performed to verify the as-built electrical connections of the areas being modified. Any discrepancy between the as-built condition and the drawings shall be documented via a CRN for engineering evaluation.

1.5 Should it become necessary to partially implement this PC/M, the implementer shall notify JPN (for possible PC/M revision).

1.6 This modification must be coordinated with PC/Ms 120-194, 177-195, 180-195 and 030-196, which involve the EDG Control Panels and Idle Start/Stop Panels.

1.7 Panel ESC-SA (Unit 1 control room)

1.7.1 Lift and spare the black and white conductors of cables 10957E-SA and 10957G-SA.

1.7.2 Remove wires between the following terminals:
a) TB17 #10 to TB42 #11.
b) TB17 #1 to TB39 #4.
c) TB42 # . to TB39 #3.

1.7.3 Remove the white wire of cable 10956F-SA from terminal TB17 #11 and connect it to terminal TB17 #10.

1.8 Panel ESC-SB (Unit 1 control room)

1.8.1 Lift and spare the black and white conductors of cables 10967E-SB and 10967G-SB.

1.8.2 Remove wires between the following terminals:
a) TB17 #10 to TB42 #11.
b) TB17 #11 to TB38 #8.
c) TB42 #12 to TB38 #7.

1.8.3 Remove the white wire of cable 10966F-SB from terminal TB17 #11 and connect it to terminal TB17 #10.

1.9 DG 1A Control Panel (Unit 1 EDG building)

1.9.1 Lift and spare the black and white conductors of cables 10957E-SA and 10957G-SA. These cables are now spare.

1.10 DG 1B Control Panel (Unit 1 EDG building)

1.10.1 Lift and spare the black and white conductors of cables 10967E-SA and 10967G-SA. These cables are now spare.

2. Post-Mod Acceptance Testing

2.1 Verify that the EDGs operate as follows after performing the modification:
a) The EDGs do not start on CIAS and the non-essential EDG trips are not blocked.
b) The EDGs do not start on CSAS and the non-essential EDG trips are not blocked.
c) The EDGs start on SIAS and the non-essential EDG trips are blocked.

2.1.1 With the EDG not running, initiate a Group 5A/5B CIAS actuation and verify the EDG does not start. Also verify the non-essential EDG trips are not blocked during CIAS actuation by connecting a jumper between terminals TB11 # 32 and TB11 #55 in the DG 1A & 1B Control Panels or actuating one of the non-essential EDG trips (see CWD 956 & 966) and observing that the lockout relay, S2, actuates. Note: the 1A3-1A2 (Train A) and 1B3-1B2 (Train B) tie breakers must be closed when performing this test.

Group 5A/5B CIAS also actuates the following equipment:
a) CIAS 5A
No other equipment.
b) CIAS 5B
Primary Water Isol Valve MV-15-1 (Close/Open Inhibit)

2.1.2 With the EDG not running, initiate a Group 3A/3B CSAS actuation and verify the EDG does not start. (Note- Group 3A/3B CSAS actuation requires a previous Group 3A/3B SIAS and will result in a Group 3A/3B CIAS actuation.) Also verify the non-essential EDG trips are not blocked during CSAS actuation by connecting a jumper between terminals TB11 # 32 and TB11 #55 in the DG 1A & 1B Control Panels or actuating one of the non-essential EDG trips (see CWD 956 & 966) and observing that the lockout relay, S2, actuates. Note: the 1A3-1A2 (Train A) and 1B3-1B2 (Train B) tie breakers must be closed when performing this test.

Group 3A/3B CSAS also actuates the following equipment:
a) CSAS 3A
    Resequencing of EDG 2A Load Blocks 6 & 7
b) CSAS 3B
    Resequencing of EDG 2B Load Blocks 6 & 7

Group 3A/3B SIAS also actuates the following equipment:
a) SIAS 3A
    RAB Main Exhaust Fan HVE-10A
    Non-essential load shed (this can be temporarily defeated by lifting either wire of cable 10990M-SA from terminal RAA21 or RAA22 in 480V Swgr 1A2, Compt. 6A).
b) SIAS 3B
    RAB Main Exhaust Fan HVE-10B
    Non-essential load shed (this can be temporarily defeated by lifting either wire of cable 10992P-SB from terminal RAA16 or RAA17 in 480V Swgr 1B2, Compt. 2A).

Group 3A/3B CIAS also actuates the following equipment:
a) CIAS 3A
    Waste Gas Isol Valve V-6554 (Close)
    Stm Gen 1A Blowdown Isol FCV-23-3 (Close)
    Stm Gen 1B Blowdown Isol FCV-23-5 (Close)
    Kitchen Exhaust Fan Isol FCV-23-24 (Close)
a) CIAS 3B
    Waste Gas Isol Valve V-6555 (Close)
    Stm Gen 1A Blowdown Isol FCV-23-4 (Close)
    Stm Gen 1B Blowdown Isol FCV-23-6 (Close)
    Kitchen Exhaust Fan Isol FCV-23-25 (Close)

2.1.3 With the EDG not running, initiate a Group 7A/7B SIAS actuation and verify the EDG starts. (Note- Group 7A/7B SIAS actuation does not result in a Group 7A/7B CIAS actuation.) Also verify the non-essential EDG trips are blocked during SIAS actuation by connecting a jumper between terminals TB20 # 11 and TB20 #12 in the DG 1A & 1B Idle Start/Stop Panels or actuating one of the non-essential EDG trips (see CWDs 956 & 966) and observing that the lockout relay, S2, does not actuate. Note: the 1A3-1A2 (Train A) and 1B3-1B2 (Train B) tie breakers must be closed when performing this test.

Group 7A/7B SIAS also actuates the following equipment:

a) SIAS 7A
   SI Tank Isol. Valve V-3624 (Open/ Close Inhibit)
   SI Tank Isol. Valve V-3644 (Open/ Close Inhibit)

b) Train B (7B)
   SI Tank Isol. Valve V-3614 (Open)
   SI Tank Isol. Valve V-3634 (Open)

3. Operations and Maintenance Guidelines

3.1 Plant Operating Procedure 1-0400050, "Periodic Test of the Engineered Safety Features," Section 8.9 must be revised to perform an EDG start on SIAS without LOOP.

FIRE PROTECTION REVIEW CHECKLIST

		YES*	NO	REFERENCE
I.	**SAFE SHUTDOWN CAPABILITY**			
	Does the Engineering Package install, relocate, modify, or affect the operation of:			
	A. Equipment on the Essential Equip. List	X		I.7.1
	B. Safe Shutdown Analyses			
	1. Safe Shutdown Circuits		X	
	2. Alternate Shutdown Components		X	
	3. Associated Circuits		X	
	4. Manual Actions		X	
II.	**FIRE PROTECTION SYSTEMS**			
	Does the Engineering Package install, modify, or affect the operation of:			
	A. Fire Detection Systems		X	
	B. Fire Water Supply System		X	
	C. Water Suppression Systems		X	
	D. Halon Suppression Systems		X	
	E. Standpipes or Hose Stations		X	
	F. Portable Fire Extinguishers		X	
III.	**FIRE RATED ASSEMBLIES**			
	Does this Engineering Package install, modify or affect the function of:			
	A. Fire Barriers		X	
	B. Fire Doors		X	

* Indicate "YES" if an item is impacted or requires justification. If "YES", a section in the EP shall disposition or justify the item, with the EP section number referenced accordingly on this form.

III. FIRE RATED ASSEMBLIES (Cont)	YES*	NO	REFERENCE
C. Fire Dampers		X	
D. Mechanical Penetration Fire Seals		X	
E. HVAC Duct Penetration Fire Seals		X	
F. Cable Tray Fire Stops		X	
G. Structural Steel Fireproofing		X	
H. Conduit or Raceway Support Fireproofing		X	
I. Conduit or Raceway Fireproofing		X	
J. Internal Conduit Fireproofing (Stuffing)		X	

IV. EMERGENCY LIGHTING

	YES*	NO	REFERENCE
A. Does the Engineering Package install, modify, or affect the operation of?		X	
B. Does the Engineering Package obstruct the required light pattern of?		X	
C. Does the Engineering Package add or relocate essential equipment or components which will require the addition or relocation of?		X	
D. Does the Engineering Package install, relocate, modify, affect, or require the use of hand held emergency lights?		X	
E. Does the Engineering Package relocate, modify, affect, or obstruct the light pattern of perimeter security lighting to equipment requiring manual actions?		X	

V. RCP OIL COLLECTION

	YES*	NO	REFERENCE
Does the Engineering Package install, modify, or affect the operation of?		X	

VI. MISCELLANEOUS

	YES*	NO	REFERENCE
A. Does the Engineering Package affect the quantity or protection of insitu combustibles (solids, liquids, or gases) beyond the assumptions in the FHA?		X	

VI.	MISCELLANEOUS (Cont)	YES*	NO	REFERENCE
B.	Does the Engineering Package Cause the addition of a large combustible inventory within 50 ft. of essential equipment, components, electrical manholes or structures?		X	
C.	Does this Engineering Package modify or affect curbs or dikes used to contain combustible liquid spills?		X	
D.	Does this Engineering Package cause the removal of a flame retardant material from non IEEE-383 cables?		X	
E.	Does this Engineering Package affect fire protection technical specifications or fire fighting strategies?		X	
F.	Does this Engineering Package install, modify or affect the operation of alternate shutdown communications?		X	
G.	Does this Engineering Package install, modify, or affect hydrogen lines (or any combustible gas) in areas of the plant containing safe shutdown equipment or components?		X	
H.	Does this Engineering Package install, modify, or affect any HVAC equipment or room heat loads in areas of the plant containing Safe Shutdown equipment or components?		X	

PREPARED BY G. R. Dodd DATE 4/24/96

VERIFIED BY W Long DATE 4/24/96

ENVIRONMENTAL QUALIFICATION (EQ) CHECKLIST

1. ELECTRICAL EQUIPMENT	YES*	NO
a) Does the PC/M add, modify or replace electrical/I&C equipment or affect any EQ Doc Pac? If NO proceed to Section 2.	X	
b) Is the equipment located in a harsh environment per EQ Doc Pac 1000 (PSL) or 1001 (PTN)? If NO proceed to Section 2.		X
c) Does the equipment perform a safety related function?		
OR		
Does the equipment perform a quality related function such that its failure could mislead an operator or adversely affect any safety related function required to mitigate or monitor an accident?		
OR		
Is the equipment classified as Category 1 or 2 by RG 1.97?		

*** If the answer to any question in Section 1.c is YES, then the equipment is subject to 10CFR50.49 and the EP must justify that the equipment is Environmentally Qualified.**

2. ENVIRONMENTAL CONDITIONS	YES**	NO
a) Does the modification add, relocate, raise flow rate of, or increase radiation levels of any piping containing radioactive liquids such that lifetime or accident exposure of electrical equipment may be increased?		X
b) Does the modification add or reroute any high energy piping, the failure of which could impinge upon electrical equipment or increase the post-break local pressure or temperature?		X
c) Does the modification alter process fluid characteristics such that the post accident pressure, temperature, pH, or boron concentration to which electrical equipment will be exposed may be changed?		X
d) Does the modification alter any barriers that shield electrical equipment from high energy lines or radiation exposure?		X
e) Does the modification add equipment to Containment or increase the post-LOCA makeup water inventory such that the design basis Containment Flood Level may be increased?		X

**** If the answer to any question in Section 2 is YES, then it must be determined if any equipment subject to 10CFR50.49 could be impacted and, if so, that its Environmental Qualification is still valid. Document the determination in the EP.**

Prepared by/Date G. R. Dodd / 4/24/96 Verified by/Date W [signature] 4/24/96

ALARA SCREENING

1. Is this PC/M administrative only (no physical modifications)?

    ______ yes, Further ALARA screening is not required.

    __X__ no, Continue screening.

2. Does this PC/M involve a location in the Radiation Controlled Area (RCA)?

    __X__ yes, Location: EDG 1A/1B Buildings Continue screening.

    ______ no, Further ALARA screening is not required.

3. Does the implementation, operation, or maintenance of this PC/M involve:

    __No__ Movement of radioactive material?

    __No__ Modification of systems containing radioactive fluids or resins such that routing or retention characteristics are affected?

    __No__ Movement/modification of existing permanent radiation shielding?

    __No__ Modification or removal of equipment that results in an uncontrolled opening/penetration into a High Radiation Area, Locked High Radiation Area, Very High Radiation Area, or Exclusion Area?

    __No__ Diving associated with systems containing radioactive material?

    __No__ Entrance into containment during power operation?

    __No__ Potential for personnel exposure to a radiation field of ≥ 1r/hour (assuming current area dose rates)?

    __No__ A total lifetime estimated dose due to the modification greater than or equal to one (1) man rem?

If any item in Section 3 above is checked "yes", indicate "yes" below:

____ yes, This PC/M has the potential to significantly impact personnel radiation exposure. Complete Form 72 to ensure total radiation dose is minimized by design.

_X__ no, This PC/M has little or no impact on personnel radiation exposure. Form 72 not required, however, normal ALARA precepts should be followed to minimize radiation exposure.

Prepared: ____________________ ________ Verified: ______________________

** Leave signatures blank if same as on PC/M coversheet **

CIAS & CSAS ACTUATED COMPONENTS AND FUNCTIONS

OUTPUT RELAY	CONTACT	CONTROL EQUIPMENT	FUNCTION	REF. CWD	EFFECTS OF MODIFICATION
			CIAS-A		
K511A	1-6	Primary Coolant Sample Valve V-5200	Close	578	None. DC valve, does not affect EDG and does not require AC power.
K511A	4-12	Pressurizer Surge Line Sample V-5201	Close	579	None. DC valve, does not affect EDG and does not require AC power.
K511A	3-10	Pressurizer Steam Sample V-5202	Close	580	None. DC valve, does not affect EDG and does not require AC power.
K511A	2-8	SI Tank Sample Valve FCV-03-1E	Close	322	None. DC valve, does not affect EDG and does not require AC power.
K512A	1-6	Reactor Containment Purge Isol. FCV-25-1	Close	511	None. DC valve, does not affect EDG and does not require AC power.
K512A	4-12	Reactor Containment Purge Isol. FCV-25-3	Close	511	None. DC valve, does not affect EDG and does not require AC power
K512A	3-10	Reactor Containment Purge Isol. FCV-25-5	Close	511	None. DC valve, does not affect EDG and does not require AC power.
K512A	2-8	Reactor Containment Purge Fan HVE-8A	Stop	509	None. CIAS action is to stop fan. Does not affect EDG and does not require AC power to perform CIS function.
K512B	1-6	Non-Essential Load Shed	Trips non-essential 4160V bus loads	990	None. DC powered. Does not affect EDG and does not require AC power to perform CIS function.
K512B	4-12	Unit 2 Ctrl Room Emerg. Filtration Actuation	Start	500	None. System powered from Unit 2 EDG.
K513A	1-6	Waste Gas Isol V-6554	Close	564	None. DC valve, does not affect EDG and does not require AC power
K513A	4-12	Steam Gen 1A Blowdown Isol FCV-23-3	Close	318	None. DC valve, does not affect EDG and does not require AC power
K513A	3-10	Steam Gen 1A Blowdown Isol FCV-23-5	Close	318	None. DC valve, does not affect EDG and does not require AC power
K513A	2-7	Kitchen Exh. Fan Isol FCV-25-24	Close	1182	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS
K514A	1-6	Containment Sump Isol LCV-07-11A	Close	576	None. DC valve, does not affect EDG and does not require AC power
K514A	4-11, 4-12	Reactor Drain Tank Isol V-6301	Close	563	None. DC valve, does not affect EDG and does not require AC power
K514A	3-10	Spare			
K514A	2-9	Spare			
K515A	1-5	Diesel Generator 1A	Start	957	Contact Deleted
K515A	4-12	Diesel Gen 1A Lockout Relay Block	Blocks Non-essential EDG trips	956	Contact Deleted
K515A	3-9, 3-10	Spare			
K515A	4-11, 4-12	Spare			

OUTPUT RELAY	CONTACT	CONTROL EQUIPMENT	FUNCTION	REF. CWD	EFFECTS OF MODIFICATION
K516A	1-6	Stm Gen Sample Isol Valve FCV-23-7 & 9	Close	461	None. DC valve, does not affect EDG and does not require AC power.
K516A	2-7	Control Rm. Outside Air Inlet Valve FCV-25-17	Close	1173	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K516A	3-9	Control Rm. Outside Air Inlet Valve FCV-25-16	Close	1172	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K516A	4-12	Spare			
K517A	1-6	Containment Radiation Sampling Sys Isol Valves FCV-26-2, -4, -6	Close/Bypass	320	None. DC valve, does not affect EDG and does not require AC power.
K517A	2-7	Control Rm. Emerg. Filtration Fan HVE-13A & Inlet Damper D-18	Start/Open	490/499	Fan would stop for 18 seconds for a LOOP subsequent to a CIAS.
K517A	3-9	Shield Bldg Vent Exhaust Fan HVE-6A	Start	513	Fan would stop for 16 seconds in the event of a LOOP subsequent to CIAS (modes 5 & 6). No effect modes 1-4, see Note 1
K517A	4-12	Control Room Toilet Isol Valve FCV-25-18	Close	1174	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K518A	1-6	Letdown Containment Isol V-2516	Close	157	None. DC valve, does not affect EDG and does not require AC power.
K518A	3-9	Instrument Air Isol MV-18-1	Close	317	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K518A	2-8	Instrument Air Isol MV-18-1	Open Inhibit	317	None. Does not require power to perform function.
K518A	4-12	RCP Controlled Bleed-off Isol V-2505	Close	159	None. DC valve, does not affect EDG and does not require AC power.
CSAS-A					
K519A	1-6	Containment Spray Pump 1A	Start	287	None. CSAS would have been preceded by a SIAS, which would have started EDG.
K519A	2-7, 2-8	Spare			
K519A	3-9, 3-10	Spare			
K519A	4-11, 4-12	Spare			
K520A	1-5	Containment Spray FCV-07-1A	Open	289	None. DC valve, does not affect EDG and does not require AC power.
K520A	2-7, 2-8	Spare			
K520A	3-9, 3-10	Spare			
K520A	4-11, 4-12	Spare			

OUTPUT RELAY	CONTACT	CONTROL EQUIPMENT	FUNCTION	REF. CWD	EFFECTS OF MODIFICATION
K521A	1-6	Diesel Generator 1A	Start	957	Contact deleted.
K521A	2-8	Spare			
K521A	3-10	Diesel Generator 1A Load Resequencing	Resequence Load Blocks 6 & 7	629	None. CSAS would have been preceded by a SIAS, which would have started EDG. Resequencing of Load Blocks 6 & 7 still required.
K521A	4-12	Diesel Generator 1A Lockout Block	Blocks non-essential EDG trips.	956	Contact deleted.
			CIAS-B		
K611A	1-6	Primary Coolant Sample Valve V-5203	Close	578	None. DC valve, does not affect EDG and does not require AC power.
K611A	4-12	Pressurizer Surge Line Sample V-5204	Close	579	None. DC valve, does not affect EDG and does not require AC power.
K611A	3-10	Pressurizer Steam Sample V-5205	Close	580	None. DC valve, does not affect EDG and does not require AC power.
K611A	2-8	Spare			
K612A	1-6	Nitrogen Header Isol V-6741	Close	566	None. DC valve, does not affect EDG and does not require AC power.
K612A	2-8	Reactor Containment Purge Isol. FCV-25-6	Close	512	None. DC valve, does not affect EDG and does not require AC power.
K612A	3-10	Reactor Containment Purge Isol. FCV-25-4	Close	512	None. DC valve, does not affect EDG and does not require AC power.
K612A	4-12	Reactor Containment Purge Isol. FCV-25-2	Close	512	None. DC valve, does not affect EDG and does not require AC power.
K612B	1-6	Non-Essential Load Shed	Trips non-essential 4160V bus loads	992	None. DC powered. Does not affect EDG and does not require AC power to perform CIS function.
K612B	2-7, 2-8	Spare			
K612B	3-9, 3-10	Spare			
K612B	4-12	Reactor Containment Purge Fan HVE-8B	Stop	510	None. CIAS action is to stop fan. Does not affect EDG and does not require AC power to perform CIS function.
K613A	1-6	Waste Gas Isol V-6555	Close	564	None. DC valve, does not affect EDG and does not require AC power.
K613A	4-12	Steam Gen 1B Blowdown Isol FCV-23-4	Close	319	None. DC valve, does not affect EDG and does not require AC power.
K613A	3-10	Steam Gen 1B Blowdown Isol FCV-23-6	Close	319	None. DC valve, does not affect EDG and does not require AC power.
K613A	2-7	Kitchen Exh. Fan Isol FCV-25-25	Close	1183	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.

OUTPUT RELAY	CONTACT	CONTROL EQUIPMENT	FUNCTION	REF. CWD	EFFECTS OF MODIFICATION
K614A	1-6	Containment Sump Isol LCV-07-11B	Close	576	None. DC valve, does not affect EDG and does not require AC power.
K614A	4-12	Reactor Drain Tank Isol V-6302	Close	563	None. DC valve, does not affect EDG and does not require AC power.
K614A	3-10	Unit 2 Ctrl Room Emerg. Filtration Actuation	Start	500	None. System powered from Unit 2 EDG.
K614A	2-7, 2-8	Spare			
K615A	1-5	Primary Water Isol MV-15-1	Close	849	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K615A	2-8	Diesel Generator 1A Lockout Block	Blocks non-essential EDG trips.	956	Contact deleted.
K615A	3-9	Diesel Generator 1B	Start	967	Contact deleted.
K615A	4-12	Primary Water Isol MV-15-1	Open inhibit	849	None. Does not require power to perform function.
K616A	1-5, 1-6	Spare			
K616A	2-7	Control Rm. Outside Air Inlet Valve FCV-25-15	Close	1171	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K616A	3-9	Control Rm. Outside Air Inlet Valve FCV-25-14	Close	1170	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K616A	4-12	SI Tank Sample Isol. Valve FCV-03-1F	Close	322	None. DC valve, does not affect EDG and does not require AC power.
K617A	1-6	Containment Radiation Sampling Sys Isol Valves FCV-26-1, -3, -5	Close/Bypass	320	None. DC valves, do not affect EDG and does not require AC power.
K617A	2-7	Control Rm. Emerg. Filtration Fan HVE-13B & Inlet Damper D-19	Start/Open	491/499	Fan would stop for 18 seconds for a LOOP subsequent to a CIAS.
K617A	3-9	Shield Bldg Vent Exhaust Fan HVE-6B	Start	516	Fan would stop for 16 seconds in the event of a LOOP subsequent to CIAS (modes 5 & 6). No effect modes 1-4, see Note 1
K617A	4-11	Control Room Toilet Isol Valve FCV-25-19	Close	1175	Isolation valves could stop for 10 seconds for a LOOP subsequent to a CIAS.
K618A	1-6	Letdown Stop Valve V-2515	Close	159	None. DC valve, does not affect EDG and does not require AC power.
K618A	2-7, 2-8	Spare			
K618A	3-9, 3-10	Spare			
K618A	4-12	RCP Controlled Bleed-off Isol ISE-01-1	Close	159	None. DC valve, does not affect EDG and does not require AC power.

OUTPUT RELAY	CONTACT	CONTROL EQUIPMENT	FUNCTION	REF. CWD	EFFECTS OF MODIFICATION
			CSAS-B		
K619A	1-6	Containment Spray Pump 1B	Start	290	None. CSAS would have been preceded by a SIAS, which would have started EDG.
K619A	2-7, 2-8	Spare			
K619A	3-9, 3-10	Spare			
K619A	4-11, 4-12	Spare			
K620A	1-5	Containment Spray FCV-07-1B	Open	289	None. DC valve, does not affect EDG and does not require AC power.
K620A	2-7, 2-8	Spare			
K620A	3-9, 3-10	Spare			
K620A	4-11, 4-12	Spare			
K621A	1-6	Diesel Generator 1B	Start	967	Contact deleted
K621A	2-7, 2-8	Spare			
K621A	3-10	Diesel Generator 1B Load Resequencing	Resequence Load Blocks 6 & 7	630	None. CSAS would have been preceded by a SIAS, which would have started EDG. Resequencing of Load Blocks 6 & 7 still required.
K621A	4-11	Spare			

REFERENCES:

1. 8770-5521
2. 8770-5525
3. 8770-5522
4. 8770-5524

NOTES:

1. Chapter 15 analyzed accidents, which would generate a CIAS in modes 1 - 4, would also generate a concurrent SIAS. This would result in automatic start of the EDGs

FSAR CHANGE PACKAGE (FCP) COVERSHEET

Plant St. Lucie Unit 1

FSAR PAGES ATTACHED:

7.3-18
7.3-49
7.3-53
7.3-54
8.3-8
8.3-9
8.3-10

FSAR FIGURES ATTACHED:

Figure 8.3-5

COMMENTS:

Automatic start of EDG on CIAS or CSAS is deleted by this PC/M.

A. R. Dodd 4/24/96
Prepared by/Date:

W Vez 4/24/96
Verified by/Date:

M F Melliin 4/24/96
Approved by/Date:

Notes:

1. All affected FSAR pages and tables shall be legibly marked up and attached. If additional space is required. then additional pages should be provided. New information for inclusion in the FSAR shall also be provided.

2. If a figure is provided elsewhere in the design package, then it need not be duplicated in the FCP. However, a note should be provided in the comment section referring to its location in the package. This also applies to new drawings which should be added to the FSAR. If a figure revision is to be included in the FCP, then a copy of the FSAR figure with a bubble around the affected area is sufficient.

In the event of a LOCA, the emergency diesel generators are automatically started on SIAS~~, CSAS or CIS~~. The actuating instrumentation and controls for these signals are part of the engineered safety features actuation system and are discussed in Sections 7.3.1.1.8, 7.3.1.1.10 and 7.3.1.1.11.

b) Control of System Operation

Once the system is actuated the diesel generator voltage and frequency are automatically controlled. Each diesel generator set has its own speed control system and voltage regulator. No other manual or automatic controls are necessary for proper system functioning. Manual backup for voltage and frequency controls are provided locally and in the control room.

Control switches are also provided locally and in the control room for manually starting the diesel generators and operating the generator breakers.

c) Monitoring of System Operation

Control room indication, alarm and status instrumentation is provided to enable the operator to evaluate system performance and detect malfunctions. Diesel generator current voltage and frequency are indicated. Alarms are provided to indicate diesel generator malfunction or trip. Refer to Sections 7.5 and 8.3.1.1.7.

d) Bypasses, Interlocks, and Sequencing

Upon loss of off-site power, the emergency diesel generators are automatically started, the breakers between normal and emergency buses are automatically tripped and loads are automatically stripped from the emergency buses. When the emergency diesel generators reach operating frequency and voltage, the diesel generator breakers are automatically closed and the loads required for safe shutdown which were previously running are automatically restarted and loaded on the diesel generators in the proper sequence as shown in Table 8.3-2. Additional loads are manually connected as required. The automatic starting and loading sequence is discussed fully in Section 8.3.1.1.7. Diesel generator logic and electrical schematic control diagrams are shown in Section 8.3.

e) Redundancy

Separate control switches and actuation circuitry is provided for starting emergency diesel generators and actuating emergency bus breakers. Physical and electrical separations are provided as discussed in Section 7.3.2.2.

7.3.1.3.4 ECCS Area Ventilation System

The auxiliary building ECCS pump area ventilation system P&ID is shown on Figure 9.4-2. The locations of the system components are shown on the plant general arrangement drawings and system logic is shown on Figures 7.3-28 through 7.3-31. The system is also discussed in Section 9.4-3.

TABLE 7.3-4

COMPONENTS ACTUATED ON ~~RAS~~ CSAS

ESFAS Action	Component	Safety Channel A	Safety Channel B	AB	(3)Returns To Normal Upon ESF-AS Reset	ESFAS Test Group	CWD
Start	Containment Spray Pump 1A	X			No	1A	287
Start	Containment Spray Pump 1B		X		No	1B	290
Open	Containment Spray Header A Inlet Valve FCV-07-1A	X			No	2A	289
Open	Containment Spray Header B Inlet Valve FCV-07-1B		X		No	2B	289
~~Start~~	~~Diesel Generator 1A~~	~~X~~			~~No~~	~~3A~~	~~957~~
~~Start~~	~~Diesel Generator 1B~~		~~X~~		~~No~~	~~3B~~	~~967~~
~~Block Trip~~	~~Diesel Generator Lockout Relay 1A~~	~~X~~			~~(1)Yes~~	~~3A~~	~~956~~
Rese-quence Block 6 & 7	Diesel Generator Loading 1A	X			(2)	3A	629
~~Block Trip~~	~~Diesel Generator L/Dckout Relay 1B~~		~~X~~		~~(1)Yes~~	~~3B~~	~~966~~
Rese-quence Block 6 & 7	Diesel Generator Loading 1B		X		(2)	3B	630
Open	Caustic Spray Valve I-SE-07-1A	X			No	1A	292

TABLE 7.3-5(Cont'd)

ESFAS Action	Component	Safety Channel A	Safety Channel B	AB	(3)Returns To Normal Upon ESF-AS Reset	ESFAS Test Group	CWD
Close	Reactor Cavity Sump Pump Disch. Isolation Valve LCV-07-11B		X		No	4B	576
Close	Control Room Outside Air Inlet Valve North FCV-25-16	X			No	6A	1172
Close	Control Room Outside Air Inlet Valve North FCV-25-14		X		No	6B	1170
Close	Control Room Outside Air Inlet Valve South FCV-25-17	X			No	6A	1173
Close	Control Room Outside Air Inlet Valve South F[illegible]V-25-15		X		No	6B	1171
Close	Control Room Toilet Air Exhaust Valve FCV-25-18	X			No	7A	1174
Close	Control Room Toilet Air Exhaust Valve FCV-25-19		X		No	7B	1175
Close	Control Room Kitchen Air Exhaust Valve I-FCV-25-24	X			No	3A	1182
Close	Control Room Kitchen Air Exhaust Valve I-FCV-25-25		X		No	3B	1183
~~Block Trip~~	~~Diesel Generator 1A Lockout Relay 83~~	~~X~~			~~Yes(?)~~	~~5A~~	~~956~~
~~Block Trip~~	~~Diesel Generator 1B Lockout Relay 83~~		~~X~~		~~Yes~~	~~5B~~	~~966~~

TABLE 7.3-5(Cont'd)

ESFAS Action	Component	Safety Channel A	Safety Channel B	AB	(3)Returns To Normal Upon ESF-AS Reset	ESFAS Test Group	CWD
Close	Containment Sample Isolation Valves:					7A	320
	FCV-26-2	X			No		
	FCV-26-4	X			No		
	FCV-26-6	X			No		
Close	Containment Sample Isolation Valves:					7B	320
	FCV-26-1		X		No		
	FCV-26-3		X		No		
	FCV-26-5		X		No		
~~Start~~	~~Diesel Generator 1A~~	~~X~~			~~No~~	~~5A~~	~~957~~
~~Start~~	~~Diesel Generator 1B~~		~~X~~		~~No~~	~~5B~~	~~967~~
Close	RDT Discharge Isolation Valve V-6301	X			No(2)	4A	563
Close	RDT Discharge Isolation Valve V-6302		X		No(2)	4B	563
Close	Steam Generator B Blowdown Isolation Valve FCV-23-5	X			No(2)	3A	319
Close	Steam Generator A Blowdown Sample Isolation Valve FCV-23-7	X			No(2)	6A	461
Close	Steam Generator B Blowdown Sample Isolation Valve FCV-23-9	X			No(2)	6A	461

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and do not depend on normal plant electrical power (except for 125V dc power) or any other plant systems for starting operation. Diesel generator starting tests are described in Section 8.3.1.3.

c. Fuel Supply System

The diesel oil fuel supply system is shown on Figures 9.5-1, 9.5-2 and 9.5-3. Two oil storage tanks are provided with a combined usable capacity of 38,350 gallons which is sufficient for 8.0 days of post-LOCA load profile operation of one diesel generator set. Each diesel generator set is served by two diesel oil day tanks each of which has a usable capacity of 159 gallons. This is sufficient to allow 1.25 hours of full post-accident load operation of the associated diesel generator set. Two diesel oil transfer pumps are provided to replenish the day tanks from oil storage tanks. These pumps are automatically controlled on day tank level and have a capacity of 25 gpm each. The diesel oil supply system is discussed more fully in Section 9.5.4.

Each of the engines on each diesel generator set has its own fuel system which includes a day tank, a fuel pump, actuator and piping. The fuel system for each engine of a diesel generator set takes its supply from the day tank provided for that diesel engine.

d. Automatic Starting and Loading

In the event of loss of normal sources of power to the onsite power system, each diesel generator set is automatically started and loaded by controls and circuitry which are independent of that used to start and load the redundant unit. Typical diesel generator starting and loading logic is shown on figure 8.3-5 and is as follows:

1) The diesel generator sets wi-11 start upon loss of voltage in the emergency 4.16 kv and/or 480v buses and/or actuation of ~~any engineered safety features signal which include~~ safety injection actuation signal (SIAS)~~, containment isolation signal (CIS) or containment spray actuation signal (CSAS)~~.

2) Upon loss of voltage in the 4.16 kv and/or 480V emergency buses, these buses will be automatically separated from the normal supply buses and all loads on the emergency buses will be tripped except those shown in Table 8.3-2 as part of the first load block. The pressurizer heater transformers, which are non-safety related loads are connected to the 4.16 kv buses. They are tripped from the buses upon loss of offsite power, however, and can only be reconnected to the buses manually.

3) After each diesel generator set has attained normal frequency and voltage, its breaker will close if normal ac power has been lost, thus immediately starting all loads belonging to the first block for which "starting required" signals are present (from engineered safety features actuation signals or from circuit conditions indicating that they were previously running). If normal ac power is still present, the diesel generator breaker will not close but the set will remain at full frequency and voltage until shut down manually.

4) The starting of subsequent loads are delayed by timing relays with 3 second intervals between them. Relays provided have a timing repeatablility accuracy of ± 5 percent.

5) If normal ac power is lost but no engineered safety features actuation signal is present, only the loads shown under the column "Loss of Off-Site Power" in Table 8.3-2 will be automatically started.

6) If, while operating as per (5) a safety injection actuation signal appears, any non emergency load that is running will be automatically tripped and the required emergency loads will be started automatically as in (3) and (4).

7) Means are provided for periodic exercising of the diesel generator sets under load when normal bus supply is from the unit auxiliary transformer. If normal ac power is lost or an accident occurs during this exercising, the diesel generator breaker is opened and the sequence returns to (3).

An idle start capability for the diesel generator sets is installed to provide a timed idle period, a controlled acceleration, and a timed idle period prior to shutdown. This feature reduces wear to the engine internals and turbocharger gear train during normal testing of the diesels. This feature is automatically overriden on an emergency start signal.

All control circuits and their components are provided with means for manual testing during normal plant operation and meet IEEE-279 criteria.

The starting and loading circuitry for the diesel generator and 4.16 kv busses is shown schematically on Figures 8.3-6A through 8.3-6i.

Means are provided to permit applying any load in the plant to the diesel generator set within its capability. However, this is strictly a manual operation under the operator's full control.

e. Protection

The diesel generator is shut down and its breaker is tripped whenever a diesel generator lockout occurs. Below is a list of conditions causing a lockout in the absence of an SIAS, ~~CIS or CSAS,~~ or with offsite power available, or during normal testing operations:

1) low engine oil pressure
2) high engine water temperature
3) engine overspeed
4) generator differential
5) generator overcurrent
6) reverse power flow to generator
7) loss of generator excitation

These lockouts are alarmed locally and annunciated in the control room as a lockout of the 1A and 1B diesel generator. Besides the above lockouts, the generator breaker is tripped and the engine is left running if a 4.16 kv bus failure occurs. Each diesel generator can be manually started or stopped both locally and from the control room.

If the diesel is started as a result of an SIAS~~, CIS, CSAS~~ or loss of offsite power, all but two diesel generator lockout signals are overriden. Those which remain functional are engine overspeed and generator differential. Overriding all but two of the lockout signals reduces the probability of spuriously tripping a diesel generator when it may be required to shut down the plant or mitigate the consequences of an accident. The rationale for retaining the engine overspeed and generator differential lockouts is in mitigating the probability of seriously damaging a diesel should one of these adverse conditions occur. The lockouts may permit a repair and return to serve during an accident or loss of offsite power condition. The two trips that are not overriden are commonly used in power plant application and have histories of highly reliable operation. The reliability of the two lockouts discussed above warrants maintaining their protective capability during normal and accident conditions.

By means of potential and current transformer test blocks and a test position of the diesel generator circuit breakers the capability is provided to periodically test the protective relaying components and the system as a whole.

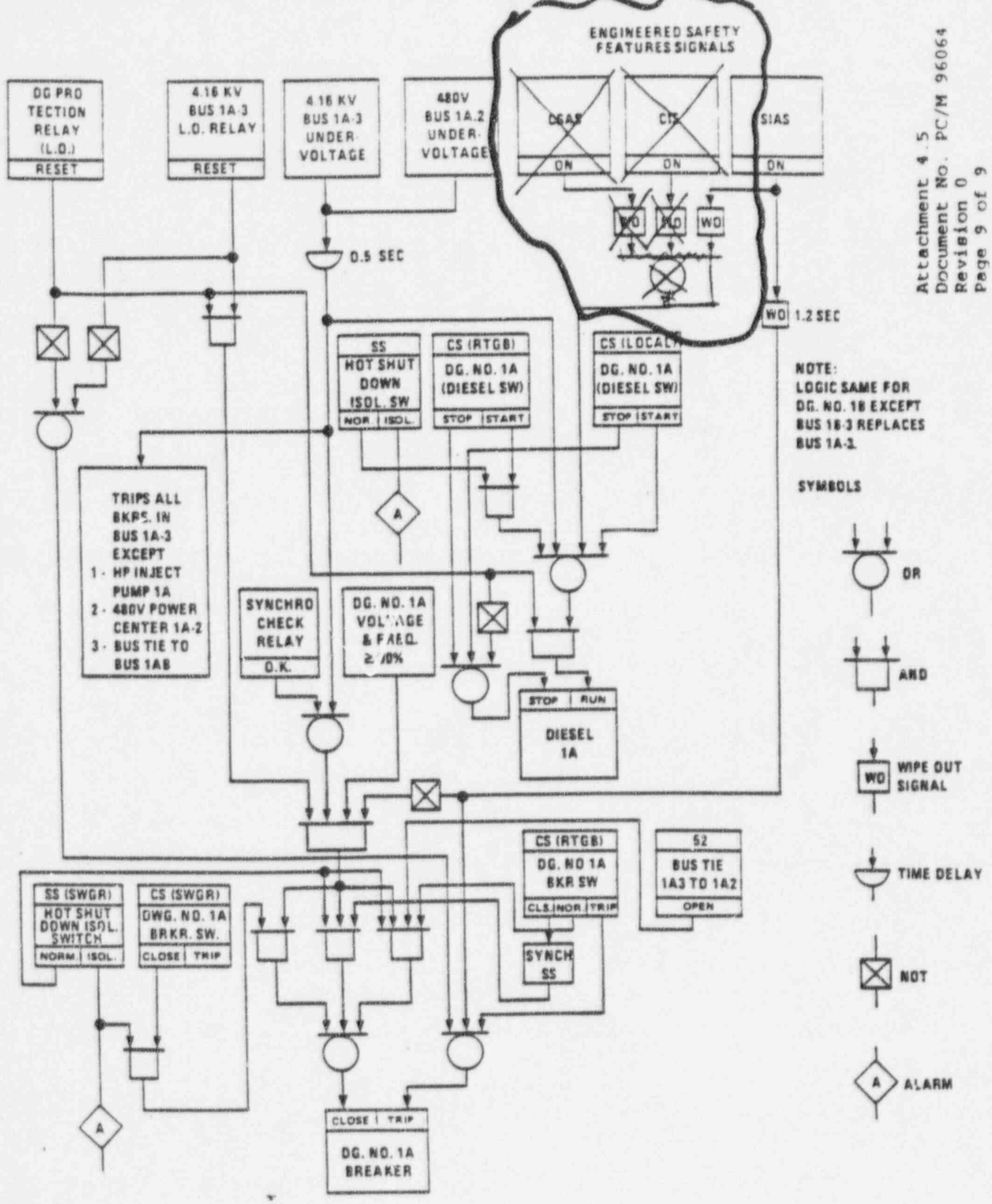
Figures 8.3-6B and E show the diesel generator lockout relays.

f. Instrumentation

All power supply sources for the diesel generator instrumentation and control system are in accordance with the redundancy criteria discussed in Section 8.3.1.2.

The following parameters are monitored and indicated either locally or in the control room:

		Control Room	Local
1)	generator voltage	*	*
2)	4 kv bus voltage	*	*
3)	generator current	*	*
4)	generator watts	*	*
5)	generator watt-hours	*	
6)	generator frequency	*	*
7)	generator reactive power		*
8)	generator field voltage		*
9)	generator field current		*
10)	diesel generator elapsed running time		*
11)	generator breaker position	*	*



FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 1

TYPICAL DIESEL GENERATOR
AUTOMATIC STARTING LOGIC

FIGURE 8.3-5

DESIGN BASIS DOCUMENT (DBD) CHANGE PACKAGE COVERSHEET

Plant St. Lucie Unit 1

DBD PAGES ATTACHED:

i, ii, iii, 48, 49, 169a, 186

DBD FIGURES ATTACHED:

COMMENTS:

A.R. Dodd 4/24/96
Prepared by/Date:

W Lezy 4/24/96
Verified by/Date:

MF Mullins 4/24/96
Approved by/Date:

Notes:

1. All affected DBD pages and tables shall be legibly marked up and attached. If additional space is required. then additional pages should be provided. New information for inclusion in the DBD shall also be provided.

2. If a figure is provided elsewhere in the design package, then it need not be duplicated in the DBD change package. However, a note should be provided in the comment section referring to its location in the package. This also applies to new drawings which should be added to the DBD. If a figure revision is to be included in the change package, then a copy of the DBD figure with a bubble around the affected area is sufficient.

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE UNIT 1

EMERGENCY DIESEL GENERATOR SYSTEM

Design Basis Document

DBD-EDG-1

REVISION ~~0~~ 1

LIST OF EFFECTIVE PAGES

Page	Rev	Page	Rev	Page	Rev
i	1	34	0	71	0
ii	1	35	0	72	0
iii	0	36	0	73	0
iv	0	37	0	74	0
1	0	38	0	75	0
2	0	39	0	76	0
3	0	40	0	77	0
4	0	41	0	78	0
5	0	42	0	79	0
6	0	43	0	80	0
7	0	44	0	81	0
8	0	45	0	82	0
9	0	46	0	83	0
10	0	47	0	84	0
11	0	48	1	85	0
12	0	49	1	86	0
13	0	50	0	87	0
14	0	51	0	88	0
15	0	52	0	89	0
16	0	53	0	90	0
17	0	54	0	91	0
18	0	55	0	92	0
19	0	56	0	93	0
20	0	57	0	94	0
21	0	58	0	95	0
22	0	59	0	96	0
23	0	60	0	97	0
24	0	61	0	98	0
25	0	62	0	99	0
26	0	63	0	100	0
27	0	64	0	101	0
28	0	65	0	102	0
29	0	66	0	103	0
30	0	67	0	104	0
31	0	68	0	105	0
32	0	69	0	106	0
33	0	70	0	107	0
				108	0

LIST OFEFFECTIVE PAGES

Page	Rev	Page	Rev
109	0	148	0
110	0	149	0
111	0	150	0
112	0	151	0
113	0	152	0
114	0	153	0
115	0	154	0
116	0	155	0
117	0	156	0
118	0	157	0
119	0	158	0
120	0	159	0
121	0	160	0
122	0	161	0
123	0	162	0
124	0	163	0
125	0	164	0
126	0	165	0
127	0	166	0
128	0	167	0
129	0	168	0
130	0	169	0
131	0	169a	1
132	0	170	0
133	0	171	0
134	0	172	0
135	0	173	0
136	0	174	0
137	0	175	0
138	0	176	0
139	0	177	0
140	0	178	0
141	0	179	0
142	0	180	0
143	0	181	0
144	0	182	0
145	0	183	0
146	0	184	0
147	0	185	0
		186	1

3.0 SYSTEM OPERATING LIMITATIONS

The diesel-generators are designed to start automatically on undervoltage signals as well as ~~certain ESFAS signals~~ **Safety Injection Actuation Signal (SIAS)**. On ~~an ESFAS signal~~ **SIAS**, the generators are started in anticipation of a loss of offsite power. However, the diesel-generators may run unloaded (on standby) for extended periods if the offsite power supply is not interrupted. No load or light load operation at full rated speed is a condition that is unique for engines in nuclear service and may occur during periodic testing as well as during accident conditions. The GM Electro-Motive Division engine was originally designed for locomotive service where no load speeds for the engines and generators are much lower than full speeds. The locomotive diesel only runs at full speed when under full load.

No load or light load operation at full rated speed can cause exhaust fires as well as general engine deterioration. Two-cycle engines have a particularly small amount of energy in the exhaust gas at no load. Lube oil leakage into the intake manifold and exhaust can occur under these conditions as a result of oil leakage from the turbocharger bearings. Turbocharger bearing leakage occurs because there is a lack of sufficient air pressure under these conditions to balance the oil pressure around the bearing. Sustained light load operation can cause the exhaust system to load-up with lube oil and unburned fuel. When full load is applied, there is some likelihood that exhaust fires and perhaps turbocharger overspeed and destruction will occur because of the very large volume of exhaust gas and high temperature. Consequently, the engine manufacturer recommends that the exhaust system be "cleaned out" after 4½ hours of operation at synchronous speed with loads between 0 and 20%. To clean out the exhaust stacks, the manufacturer recommends running the engine at a minimum of 40% load for a minimum of 30 minutes.

No load and light load operation also causes incomplete combustion and should be minimized in the interest of reducing the formation of gum and varnish deposits on the engine cylinder walls, valves, and piston rings.

4.0 SYSTEM INTERFACES

4.1 Supported Systems

System	Requirements/Limitations
Class 1E 4160 V ac	The emergency diesel generators are required to provide power (4160 V ac, 3-phase, 60 hz) to the independent load groups for accident mitigation or safe shutdown of the plant when the offsite power supply is interrupted. Voltage and frequency must be maintained during load sequencing to accelerate motor loads to rated speed while preventing the coastdown or stalling of running motors. Voltage and frequency must be maintained within acceptable levels during steady state operation to prevent degraded equipment performance.

4.2 Supporting Systems

System	Requirements/Limitations
Class 1E 125 V dc	125 V dc control power is required for the control circuits, field flashing circuits and air start solenoid valves to permit diesel-generator startup when the offsite ac power supply is interrupted. The control power must be provided from independent circuits supplied from the station battery of the same division. 125 V dc power is also required for the electric-driven fuel pump and the backup soak back pump on each engine.
Class 1E 480 V ac	480 V ac power is required for the immersion heaters and soak back pump on each engine. These components maintain the engines in a warm, ready to start condition.
ESFAS	ESFAS provides the safety injection~~, containment isolation, and containment spray system~~ actuation signals to the engine start circuitry. The ~~ESFAS~~ safety injectio. signal~~s~~ for each engine must be provided from independent trains of the same division.

8.2.9 PC/M 96064 - Deletion of EDG Automatic Start on CIAS and CSAS

The EDG automatic starts on CIAS and CSAS were deleted. This was done to prevent a situation where an EDG would be running in parallel to offsite power and a CIAS or CSAS without SIAS would occur. The result of such an occurrance would be to block the protective relay trips while the EDG was still paralleled to offsite power. This could cause damage to the EDG in the event of a condition requireing a trip of the EDG, such as reverse pwer or overcurrent, which would otherwise be blocked with the CIAS or CSAS present. It was determined that the plant design basis did not require EDG start in standby for CIAS or CSAS.

10.7.11	Document No. 8770-B-052, Ebasco Piping Line List (St. Lucie Unit 1), Revision 21
10.7.12	PC/M 357-178, Diesel Generator Idle Start, Supplement 1
10.7.13	**PC/M 96064, "Deleti... of EDG Automatic Start on CIAS and CSAS," Rev. 0, Supp. 0.**

Notes:

1. Drawing 8770-5659 does not appear to reference correct part number for the thermostatic valve. Part list for the engine references No. 8394263
2. FSAR does not include high crankcase pressure as a non-emergency trip
3. Calculation No. PSL-1FJM-91-004, Unit 1 EDG Diesel Oil Transfer System Discharge Pressure and Discharge Flow and Minimum Net Positive Suction Head, Revision 1, does not specify the correct NPSH requirement for the transfer pump operating at 73.4 gpm. The calculation quotes the minimum required NPSH as 11 feet. However, the pump curve shows that it is about 6 feet.
4. FSAR Table 9.5-3 lists ASME Section III as the design code for the cooling water piping. Reference 10.6.7 (vendor letter) specified ANSI B31.7 as the piping design code.
5. FSAR Table 9.5-1 indicates that the diesel oil storage tanks and skid-mounted day tanks are ASME Section III (Class 3) components. However, the DOST was designed to API Standard 620 and the day tanks were designed to NFPA code № 30, 31 & 37
6. The design temperature for the air start subsystem is 300 °F per the line list and EMDRAC drawing 8770-5656, Emergency DG Set Air System Piping Spec.. It is listed as 350 °F in calculation No. PSL-1XJM-73-054, Diesel Engine Cooling Water System Design Data (vendor letter)

Facility PSL Unit 01
PC/M ~~or DCR No.~~ ~~9406~~96064 ARO 4/24/96
Attachment No. 4.7
Revision No. 0
Page 1 of 1

TOTAL EQUIPMENT DATA BASE CHANGE PACKAGE COVER SHEET

Description of Change:

The following components are to be made spare:
K20/957
K21/957
K20/967
K21/967

Basis for Change:

PC/M 96064 deletes the CIAS and CSAS automatic start and non-essential trips for EDGs 1A & 1B. The components listed above are to be abandoned in place in the EDG Control Panels.

References:

PC/M 96064
CWD 8770-B-327 Sh. 957
CWD 8770-B-327 Sh. 967

Approvals

Prepared by A. R. Dodd Date 4/24/96
Verified by W [signature] Date 4/24/96
Approved by [signature] Date 4/24/96

Data Review/Input

Reviewed by: ______ Date: ______
(as applicable)

Data Entry by: ______ Date: ______

Data Entry Verified by: ______ Date: ______

Form 53, Rev 6/94

Facility PSL Unit 01
PC/M ~~or DCR No.~~ ~~94064~~ 96064 ARD 4/24/9
Attachment No. 4.8
Revision No. 0
Page 1 of 2

CABLE AND RACEWAY SYSTEM (CARS) CHANGE PACKAGE COVER SHEET

Description of Change:

The following cables are to be made spare:
10957E (becomes SP11973)
10957G (becomes SP11974)
10967E (becomes SP11975)
10967G (becomes SP11976)

Basis for Change:

PC/M 96064 deletes the CIAS and CSAS automatic start and non-essential trips for EDGs 1A & 1B. The cables listed above are routed between the ESC-SA and -SB and DG 1A and 1B Control Panels and are to be made spare.

References:

PC/M 96064
CWD 8770-B-327 Sh. 957
CWD 8770-B-327 Sh. 967

Approvals

Prepared by A. R. Dodd Date 4/24/96
Verified by W [signature] Date 4/24/96
Approved by [signature] Date 4/24/96

Data Review/Input

Reviewed by: ________ Date: ____
(as applicable)

Data Entry by: ________ Date: ____

Data Entry Verified by: ________ Date: ____

Current As Of 4/18/96
08:05:06

FLORIDA POWER AND LIGHT COMPANY

Cable And Raceway: Cable List Report Listing

ST. LUCIE PLANT Unit 1

SELECTION CRITERIA: '10957E','10957E',96064,'W','01'

Facility PSL Unit 01
PC/M ~~or DCR No.~~ ~~94064~~ 96064 ARW 4/24/96
Attachment No. 4.8
Revision No. 0

Cable Id	Stat	Sep Cd/ System	Qty	BM Id/ Description	Length	Equipment Description	Cable Routing
10957E	W D	SA DG	1	D03-12 2/C #16	487	From: ESC PNL SA To: DG-1A CNTL PNL	10957B, C17, 245, 204, 203, 202, 752, 751, 783, 750, 748, 747, 744, 741, 738, 739, 2116, C10, 2081, 2092, 2112, 1350, 1371, 1372, 1351, 1369, 1375, 1352, 1353, 1354, 1358, DR170, 13137
10957G	W D	SA DG	1	D03-12 2/C #16	487	From: ESC PNL SA To: DG-1A CNTL PNL	10957B, C17, 245, 204, 203, 202, 752, 751, 783, 750, 748, 747, 744, 741, 738, 739, 2116, C10, 2081, 2092, 2112, 1350, 1371, 1372, 1351, 1369, 1375, 1352, 1353, 1354, 1358, DR170, 13137
10967E	W D	SB DG	1	D03-12 2/C #16	594	From: ESC PNL SB To: DG-1B CNTL PNL	R9-25SB, C38, 219, 220, 258, R6-2SB, C30, 230, 229, 228, 231, 251, 233, 235, 237, 238, 239, 240, 241, 242, 2035, 2034, 2033, 2032, 2031, 2062, 2063, 2064, 2065, 2050, 2049, 2045, 2044, 2043, 1842, 1841, 1840, 1839, 1838, 1837, 1845, 1846, 1847, 1848, 1849, 1856, 1919, 1922, 1923, 1924, 1925, 1906, 1907, 1908, 1909, 1926, 1935, 1927, 1910, 1914, 1928, 1915, 1912, 1913, 11162, DR174, 10987
10967G	W D	SB DG	1	D03-12 2/C #16	594	From: ESC PNL SB To: DG-1B CNTL PNL	R9-25SB, C38, 219, 220, 258, R6-2SB, C30, 230, 229, 228, 231, 251, 233, 235, 237, 238, 239, 240, 241, 242, 2035, 2034, 2033, 2032, 2031, 2062, 2063, 2064, 2065, 2050, 2049, 2045, 2044, 2043, 1842, 1841, 1840, 1839, 1838, 1837, 1845, 1846, 1847, 1848, 1849, 1856, 1919, 1922, 1923, 1924, 1925, 1906, 1907, 1908, 1909, 1926, 1935, 1927, 1910, 1914, 1928, 1915, 1912, 1913, 11162, DR174, 10987
SP11973	W N	SA	1	D03-12 2/C #16	487	From: SPARE (ESC PNL SA) To: SPARE (DG-1A CNTL PNL)	10957B, C17, 245, 204, 203, 202, 752, 751, 783, 750, 748, 747, 744, 741, 738, 739, 2116, C10, 2081, 2092, 2112, 1350, 1371, 1372, 1351, 1369, 1375, 1352, 1353, 1354, 1358, DR170, 13137 NOTE: PCM 96064 WAS ESSENTIAL CABLE 10957E
SP11974	W N	SA	1	D03-12 2/C #16	487	From: SPARE (ESC PNL SA) To: SPARE (DG-1A CNTL PNL)	10957B, C17, 245, 204, 203, 202, 752, 751, 783, 750, 748, 747, 744, 741, 738, 739, 2116, C10, 2081, 2092, 2112, 1350, 1371, 1372, 1351, 1369, 1375, 1352, 1353, 1354, 1358, DR170, 13137 NOTE: PCM 96064 WAS ESSENTIAL CABLE 10957G
SP11975	W N	SB	1	D03-12 2/C #16	594	From: SPARE (ESC PNL SB) To: SPARE (DG-1B CNTL PNL)	R9-25SB, C38, 219, 220, 258, R6-2SB, C30, 230, 229, 228, 231, 251, 233, 235, 237, 238, 239, 240, 241, 242, 2035, 2034, 2033, 2032, 2031, 2062, 2063, 2064, 2065, 2050, 2049, 2045, 2044, 2043, 1842, 1841, 1840, 1839, 1838, 1837, 1845, 1846, 1847, 1848, 1849, 1856, 1919, 1922, 1923, 1924, 1925, 1906, 1907, 1908, 1909, 1926, 1935, 1927, 1910, 1914, 1928, 1915, 1912, 1913, 11162, DR174, 10987 NOTE: PCM 96064 WAS ESSENTIAL CABLE 10967E
SP11976	W N	SB	1	D03-12 2/C #16	594	From: SPARE (ESC PNL SB) To: SPARE (DG-1B CNTL PNL)	R9-25SB, C38, 219, 220, 258, R6-2SB, C30, 230, 229, 228, 231, 251, 233, 235, 237, 238, 239, 240, 241, 242, 2035, 2034, 2033, 2032, 2031, 2062, 2063, 2064, 2065, 2050, 2049, 2045, 2044, 2043, 1842, 1841, 1840, 1839, 1838, 1837, 1845, 1846, 1847, 1848, 1849, 1856, 1919, 1922, 1923, 1924, 1925, 1906, 1907, 1908, 1909, 1926, [illegible], 1927, 1910, 1914, 1928, 1915, 1912, 1913, 11162, DR174, 10987 NOTE; PCM 96064 WAS ESSENTIAL CABLE 10967G

FLORIDA POWER & LIGHT COMPANY
ST LUCIE UNIT NO. 1
APPENDIX "R" SAFE SHUTDOWN ANALYSIS
8770-B-048 (Rev 2)

ALTERNATE SHUTDOWN (B) TRAIN EQUIPMENT/CABLES HAVE BEEN SELECTED FOR PROTECTION IN THIS AREA

FA - B, FZ - 57 CABLE SPREAD ROOM (Cont'd)

CABLE	CABLE FUNCTION	PROTECTION REQUIRED	DISPOSITION
DG SB			
H10189L	I-SE-02-4 Sol Pwr	NO	Not required for alternate shutdown (This area)
H10189M	I-SE-02-4 LS Cont	NO	Not required for alternate shutdown (This area)
H10189N	I-SE-02-4, 125V DC 1B	NO	Not required for alternate shutdown (This area)
H10963C	DG 1B 4KV Bkr Cont & Ind	NO	Isolated by transfer switch
H10964B	DG 1B CT Leads Metering	NO	RTGB Indication not required
H10964E	DG 1B PT Leads Metering	NO	Isolation switch provided
H10964F	DG 1B PT Leads Metering	NO	Isolation switch provided
H10966F	DG 1B Lo Rel Ckt SIAS/CSAS/	NO	Isolation switch provided CS
H10967B	DG 1B SIAS B Start Cont	NO	Isolation switch provided
PC/M H10967C	DG 1B SIAS B Start Cont	NO	Isolation switch provided
H10967D	DG 1B Cont & Ind	NO	Isolation switch provided
~~H10967B~~	~~DG 1B SIS B Start Cont~~	~~NO~~	~~Isolation switch provided~~
~~H10967C~~	~~DG 1B CSAS B Start Cont~~	~~NO~~	~~Isolation switch provided~~
H10968A	DG 1B RTGB 101 Volt Adj Cont	NO	Isolation switch provided
H10968B	DG 1B Gov Cont	NO	Isolation switch provided
HVAC SB			
C10465B	SIAS B for DMPR D3&D4 Mtrs	NO	Open doors RA7, RA61, RA6, & RA 32, operate HVE-9B
C10465G	DMPR D3 & D4 Cntl & Ind	NO	Open doors RA7, RA61, RA6, & RA32, operate HVE-9B
C10465H	DMPR D3 & D4 Cntl & Ind	NO	Open doors RA7, RA61, RA6, & RA32, operate HVE-9B
C10465L	ECCS Pump RM DMPR D3 Mtr Cnt	NO	Open doors RA7, RA61, RA6, & RA32, operate HVE-9B
C10465M	ECCS Pump RM DMPR D4 MTR Cnt	NO	Open doors RA7, RA61, RA6, & RA32, operate HVE-9B
C10465S	D8B Mtr 120V AC Pwr and Cnt	NO	Open doors RA7, RA61, RA6, & RA32, operate HVE-9B
C10465V	DMPR D8B & D9B Cntl & Ind	NO	Open doors RA7, RA61, RA6, & RA32, operate HVE-9B
C10466B	SIAS B For DMPR D5B & D7B	NO	Open doors RA8, R118 & RA32, operate HVE-9B
C10466F	DMPR D7B & D5B Cntl & Ind	NO	Open doors RA8, R118 & RA32, operate HVE-9B
C10466M	DMPR D7B Cntl	NO	Open doors RA8, R118 & RA32, operate HVE-9B
C10467B	SIAS Intlk for D11B & D6B	NO	Open doors RA1, RA7, RA32, operate HVE-9B
C10467K	DMPR D11B & D6B Cntl & Ind	NO	Open doors RA1, RA7, RA32, operate HVE-9B

Inter-Office Correspondence

FPL

JPN-PSLP-96-0080

To:	S. A. Valdes St. Lucie Plant	Date:	MAR 28 1996
From:	D. J. Denver Nuclear Engineering	Department:	JPN/JB
Subject:	ST. LUCIE PLANT UNIT 1 STAR 952202 PMAI 96-03-260 TITLE: EDG RELAY AND MOUNTING SOCKET REPLACEMENT FILE: PC/M 030-196M		

Attached for your review, approval, and use is the final issuance (Revision 0) for the subject Plant Change Modification.

This Engineering Package provides the details necessary for the replacement of existing Curtis RS-11 relay sockets, mounting track, and Square D KPD-13 relays with new, qualified components. Please note that there is a holdpoint in the PC/M pending FPL receipt and approval of the assembly qualification test report.

By copy of this letter, Document Control is requested to distribute this package to the normal distribution.

If you have any questions, contact A. R. Dodd at 691-2171 or Rick Raldiris at 691-2104.

ARD
ARD/MPR
MPR

CRN
6169

Attachment

Copies to:

T.M. Gerstner - OM/PSL
H.L. Fagley/DCC - CS/PSL (w/Repro)
S. Kozlin - JDC/JB (orig dwgs)
K.K. Mohindroo - JPN/PSL
C.M. Spalter - JPN/JB

POST
P.R.G.
PSL INFO SVC

F:\NIS\FORMS\PSL\FORM.009

Form 1008 (Stocked) Rev. 2/89

ATTACHMENT 2
PC/M REVIEW FORM
(Page 1 of 2)

PC/M Number 030-196 **Supplement Number** 0 **Expiration Date** 12/1/96

PC/M Title: EDG Relay & Mounting Socket Replacement

PC/M Classification:

X Major Modification or ______ Minor Modification

Safety Classification:

X Safety Related ______ Quality Related
______ Not Nuclear Safety Related ______ Administrative

PC/M Category:

X Normal ____Either/Or ____As-Requested Package ____As-Fail ____ Generic

---

Does the PC/M contain a Safety Evaluation? ☐ Yes or ☑ No

Is this a proposed change or modification to a unit system or equipment that affects nuclear safety? ☑ Yes or ☐ No

If either of the above questions is YES, FRG approval is required.

FRG Review Required? ☑ Yes or ☐ No

M. Willi... Date: 5/2/96
Configuration Management

B Dawe Date: 5/4/96
Plant General Manager

FRG Number: 96-121 FRG Secretary: Lynne Gilchrist Date: 5/4/96
for Johanna Clay

FRG Comments:

ATTACHMENT 2
PC/M REVIEW FORM
(Page 2 of 2)

Implementing Documentation:

Department	ER/NPWO #	W/O #
EM	65/2073	96009957
EM	65/2074	96009958

PC/M Review and Approval:

QL-A

M. Williams — Configuration Management — Date 5/2/96

Quality Control — Date 5/3/96

Comments:

Areas Affected:	Yes or No	Description
Operator Training	Yes	As per Training Department Requirements
Operating Procedures	NO	
Surveillance Procedures	NO	
Maintenance Procedures	YES (EM)	
Spare Parts	YES	
Drawings/Technical Manuals	YES	SRDs? Y / N
FUSAR Change	NO	
TEDB Change	YES	
Human Factors (CREDIT)	NO	
Environmental Concerns	NO	
In-Service Inspection	NO	
Maintenance Rule	YES	
Plant Restrictions	Mode 5 OR 6	
Others	HOLDPOINT Pg. 6	

M. Williams — Configuration Management — Date 5/2/96

MINOR ENGINEERING PACKAGE (MEP)

PLANT St. Lucie UNIT 01 PC/M NUMBER 030-196M SUPPL 0

ORIGINATING DOCUMENT N/A EXPIRATION DATE 12/1/96

PC/M CLASSIFICATION XX SR ___ QR ___ NNS ___ ADMIN

TITLE EDG Relay and Mounting Socket Replacement

ADDITIONAL REQUIREMENTS/INSTRUCTIONS	YES	NO
AS-BUILDING TO COMMENCE UPON ISSUANCE OF PACKAGE?		X
THIS PACKAGE HAS THE POTENTIAL TO SIGNIFICANTLY IMPACT PERSONNEL RADIATION EXPOSURE (See Form 71). IF YES, FORM 72 IS REQUIRED.		X

10CFR50.59 SCREENING	YES	NO
1) DOES THE CHANGE REPRESENT A CHANGE TO THE FACILITY AS DESCRIBED IN THE SAR?		X
2) DOES THE CHANGE REPRESENT A CHANGE TO PROCEDURES AS DESCRIBED IN THE SAR?		X
3) IS THE CHANGE ASSOCIATED WITH A TEST OR EXPERIMENT NOT DESCRIBED IN THE SAR?		X
4) COULD THE CHANGE AFFECT NUCLEAR SAFETY IN A WAY NOT PREVIOUSLY EVALUATED IN THE SAR?		X
5) DOES THE CHANGE REQUIRE A CHANGE TO THE TECHNICAL SPECIFICATIONS?		X

NOTE: IF THE ANSWER TO ANY OF THE ABOVE 10CFR50.59 SCREENING QUESTIONS IS YES, THE MEP CANNOT BE USED

REVIEW/APPROVAL:

GROUP	INTERFACE TYPE			PREPARED	VERIFIED	APPROVED	FPL APPROVED*
	INPUT	REVIEW	N/A				
MECH			X	N/A	N/A	N/A	N/A
ELECT	X			[illegible]	[illegible]	[illegible]	N/A
I&C			X	N/A	N/A	N/A	N/A
CIVIL	X			[illegible]	[illegible]	[illegible]	N/A
NUC**		X		N/A	N/A	[illegible]	N/A
ESI			X	N/A	N/A	N/A	N/A
NUC FUEL			X	N/A	N/A	N/A	N/A
El. Disc. Chief		X		N/A	N/A	[illegible]	N/A

* For Contractor MEPs As Determined By Projects

** Review Interface As A Minimum On All Non-Admin MEPs

FPL PROJECTS APPROVAL: [illegible] DATE: 3/28/96

ENGINEERING JUSTIFICATION

BACKGROUND

While performing testing of the 2A Emergency Diesel Generator (EDG) during the 1995 Unit 2 refueling outage, 5 failures of Curtis RS-11 relay sockets were discovered in the EDG control circuits. Two failure modes were identified: 1) failure of the solder connections between the socket and the circuit board, and 2) failure of the connection between the socket and the relay pins due to relaxation of the socket contact force.

The relay sockets on the 2A EDG were replaced with new Curtis RS-11 sockets or inspected and tested and the 2A EDG was tested and returned to service during the outage. The 2B EDG was taken out of service for the 18-month preventive maintenance and all of the relay sockets were replaced with new Curtis RS-11 sockets. Some of the removed relay sockets had visible hairline cracks in the solder connections around one or more pins at the base of the relay socket.

Based on the failures identified on EDG 2A and the condition of the sockets removed from the 2B EDG, it was determined that the EDG's ability to perform their safety function could have been affected. The Shift Technical Advisor was notified of a potentially reportable condition in accordance with 10CFR50.72 and a 4 hour report was made to the NRC.

The 1A and 1B EDG were removed from service prior to scheduled surveillance and the relay sockets were either replaced with new Curtis RS-11 sockets or inspected. None of the 60 relay socket assemblies removed from the 1A or 1B EDG panels showed signs of failure. There was no evidence of intermittent connections between the sockets and the relay pins.

Several of the relay sockets were examined in the FPL Metallurgical Laboratory to determine the root cause of the socket failures. The findings indicate that the solder connection failure mechanism begins with the development of tight cracks caused by high cycle (vibration) fatigue. The resultant cracks weaken the mechanical strength of the connection and act as stress concentrators during relay insertions and removals. Relay insertions and removals on bases with weakened solder joints can cause the relay base solder joints to fail. The contributing factors to the failed solder connections are: 1) the design of the socket assembly (relay and base structurally supported by solder connections), 2) the mechanical loading placed on the connection by the cantilevered relay and the cyclic forces caused by vibration, 3) the inadequate amount of solder applied to the relay base connections, and 4) the forces due to removal and insertion of the relay.

Another failure noted was the loosening of the relay in the socket. The failure mechanism responsible for the reported opening of the female ends of the bases' socket pins was plastic deformation resulting from vibrations induced by operation of the EDG. The design of the Curtis RS-11 sockets was such that the female end could expand in the retaining hole, leading to degraded relay-socket connection and possible erratic relay operation.

In order to resolve all of the problems concerning the relays and sockets, it was decided to procure replacement relays and sockets of a different design to eliminate the solder connections and prevent possible loosening of the relay-socket connection. The relays and sockets are to be procured qualified for their intended service (IEEE 344-1975 and IEEE 323-1974, mild environment).

HOLDPOINT

The seismic qualification of the new relays, sockets and tracks has not been reviewed by Engineering; therefore, this Engineering Package can not be implemented until this hold point has been removed by Engineering.

RATIONALE FOR SAFETY CLASSIFICATION

The circuits and components involved in this modification comprise the logic elements for controlling the start and operation of the Emergency Diesel Generators. The Emergency Diesel Generators supply power to those electrical loads which are needed to achieve safe shutdown of the plant or to mitigate the consequences of a loss of coolant accident (LOCA) in the event of a coincident loss of normal ac power supply, as discussed in Section 8.3 of the FSAR. The EDG system and components are classified Nuclear Safety Related. Locations of the components are in the EDG Idle Start and Stop Panels, which are classified as Nuclear Safety Related. Therefore, this modification is classified as Nuclear Safety Related.

10CFR 50.59 SCREENING JUSTIFICATION

The Emergency Diesel Generators and their operation are classified as safety related and are addressed in the FSAR in detail. However, the discussions in Section 8.3 of the FSAR are concerned with the overall logic for the automatic starting of the EDGs and the blocking of EDG safety trips for SIAS, CSAS or CIAS and do not specifically discuss the types of relays used. Also, this modification does not affect the operational logic of the Emergency Diesel Generators and does not require additional or different operator actions.

Installation of the mounting track, sockets and relays in the EDG Idle Start Panels affects Safety Related panels. The existing mounting track, sockets and relays are seismically qualified in the cabinets as will be the new mounting track, sockets and relays (see HOLDPOINT). There will be no adverse effect on the structural response of the supporting cabinet due to the replacement of this equipment since the net weight change is negligible.

Therefore, this modification does not represent a change to the facility or procedures as described in the SAR. The modification is not associated with any test or experiment not described in the SAR. This modification installs qualified components in the EDG Idle Start-Stop Panels without altering the operating logic; thus, it can not result in any degradation, either directly or indirectly, to any safety functions required for analyzed accidents and does not increase any radiological hazard. For the above reasons this modification can not affect nuclear safety in a way not previously evaluated in the SAR. Since there is no change to the EDG control logic and there are no individual relay test or surveillance requirements imposed by the Technical Specifications, no change to the Technical Specifications is required.

This evaluation supports the 10 CFR 50.59 screening on page 1 and concludes that the modification does not fall under the requirements of 10 CFR 50.59. Therefore, this PC/M does not involve an unreviewed safety question and can be implemented without prior NRC approval.

DESIGN BASIS AND ANALYSIS

Replacement of the Curtis RS-11 sockets and mounting track with Potter & Brumfield sockets and mounting track will resolve the problems with EDG relay/socket failures due to solder connection failures and weakened pin contacts. The Potter & Brumfield sockets are made of molded polycarbonate with one-piece formed plated bus connections between pin contacts and screw terminals; there are no solder connections. The socket female pin design does not allow for expansion of the female pin in the retaining hole, thus preventing any problems of vibration-induced plastic deformation. Therefore, the Potter & Brumfield sockets are considered less susceptible to the same failure modes as the Curtis RS-11 sockets.

The replacement relays have contacts made of silver-cadmium oxide, which is identical to those of the existing Square D relays. The replacement relays are operable over a voltage range which envelopes 90 - 140 Vdc and therefore are compatible with the DC system at St. Lucie. Contact rating for both the existing and replacement relays is 10 amps at 120 Vac. The 125 Vdc rating for the contacts is not published; however, testing performed during qualification of the relays/sockets/mounting track will confirm suitability in the EDG circuits. A review of the burden for each contact of each relay was performed. The highest burden appears to be that of the air start solenoid valves - less than 1 amp on energization. Burdens for the remaining contacts typically consist of other relays or annunciator inputs. Since the burden of each of the replacement relays is the same as that of the existing relays (3 watts maximum), battery loading and the low DC system voltage, battery charger sizing and safety related battery calculations are not affected.

The existing relays, sockets and mounting tracks are to be replaced on a one-for-one basis with the new relays, sockets and mounting tracks. Contact arrangement and operation of the replacement relays are identical to those of the existing relays. Wiring and terminations of the new sockets are identical to those of the existing sockets, thus eliminating the need for extensive rewiring in the panels. This modification preserves the existing EDG control circuit configuration and logic and requires no wiring changes. The replacement relays have pickup/dropout times of 15/10 msec, which is the same as the existing Square D relays; therefore, no new relay contact races are created by this modification.

The new relays, sockets and track, as a composite unit, have been purchased to be seismically qualified to IEEE 344-1975 (SEE HOLDPOINT). The acceptance criteria for the seismic testing is that functionality of the components be maintained, and that the relays do not exhibit contact chatter for longer than 2 msec (SEE HOLDPOINT). The new components will be mounted on the EDG Idle Start and Stop Panels using the same mounting details as used during the seismic testing (See HOLDPOINT).

The weight of the original relay and socket is at least 5.5 oz (by physical inspection); therefore, the minimum weight of the existing 30 relays and sockets used in each panel is 10.3 lbs. The weight of the new relay and socket combination is 5.0 oz (Ref. 19 & 20) and the new total weight for 30 units is 9.4 lbs. Four new aluminum tracks will replace the existing vinyl tracks. The aluminum tracks are smaller in size than the existing tracks (Ref. 19 and 20). Therefore, conservatively assuming that the new tracks weigh the same as the old, there is a minimum reduction in weight of 1 lb. The weight of the EDG Idle Start and Stop Panel is approximately 1000 lbs (Ref. 22). The overall change in weight is negligible relative to the overall weight of each panel and the reduction will not adversely affect the seismic qualification of the panel.

Performance of this modification does not have the potential to significantly impact personnel radiation exposure. The components are located within the Radiation Controlled Area; however, no radioactive or contaminated systems or components are involved.

Replacement of the relays, relay sockets and tracks does not add any combustible materials to the fire zones since there is no net increase in combustibles and all components are located within a control panel.

DESIGN INTEGRATION REVIEW

The St. Lucie Package Information Tracking System and Drawing Change Tracking System were accessed on March 21, 1996, and there are no outstanding designs in progress which will affect or are affected by this MEP. The Active Safety Evaluations List was also accessed on March 21, 1996, for review and no safety evaluations are impacted, nor do they impact this MEP.

OTHER AFFECTED DOCUMENTS

Document	Reference Paragraph/Page or Attach Revised Pages
TEDB	See attached TEDB Change Package

MATERIAL

Item	Quantity	Description	Reference	Pre-Purchased?
1	60	Relays (P&B KRP-14DG-110*)	See Note	Yes
2	8	Mounting Track (P&B 24A110*)	See Note	Yes
3	60	Relay Sockets (P&B 27E892*)	See Note	Yes
4	60	End Clips/Spacers (P&B 24A071* & 40G432*)	See Note	Yes

* or equivalent

Note: All components were procured under stock code #0203663-1.

SPECIAL INSTRUCTIONS\IMPLEMENTATION REQUIREMENTS

1. **Holdpoint: The seismic qualification of the new relays, sockets and tracks has not been reviewed by Engineering; therefore, this Engineering Package can not be implemented until this hold point has been removed by Engineering.**

2. This modification must be performed when the plant is in Mode 5 or 6 or defueled with the Emergency Diesel Generator being modified out of service with clearances issued.

3. Care must be taken to ensure that adjacent components and wiring in the EDG Idle Start Panel are not disturbed when performing the modification.

4. A pre-implementation visual inspection shall be performed to verify the as-built electrical connections of the relays listed in Table 1 as shown on the drawings. Any discrepancy between the as-built condition and the drawings (Ref. 8 & 9) shall be documented via a CRN for engineering evaluation. Verify that all wires terminated on the existing relay sockets are labeled.

5. Remove the existing relays from the sockets. Determinate all wires from the sockets and remove the existing sockets and mounting tracks.

6. The new mounting tracks are to be cut to the same lengths and located on the same centerlines (± 1/2 inch) as the existing mounting tracks are. See Drawing 8770-10292 (both EDGs). The new track shall be installed using a #8 SAE J429 zinc plated screw in each slotted hole of the track (SEE HOLDPOINT). Suitable holes are to be drilled and tapped in the panel as required and screws are to be installed snug tight. Install per Specification SPEC-C-005, latest revision.

7. The new sockets and relays are to be installed on the track in accordance with manufacturer's instructions (SEE HOLDPOINT). Each track shall have the same number of sockets installed as on the original track. End clips are to be installed at both the bottom and top end of the tracks. The sockets are to be spaced using additional end clips so the new sockets are located in the approximate same vertical location as the old sockets and all wires can be terminated without splicing. All screws are to be tightened snug tight. See attached Vendor information.

8. Wires are to be terminated on the new sockets in the same manner as on the original sockets, including any jumpers between terminals (see References 3 through 18). New 14 AWG SIS or Tefzel wiring is to be used where it is not possible to reuse existing wiring due to damage or other reason. New wiring is to be labeled with the same designations as the existing wiring.

9. The new relays are to be tested for operation in the shop, installed in the sockets, and labeled.

10. The Unit 1 EDG Vendor Manual, 8770-6703, is to be updated with the vendor information contained in Attachment 4. The existing information concerning Square D KPD-13 relays and Curtis RS-11 relay sockets is to be removed.

POST MODIFICATION TESTING

1. All wiring affected by this modification is to be verified correct in accordance with References 3 - 18.

2. The EDGs are to be started with a simulated ESFAS signal by connecting a jumper from TB2A-50 to TB2A-51 (Ref 6 & 11) in DG 1A and DG 1B Control Panel. This will start the EDG but will not block the EDG protective trips.

REFERENCES

1. St. Lucie Unit 1 FSAR through Amendment 14.

2. St. Lucie Unit 1 Technical Specifications through Amendment 141.

3. 8770-10298; "DG 1A Idle Start-Stop Panel - Left Subpanel Wiring Diagram;" Rev. 1.

4. 8770-11440; "Diesel Generator 1B Idle Start-Stop Panel - Left Subpanel Wiring Diagram;" Rev. 0.

5. 8770-B-327, SH.956; "Control Wiring Diagram, Diesel Generator 1A - Lockout Relay;" Rev. 18.

6. 8770-B-327, SH.957; "Control Wiring Diagram, Diesel Generator 1A - Start Circuits;" Rev. 13.

7. 8770-B-327, SH.958; "Control Wiring Diagram, Diesel Generator 1A - Remote Control;" Rev. 10.

8. 8770-B-327, SH.959; "Control Wiring Diagram, Diesel Generator 1A - Start Solenoids;" Rev. 14.

9. 8770-B-327, SH.960; "Control Wiring Diagram, Diesel Generator 1A - Ann. Ext. Wiring;" Rev. 14.

10. 8770-B-327, SH.966; "Control Wiring Diagram, Diesel Generator 1B - Lockout Relay;" Rev. 17.

11. 8770-B-327, SH.967; "Control Wiring Diagram, Diesel Generator 1B - Start Circuits;" Rev. 17.

12. 8770-B-327, SH.968; "Control Wiring Diagram, Diesel Generator 1B - Remote Control;" Rev. 12.

13. 8770-B-327, SH.969; "Control Wiring Diagram, Diesel Generator 1B - Start Solenoids;" Rev. 13.

14. 8770-B-327, SH.970; "Control Wiring Diagram, Diesel Generator 1B - Ann. Ext. Wiring;" Rev. 15.

15. 8770-B-327, SH.1118; "Control Wiring Diagram, D.G. 1A Hydr. Gov. Speed Setting Motor Control;" Rev. 1.

16. 8770-B-327, SH.1119; "Control Wiring Diagram, D.G. 1A Idle Start-Stop Annunciator;" Rev. 5.

17. 8770-B-327, SH.1128; "Control Wiring Diagram, D.G. 1B Hydr. Gov. Speed Setting Motor Control;" Rev. 0.

18. 8770-B-327, SH.1129; "Control Wiring Diagram, D.G. 1B Idle Start-Stop Annunciator;" Rev. 5.

19. Potter & Brumfield Catalog (see Attachment 4).

20. Vendor Manual 8770-6703; Emergency Diesel Generators; Stuart & Stevenson; Rev. 10.

21. IEEE 344-1975; "Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations;" 1975.

22. FPL dwg no. 8770-11202, Rev. 0 "Seismic Qualification Test Report of Idle Start Control Panel for St. Lucie 1 Nuclear Power Plant."

23. IEEE 323-1974; "IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations;" 1974.

ATTACHMENTS

Attach Number	Description/Title	Number of Pages
1	Table 1: Affected Relays	1 aEH 8/29/14
2	Affected Drawings and Vendor Manuals	~~2~~ 1
3	TEDB Change Package	4
4	Vendor Information	5

AFFECTED DRAWINGS

PC/M DRAWING NO.	REV	DESCRIPTION/TITLE	(1) D	ALL AFFECTED PLANT DRAWINGS	(2) REV	(3) P	MEP(4) REV

See Attachment 2

AFFECTED VENDOR MANUALS

VENDOR MANUAL NUMBER	(2) REV	VENDOR/EQUIPMENT	(1) D	REMARKS	MEP(4) REV

See Attachment 2

(1)DISCIPLINE: C = CIVIL; E = ELECT; I = I&C; M = MECH; N = NUCLEAR
(2)REVISION of affected drawing/vendor manual. Indicate "new" if the drawing/vendor manual is being created. The engineer is accountable for reserving the new drawing/vendor manual number.
(3)UPDATE PRIORITY: Indicate 1 (SRD), 2 (non-SRD), or 5 (other) for PSL. Indicate 1 (POD), 2 (CRD), 3 (MD), 4 (ED), or 5 (other) for PTN.
(4)MEP REVISION under which last drawing change was made.

TABLE 1: AFFECTED RELAYS

EDG 1A (IDLE START PANEL)		EDG 1B (IDLE START PANEL)	
AR/1119	IRA/959	AR/1129	IRA/969
ASR/957	K16X/O/957	ASR/967	K16X/O/967
BF1/959	K16X/R/957	BF1/969	K16X/R/967
BF2/959	LA/1118	BF2/969	LA/1128
BF3/959	LB/1118	BF3/969	LB/1128
BF4/959	NSR/959	BF4/969	NSR/969
BF5/959	NSRA/959	BF5/969	NSRA/969
BF6/1118	RA/1118	BF6/1128	RA/1128
BF7/1119	RB/1118	BF7/1129	RB/1128
CPA/959	RF/959	CPA/969	RF/969
CPB/959	SC1/957	CPB/969	SC1/967
ELO/959	SC2/957	ELO/969	SC2/967
ELOA/959	SC3/957	ELOA/969	SC3/967
ESR/959	SC4/957	ESR/969	SC4/967
IR/959	ZSR/959	IR/969	ZSR/969

Facility St. Lucie Unit 01
PC/M or DCR No. 030-196M
Attachment No. 2
Revision No. 0
Page 1 of 1

AFFECTED DRAWINGS

JPN DWG #	SHEET	REV	DESCRIPTION/TITLE	DS	AFFECTED DWG	SHEET	REV	PR	PK RV
ATTACHMENT 3			TOTAL EQUIPMENT DATABASE		TEDB			1	00
JPN-030-196-100		0	D.G.1A IDLE START-STOP PNL-LEF		8770-10298		1	2	00
JPN-030-196-101		0	D.G.1B IDLE START-STOP PNL.LEF		8770-11440		0	2	00
JPN-030-196-102		0	DIESEL GEN.IDLE START/STOP PAN I		8770-10292		2	2	00

TOTAL AFFECTED DRAWINGS REPORTED --------- 4

AFFECTED VENDOR MANUALS

PLANT DOC NO	SHEET	REV	VENDOR/EQUIP	DISC	REMARKS	PKG REV
8770-6703		10	EMERGENCY DIESEL GENERATOR SYSTEM - GENERAL DES-	E		00

TOTAL AFFECTED VENDOR MANUALS REPORTED --------- 1

TOTAL EQUIPMENT DATA BASE CHANGE PACKAGE COVER SHEET

Description of Change:

The Square D model KPD-13 relays and Curtis model RS-11 sockets (with accompanying mounting track) are being replaced with Potter & Brumfield model KRP-14DG-110 relays and model 27E892 sockets (with accompanying mounting track and end clips).

Basis for Change:

PC/M 030-196M.

References:

PC/M 030-196M
2998-B-327, Sh. 957
2998-B-327, Sh. 959
2998-B-327, Sh. 967
2998-B-327, Sh. 969
2998-B-327, Sh. 1118
2998-B-327, Sh. 1119
2998-B-327, Sh. 1128
2998-B-327, Sh. 1129
2998-B-3267, Sh. 957
2998-B-3267, Sh. 959
2998-B-3267, Sh. 967
2998-B-3267, Sh. 969

Approvals

Prepared by G. R. Dodd Date 3/28/96
Verified by W Lee Date 3/28/96
Approved by [signature] Date 3/28/96

Data Review/Input

Reviewed by: ____________ Date: ______
(as applicable)

Data Entry by: ____________ Date: ______

Data Entry Verified by: ____________ Date: ______

* Facility: PSL Unit: 01 LMD: E
* Component: AR/1119
* Associate: ____________
*
* Date Printed: 03/14/96

* PC/M-030-196M
*
* Att: 3
* Rev: 0
* Page 2 of 4

TOTAL EQUIPMENT DATA BASE SHEET

EQ Tag: N/A EQ Rev: N/A EQ Doc Pac: N/A

System: 59 DIESEL GENERATOR SYSTEM

Seismic: I Safety Class: SR Eng Ref: ____________

Q Group: 1E EQ Surv Note: N/A EQ Speer: N/A RG197: _

EQ Related: N EQ Scew: N/A RG197 Cat: _

Q Basis: ___ EQ Remarks: N/A RG197 Type: _

Comp Type: RL Sub Type: ___ Safety Channel: ___ Pcm: ______

Name: AUXILIARY RELAY FOR DG 1A IDLE START STOP

Locn Code: DGB/DG 1A IDLE PNL Startup System: 053

Locn Desc: ____________

Instl MFG #: PAB POTTER & BRUMFIELD ~~SQD SQUARE D~~ Engineering Verified: Y

Instl Model: ~~KPD 13~~ KRP-14DG-110 Rev: 000 Orig Po: ~~59169 59TN08~~

Comp Group: ____________ NPRDS: Y Acct No: 530

EQ Tab: ___ Insulation Rmvl: _ Train: _

Scaffold Req: _ Critical Comp: _ Control Room Comp: _

Work Group: _______ IST Reqd: N RWP Reqd: N

Maint Pgms: _ _ _ _ _ _ _ _ _ _

Facility: PSL Unit: 01 LMD: E	PC/M 030-196M
Component: AR/1119	
Associate: ____________	Att: 3
	Rev: 0
Date Printed: 03/14/96	Page 3 of 4

TOTAL EQUIPMENT DATA BASE SHEET

Drawing:	Sheet:	Coordinates
8770-B-327	1119	____
8770-10292	________	____
8770-10295	________	____
8770-10296	________	____
8770-10297	________	____
8770-10298	________	____
8770-10299	________	____

Tech Manuals:
8770-6703

Procedures:

Notes:
PCM/DCR HISTORY: DCR-SLE-92-253
RELAY UTILIZES POTTER & BRUMFIELD SOCKET MODEL 27E892

Approved Alternate
Mfg: Description: Model: Rev. Instl. Eng Ver.

Parameter
Name: Value: UOM:

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Attachment No. 3
Revision No. 0
Page 4 of 4

Make similar changes as shown on pages 2 & 3 of this attachment to the following components:

AR/1119
AR/1129
ASR/957
ASR/967

BF1/959
BF2/959
BF3/959
BF4/959
BF5/959
BF6/1118
BF7/1119
BF1/969
BF2/969
BF3/969
BF4/969
BF5/969

BF6/1128
BF7/1129

CPA/959
CPA/969
CPB/959
CPB/969

ELO/959
ELO/969
ELOA/959
ELOA/969

ESR/959
ESR/969
IR/959

AR/1129
ASR/967
BF1/969
BF2/969
BF3/969
BF4/969
BF5/969
BF6/1128
BF7/1129
CPA/969
CPB/969
ELO/969
ELOA/969
ESR/969

IRA/959
IR/969
IRA/959
IRA/969

K16X/O/957
K16X[illegible]/967
K16X/R/957
K16X/R/967

LA/1118
LA/1128
LB/1118
LB/1128

NSR/959
NSR/969
NSRA/959
NSRA/969

RA/1118
RA/1128
RB/1118
RB/1128

RF/959
RF/969

SC1/957
SC1/967
SC2/957
SC2/967
SC3/957
SC3/967
SC4/957
SC4/967

ZSR/959
ZSR/969

Facility St. Lucie Unit 01
PC/M or DCR No. 030-196M
Attachment No. 4
Revision No. 0

VENDOR INFORMATION

POTTER & BRUMFIELD

KRPA, KRP, KA series

5 to 10 AMP GENERAL PURPOSE RELAY

File E29244, E22575
File LR15734

FEATURES

- Industry standard octal-type termination for quick installation.
- Contact arrangements from 1 Form A (SPST - NO) to 3 Form C (3PDT).
- Indicator lamp and push-to-test options available on certain models.
- The KRPA series is the automated manufactured version of the KRP series.
- Hermetically sealed option available with KH UL recognized for Class I Div. 2 Hazardous locations, Groups A, B, C, D.

CONTACT DATA @ 25°C

Arrangements: See Ordering Information Table.
Materials: Silver or silver-cadmium oxide, with or without gold flashing.
Expected Life: 10 million operations min., mechanical; 100,000 operations min. @ rated loads.

KA, KRP, KRPA — UL/CSA CONTACT RATINGS @ 25°C (KR not UL Rated)

Contact Code	Arrangement	Contact Rating
Y&L (Silver)	1, 2, 3 Poles	5A @ 120VAC 3A @ 240VAC 1/10HP @ 120VAC 1/6HP @ 240VAC
G&N (Silver-Cad. Oxide)	1, 2, 3 Poles	10A @ 240VAC 1/2 HP @ 240VAC 1/3HP @ 120VAC

KRP, KRPA — FACTORY RATINGS

Contact Code	Arrangement	Contact Rating
Y&L	1, 2, 3 Poles	5A @ 28VDC, 120VAC, 80% PF
G&N	1, 2, 3 Poles	10A @ 28VDC, 120VAC, 80% PF 6A @ 250VAC

KA UL CONTACT RATINGS

Contact Code	Series	Contact Ratings
Y	KA[1]	5A @ 120VAC, 3A @ 240VAC, 1/10 HP @ 120VAC, 1/6 HP @ 240VAC
G	KA[2]	10A @ 120VAC, 6A @ 240VAC 1/6 HP @ 120VAC, 1/3 HP @ 240VAC

[1] Listed by C.S.A. for 5A @ 120VAC 80% PF
[2] Listed by C.S.A. for 10A @ 120VAC 80% PF

INITIAL DIELECTRIC STRENGTH

Between Open Contacts: 500V rms.
Between All Elements: 1,500V rms.

COIL DATA @ 25°C

		Nominal Power	Maximum Power
KRP	AC	2VA	Open Models - 5VA Enclosed Models - 4VA
KRPA	DC	1.2W	Open Models - 4W Enclosed Models - 3W
KA	AC	2VA	Open Models - 4VA
	DC	125mW per movable arm	Open Models - 4W

Duty Cycle: Continuous.
Initial Insulation Resistance: KRP, KRPA - 1000 Megohms, min.
KA - 100 Megohms, min.

COIL DATA @ 25°C

	Nominal Voltage	DC Resistance (Ω) ±10%	Nominal Coil Current (mA)
DC Coils	6	32	188
	12	120	100
	24	472	51
	48	1,800	26.6
	110	10,000	11.5
	220	Use 110V relay with 10,000 Ω 5W Resistor in series	
AC Coils	6	6	335
	12	24	168
	24	85	84
	120	2,250	17.5
	240	9,110	8.75

OPERATE DATA @ 25°C

Must-Operate Voltage:
DC: 75% or less of nominal voltage.
AC: 85% or less of nominal voltage.
Operate Time (Excluding Bounce):
15 milliseconds typical @ nominal voltage.
Release Time (Excluding Bounce):
10 milliseconds typical @ nominal voltage.

ENVIRONMENTAL DATA

Temperature Range:
Open Models: AC: -45°C to +70°C
DC: -45°C to +85°C.
Enclosed Models: AC: -45°C to +55°C
DC: -45°C to +70°C

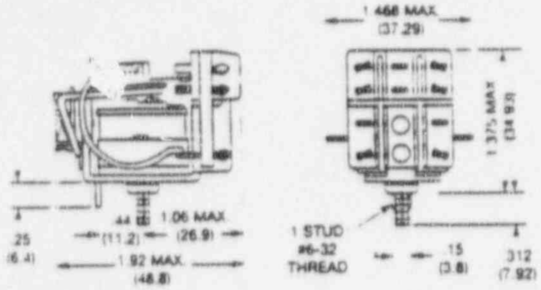
MECHANICAL DATA

Open Models: Solder Terminals.
Enclosed Models: Octal-Type Plug.
Enclosures: Transparent Polycarbonate.
Hermetically sealed metal case.
Also available with KR.
Weight: KA: 1.7 oz. (48.2 g) approximately.
KRPA, KRP: 3.0 oz. (85 g) approximately.

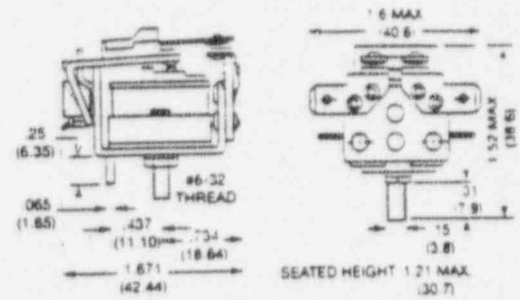
VENDOR INFORMATION

OUTLINE DIMENSIONS

KA SERIES



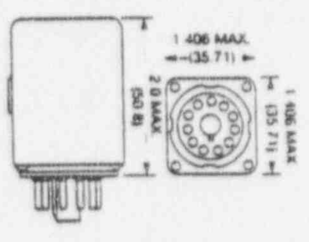
KR3-H



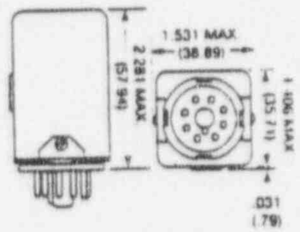
TOLERANCES ON .XX DECIMALS ± .02 (± .5) UNLESS OTHERWISE SPECIFIED
TOLERANCES ON .XXX DECIMALS ± .005 (± .13) UNLESS OTHERWISE SPECIFIED

KR SERIES ENCLOSURES

TYPE "P" CLEAR DUST COVER



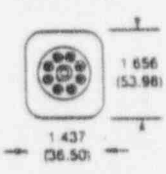
For KRPA and KRP



For KRP3-H

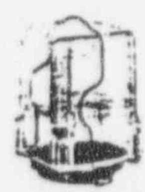
OPTIONAL HERMETICALLY SEALED ENCLOSURE

Octal Plug



Height: 2.125" (53.98 mm) max.

HOLD-DOWN SPRING

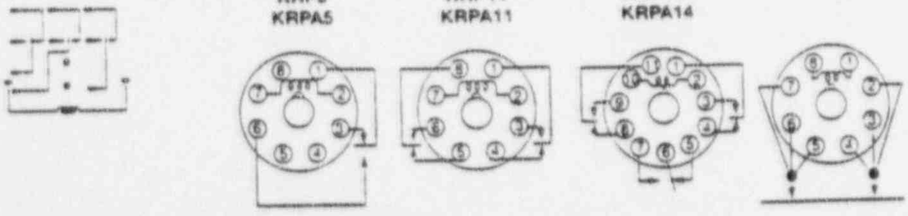


20C176 KRPA & KRP
20C206 KAP and KRP3

Durable stainless steel spring can be moved aside for relay removal or installation. Mounts with same machine screws or rivets that secure socket to chassis. Two .156" (3.96 mm) dia. holes required.

WIRING DIAGRAMS (Bottom Views)

KA | KAP5 KRP5 KRPA5 | KAP11 KRP11 KRPA11 | KAP14 KRP14* KRPA14 | KRP3AH



*The hermetically sealed KRP14 has pins 5 and 6 reversed.

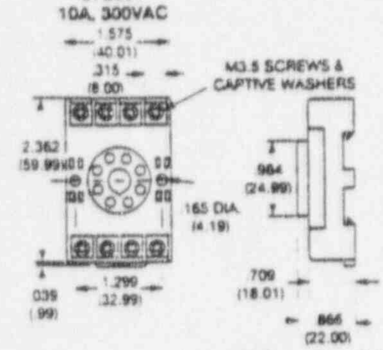
VENDOR INFORMATION

SOCKETS FOR KRP, KRPA SERIES RELAYS

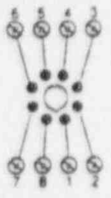
The following sockets are normally maintained in stock for immediate delivery.

SCREW TERMINAL, DIN RAIL SNAP-MOUNT SOCKETS
(Use with mounting track 24A110)

27E891
10A, 300VAC

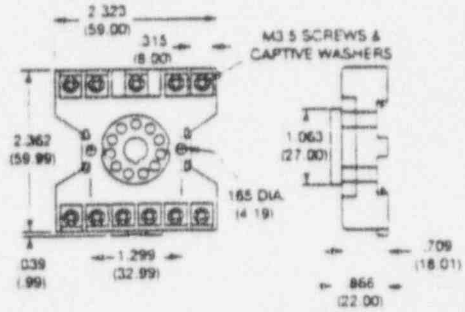


TERMINAL LOCATION

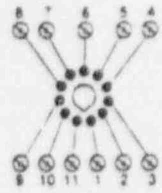


TOP VIEW

27E892
10A, 300VAC

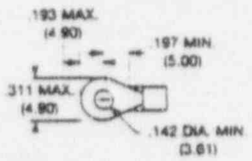


TERMINAL LOCATION

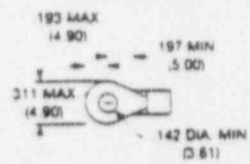


TOP VIEW

TERMINAL SIZE



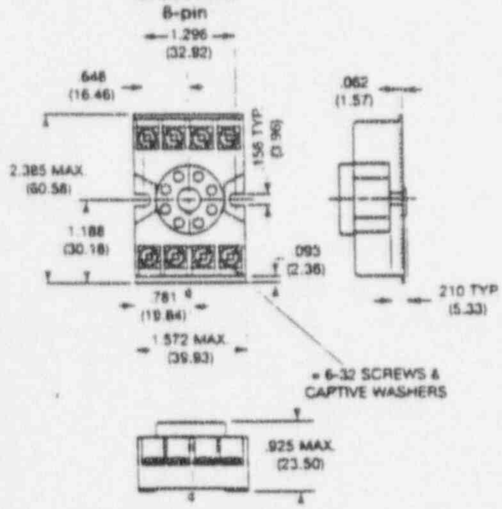
TERMINAL SIZE



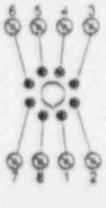
Sockets have M3.5 screw terminals which accept up to two #12 AWG wires. Rated 10 amps @ 300VAC and meets UL 94V-O. Socket shipped with two 20C317 anchor clips.

SCREW TERMINAL SOCKETS

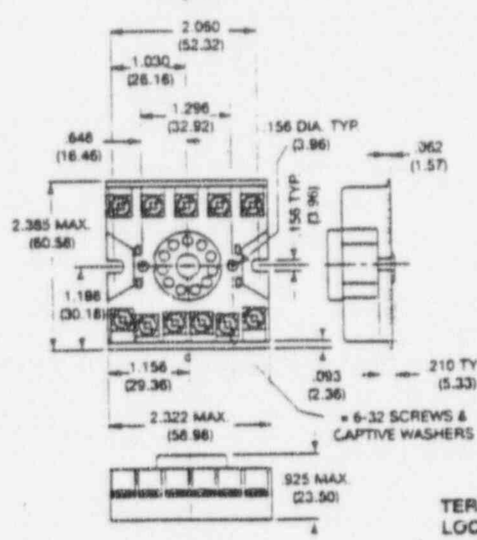
27E122
10A, 300VAC
8-pin



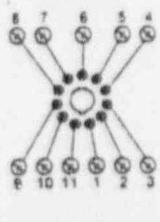
TERMINAL LOCATION



27E123
10A, 300VAC
11-pin



TERMINAL LOCATION



Facility St. Lucie Unit 01
PC/M or DCR No. 030-196M
Attachment No. 4
Revision No. 0

VENDOR INFORMATION

ORDERING INFORMATION

Typical Part No. ➤	KRPA	-5	A	Y		-120

1. **SERIES** = KRPA (Newer version, enclosed)
   KRP (Older version, enclosed)
   KR (Hermetically sealed option 'E')
   KA (Open style)

2. **CONTACT ARRANGEMENT:**

1 = 1 Form A (SPST-NO)	7 = 2 Form A (DPST-NO)
2 = 1 Form B (SPST-NC)	8 = 2 Form B (DPST-NC)
3 = 1 Form X (SPST-NO-DM)	11 = 2 Form C (DPDT)
4 = 1 Form Y (SPST-NC-DB)	12 = 3 Form A (3PST-NO)
5 = 1 Form C (SPDT)	13 = 3 Form B (3PST-NC)
6 = 1 Form Z (SPDT[DB-DM])	14 = 3 Form C (3PDT)

3. **COIL INPUT:**
   A = AC, 50/60 Hz. DS = Diode Suppression (DC coil only)
   D = DC

4. **CONTACT RATING AND INDICATOR LAMP OPTION:**

TYPE	KRPA	KRP	KR	KA
Codes Available	Y, G, L, N, YF, GF, LF, NF	Y, G, N, YF, GF, NF	Y, G, GF	Y, G

Leave Blank = Silver, no indicator lamp for hermetically sealed KR (option E below).
Y = Silver, no indicator lamp
G = Silver-cadmium oxide, no indicator lamp
L = Silver, with indicator lamp*
N = Silver-cadmium oxide, with indicator lamp
YF = Silver gold-flashed, no indicator lamp
GF = Silver-cadmium oxide gold-flashed, no indicator lamp
LF = Silver gold-flashed contacts, with indictor lamp*
NF = Silver-cadmium oxide gold-flashed contacts, with indicator lamp*

5. **O.'TIONS:**
   Leave Blank = No options.
   P = Push-to-test button (KRPA only).
   E = Hermetically Sealed Option (KR only).

6. **COIL VOLTAGE:**
   Up to 277VAC
   Up to 125VDC

*Indicator Lamp not available on 25-90V coils. Only 120-240VAC and 110VDC models are UL recognized and CSA certified.

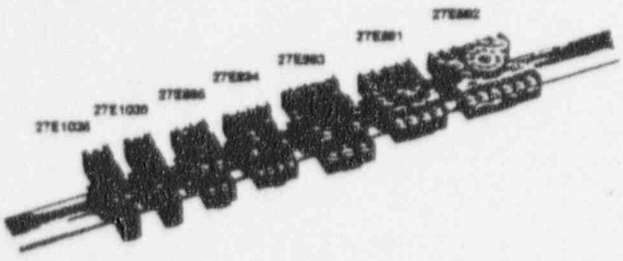
STOCK ITEMS – The following items are normally maintained in stock for immediate delivery.

KA-5AG-120	KR-11AE-120	KRP-11DG-110	KRPA-5DG-12	KRPA-11DG-12	KRPA-14DG-12
KA-5AY-24	KR-11AGE-120	KRP-11DG-125	KRPA-5DG-24	KRPA-11DG-24	KRPA-14DG-24
KA-5AY-120	KR-11DE-24	KRP-11DN-12	KRPA-5DG-110	KRPA-11DG-48	KRPA-14DG-48
KA-5DG-6	KR-11DGE-12	KRP-11DN-24	KRPA-5DY-12	KRPA-11DG-110	KRPA-14DG-110
KA-5DG-12	KR-11DGE-24	KRP-11DN-110	KRPA-5DY-24	KRPA-11DN-12	KRPA-14DN-24
KA-5DG-24	KR-14AGE-120	KRP-11DY-12	KRPA-11AG-6	KRPA-11DN-24	KRPA-14DY-24
KA-5DG-110	KR-14DGE-24	KRP-11DY-24	KRPA-11AG-12	KRPA-11DN-110	
KA-11AG-120	KRP-5AG-120	KRP-14AG-24	KRPA-11AG-24	KRPA-11DY-12	
KA-11AY-6	KRP-11AG-6	KRP-14AG-120	KRPA-11AG-120	KRPA-11DY-24	
KA-11AY-24	KRP-11AG-12	KRP-14AG-240	KRPA-11AG-240	KRPA-11DY-110	
KA-11AY-120	KRP-11AG-24	KRP-14AN-120	KRPA-11AN-12	KRPA-14AG-12	
KA-11DG-12	KRP-11AG-120	KRP-14AY-120	KRPA-11AN-24	KRPA-14AG-24	
KA-11DG-24	KRP-11AG-240	KRP-14DG-12	KRPA-11AN-120	KRPA-14AG-120	
KA-11DG-110	KRP-11AN-24	KRP-14DG-24	KRPA-11AN-240	KRPA-14AG-240	
KA-11DY-12	KRP-11AN-120	KRP-14DG-110	KRPA-11AY-6	KRPA-14AN-24	
KA-14AG-120	KRP-11AN-240	KRP-14DN-24	KRPA-11AY-12	KRPA-14AN-120	
KA-14AY-120	KRP-11AY-120	KRPA-5AG-24	KRPA-11AY-24	KRPA-14AN-240	
KA-14DG-12	KRP-11DG-12	KRPA-5AG-120	KRPA-11AY-120	KRPA-14AY-24	
KA-14DG-24	KRP-11DG-24	KRPA-5AY-120	KRPA-11AY-240	KRPA-14AY-120	
KA-14DG-110	KRP-11DG-48	KRPA-5DG-6	KRPA-11DG-6	KRPA-14AY-240	

Facility St. Lucie Unit 01
PC/M or DCR No. 030-196M
Attachment No. 4
Revision No. 0

VENDOR INFORMATION

POTTER & BRUMFIELD



DIN RAIL MOUNT SCREW TERMINAL SOCKET TRACK MOUNTING SYSTEM

File E59244
File LR35144

FEATURES

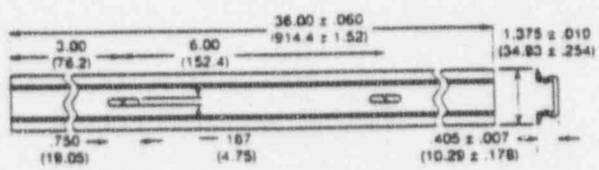
- Sockets mount on standard 35mm DIN track & P&B "top hat" track.
- Spring loaded integral clip holds sockets securely to the track.
- Small screwdriver can be used to release sockets from track.
- All DIN sockets, except 27E1038 and 27E1039, are shipped with two anchor clips for hold down springs. Hold-down springs must be ordered separately. See Relay & Socket Usage Chart beginning on page 101.
- End clips can be used to further stabilize sockets on track.

LOCATION OF SOCKET DIMENSIONS

Typical Relay	Base	Socket Part Number	Page
KRPA (DPDT)	8-pin octal-type	27E891	98
KRPA (3PDT)	11-pin octal-type	27E892	98
KUP	11-blade square	27E893	91
KH	14-blade square	27E894	80
K10	8-blade square	27E895	83
RKS (code 1)	5-blade square	27E1038	62
RKS (codes 2,3 & 5)	8-blade square	27E1039	62

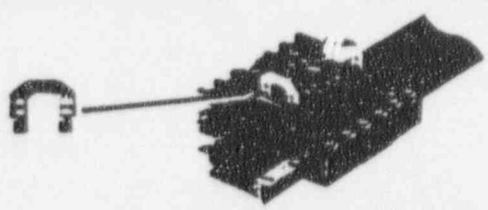
24A110 – DIN RAIL STYLE MOUNTING TRACK

24A110 mounting track is designed to accept snap-mount sockets, as well as all other P&B screw terminal sockets. Track is made of lightweight, sturdy extruded aluminum and is shipped in three-foot (914cm) lengths with mounting holes on six-inch (152mm) centers. Track can be cut to shorter lengths or used end-to-end.



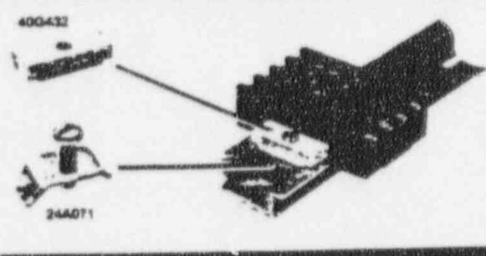
20C317 – ANCHOR CLIP

20C317 steel anchor clip snaps into the body of the socket and is used as an anchor point for relay hold down spring. Two clips are shipped with each socket except 27E1038 and 27E1039.



24A071 & 40G432 – END CLIP

24A071 steel mounting clip with one #6-32 screw 7/16" (11.1mm) long is used with a 40G432 insulator to prevent sockets from moving sideways or sliding off the end of the track.



ORDERING INFORMATION – Boldface items are normally maintained in stock for immediate delivery.

Part Number	Description
24A110	DIN rail style extruded aluminum mounting track for DIN or standard sockets.
20C317	Anchor clip to secure relay hold down spring to socket base.
24A071	Steel mounting clip with one #6-32 screw 7/16" (11.1mm) long. Use with 40G432 below to make end clip.
40G432	Plastic insulator. Use with 24A071 above to make end clip.

ST. LUCIE

Status Meeting

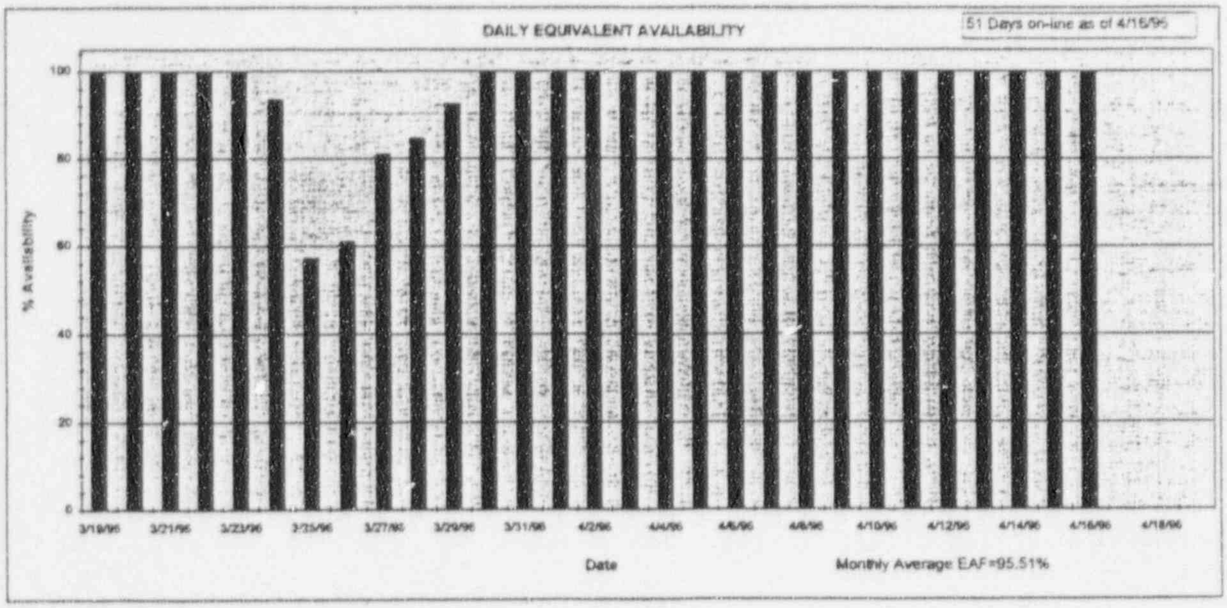
4/18/96

EE/6

ST. LUCIE STATUS MEETING AGENDA
FOR APRIL 18 , 1996
9:00 AM, SSB ROOM 4011

OPENING REMARKS	W. Bohlke
OPERATING REPORT/RECENT EVENTS	J. Scarola
CONDENSER WATERBOX PIPING	D. Denver
MAINTENANCE RULE	M. Snyder
STORES INVENTORY REDUCTION	L. [illegible] ers
IHE 96-030	
RCS LEAKAGE	J. Porter
E-PLAN REPORTING	K. Heffelfinger
FFD AUDIT SUMMARY	C. Burton
MODIFICATION CONTROL	J. Holt
OUTAGE PREPARATIONS/ORGANIZATION	A. Pell
OUTAGE PROJECTS/CONTINGENCIES	
S/G INSPECTION	G. Boyers
RX VESSEL/CORE SUPPORT BARREL INSPECTION	K. Mayhew/ G. Pustover
MAIN GENERATOR INSPECTION	R. Ball
PRESSURIZER CODE SAFETY VALVES	J. Price
DEPAL.IM NT REPORTS	
HUMAN RESOURCES	L. Morgan
OPERATOR ATTRITION & ASSUMPTIONS	
OPERATIONS	B. Frechette
MAINTENANCE	N. Motley
SYSTEMS/COMPONENTS	C. Wood
ENGINEERING	D. Denver
CORRECTIVE ACTIONS	B. Dawson
QUALITY ASSURANCE	W. Bladow
LICENSING	E. Weinkam
SERVICES	C. Burton
MATERIALS	D. Quilty/ T. Kreinberg

Unit 1
Equivalent Availability

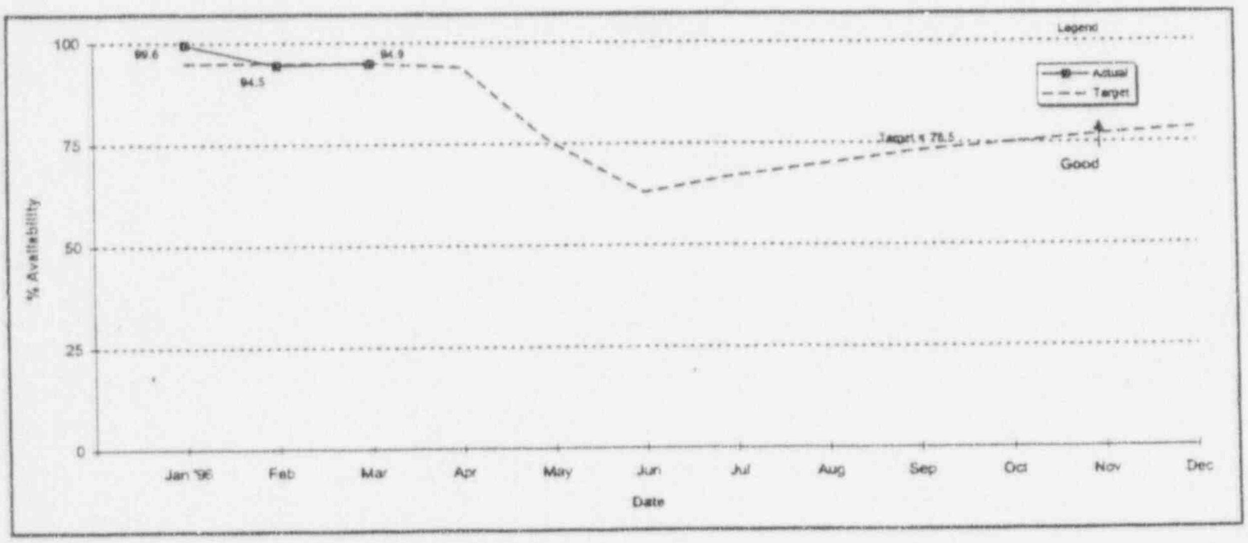


Lost Generation

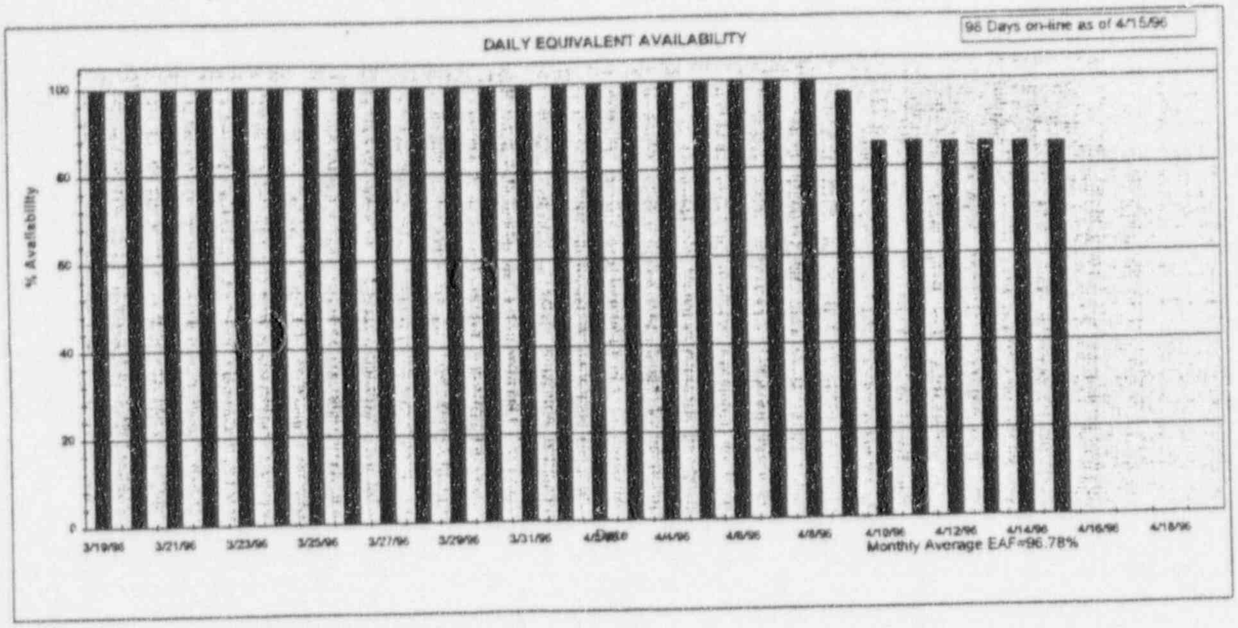
Date	MWH Loss	Reason
3/24/96	-132	Waterbox Cleaning
3/25/96	-6584	Waterbox Cleaning
3/26/96	-7625	Waterbox Cleaning
3/27/96	-3828	Waterbox Cleaning
3/28/96	-3101	Waterbox Cleaning
3/29/96	-1502	Waterbox Cleaning

Based on a Maximum Dependable Capacity of 830 MW

EQUIVALENT AVAILABILITY FACTOR - UNIT 1



Unit 2
Equivalent Availability

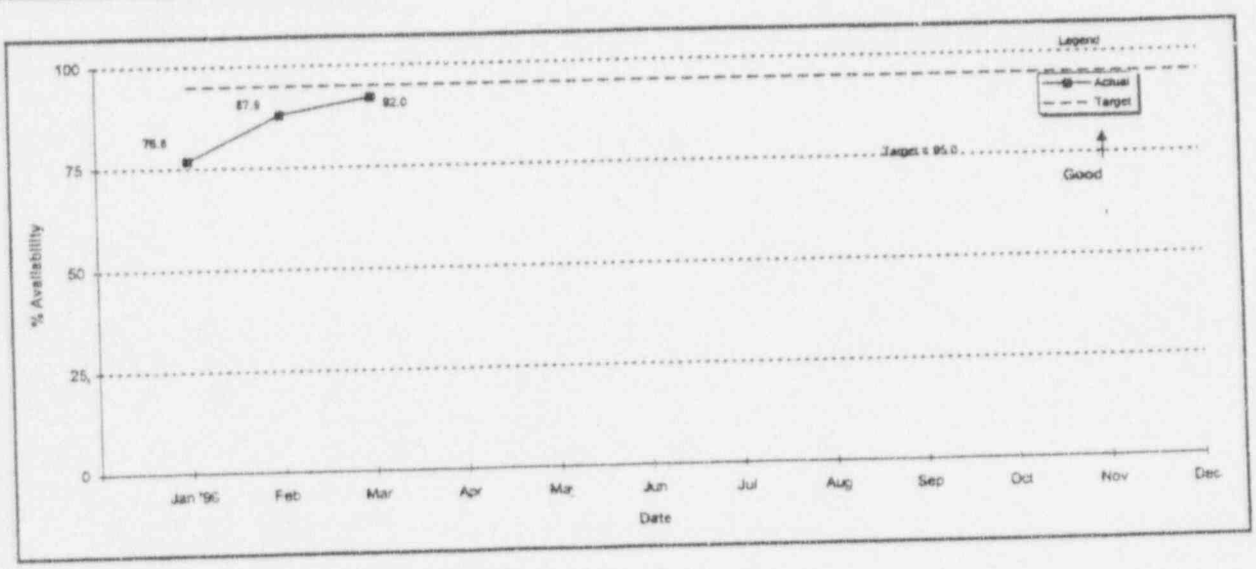


Lost Generation

Date	MWH Loss	Reason
3/25/96	-250	Turbine Valve Test
4/3/96	-177	Letdown Isolation
4/9/96	-775	Waterbox piping repair.
4/10/96	-3089	Waterbox piping repair.
4/11/96	-3079	Waterbox piping repair.
4/12/96	-3131	Waterbox piping repair.
4/13/96	-3177	Waterbox piping repair.
4/14/96	-3157	Waterbox piping repair.
4/15/96	-3181	Waterbox piping repair.

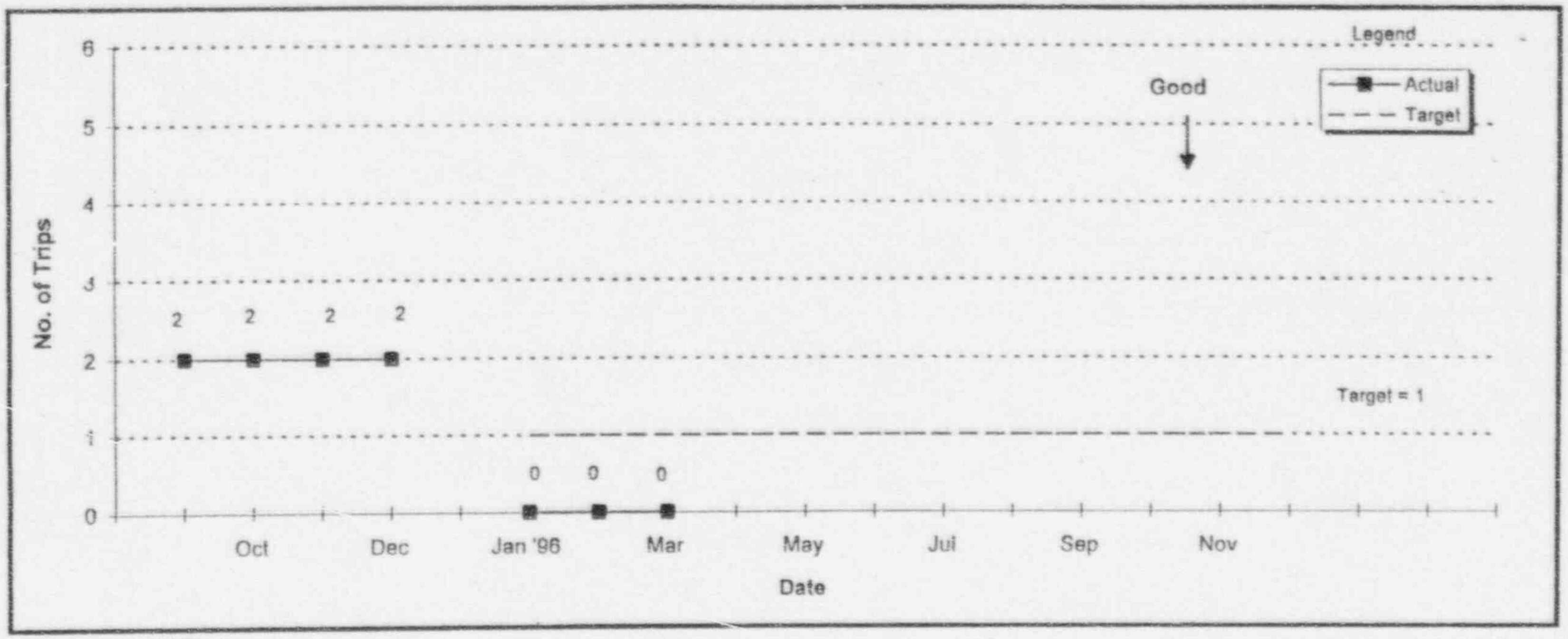
Based on a Maximum Dependable Capacity of 839 MW

EQUIVALENT AVAILABILITY FACTOR - UNIT 2



AUTOMATIC REACTOR TRIPS

Jeff West - Operations



Data Source: Jeff West

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CONDENSER WATERBOX
PIPING

ST. LUCIE UNIT 2
CONDENSER WATERBOX CORROSION

I. Current Situation

2A1 Waterbox: Out-of-service for repairs.

II. Problem Statement:

Two through-wall holes identified in the 2A1 and 2B1 outlet water boxes on 4/9/96.

III. Background:

- 84" diameter stainless steel components installed upstream and downstream the condensers during the 1995 refueling outage.
- The installation coupled stainless steel with the carbon steel waterboxes and cast iron piping. The failures were in the carbon steel waterboxes.

IV. Root Causes:

- The failure mechanism for the through-wall holes and wall thinning was galvanic corrosion.
- The galvanic corrosion resulted from the coupling of dissimilar metals (stainless and carbon steels) in a conductive, corrosive environment.
- The large surface areas of the new stainless steel components and the small surface areas in the carbon steel (pinholes in the coating system) caused the corrosion rates to be extremely high.
- The modified cathodic protection system installed concurrent with the stainless steel components did not adequately protect the carbon steel waterboxes.
- The Design Review Process was also inadequate in that it did not identify this problem.
- Post Modification Testing indicated less than adequate protection but the cognizant engineer did not believe change was necessary.

IV. Repairs

- Areas of wall degradation have been weld repaired to restore wall thickness.
- Breaches of the carbon steel coating system have been repaired.
- Corroded portions of the baffle plates, installed at the condenser discharge, have been repaired or replaced.

V. Corrective Actions:

<u>Actions Completed:</u>

- The internal surfaces of the S.S. components have been coated (as much as practical) to reduce the area of the stainless steel.
- Additional anodes and reference cells have been installed in the proximity of the S.S. components in the 2A1 & 2B1 loops.
- Temporary power has been provided to the 2B1 cathodic protection anodes.
- An independent industry expert has provided input corrective actions.
- Testing has been conducted to determine the required number of anodes and proper operating levels of current.

<u>Actions In progress:</u>

- Installation of additional independent rectifiers and controllers will be implemented when parts are available.
- An independent consultant is to prepare the Unit 1 & 2 long term design packages.
- Corrective Actions are being incorporated into the Unit 1 design scheduled for implementation during the upcoming refueling outage.

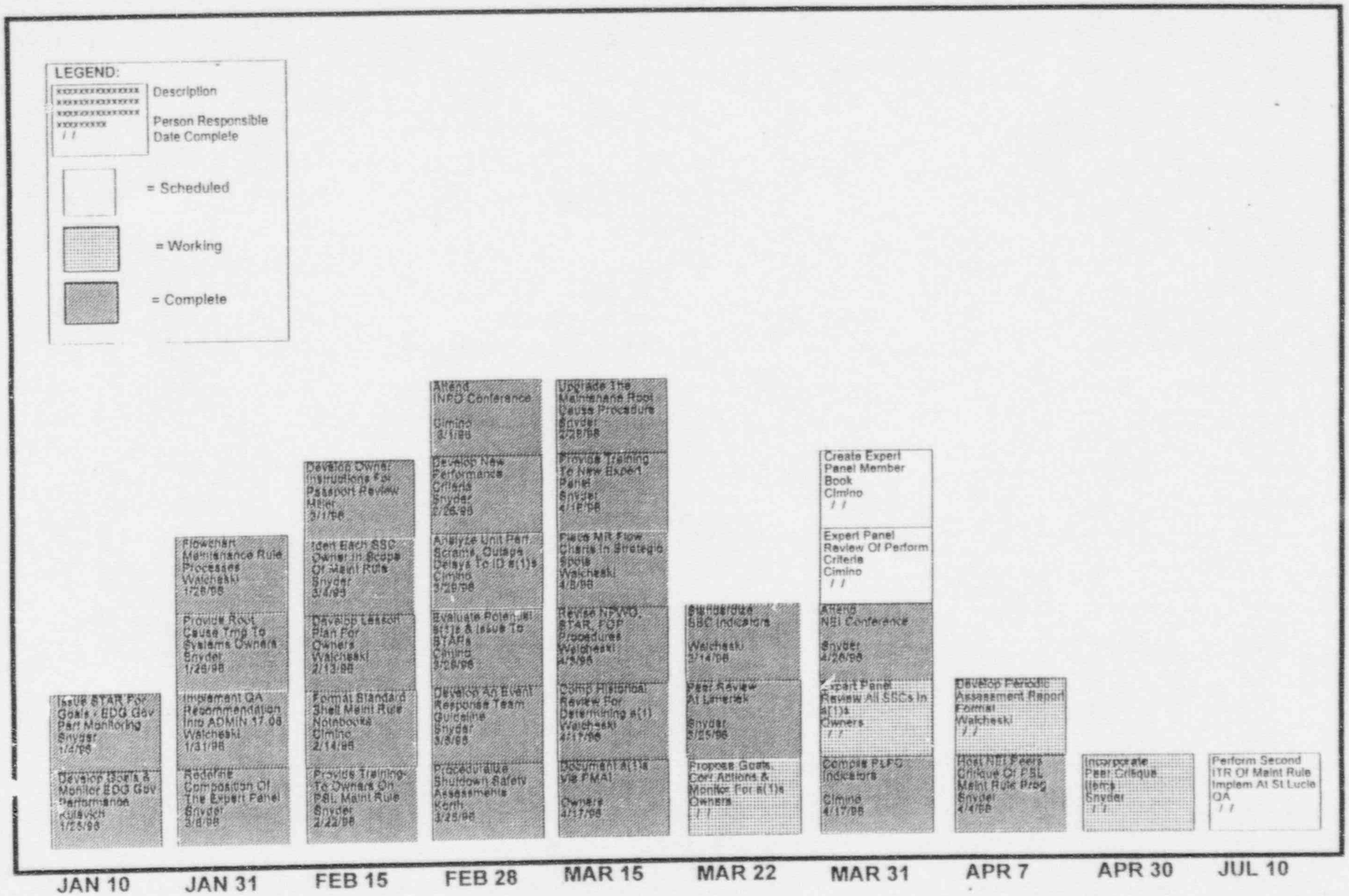
<u>Future Actions:</u>

- In future efforts, outside engineering resources will be utilized to support extraordinary engineering problems.
- Use FPL Staff as a second opinion or alternate outside sources for design review of these problems.

MAINTENANCE RULE

IMPLEMENTATION SCHEDULE FOR THE MAINTENANCE RULE
1996

Updated 4/17/96



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TASKS COMPLETED FOR MAINTENANCE RULE SINCE 10 JANUARY

PROGRAM UPGRADES

MRule procedure revised wrt QA ITR, NUMARC 93-01, Turkey Point

New system Performance Criteria wrt technical basis

SYSTEM OWNERS

MRule 'system owners' identified

System owners and supporting component engineers trained on MRule

Expert Panel members identified and trained on MRule

ROOT CAUSE

Trained system owners on RCA (Used INPO Good Practice techniques)

Developed site procedure on 'how to' for Root Cause Analysis

Implemented SCE Guideline for ERT and RCA teams.

HISTORICAL REVIEW

3 year review of SSC performance to ID potential a(1)s

System Owner involvement

BENCHMARKING

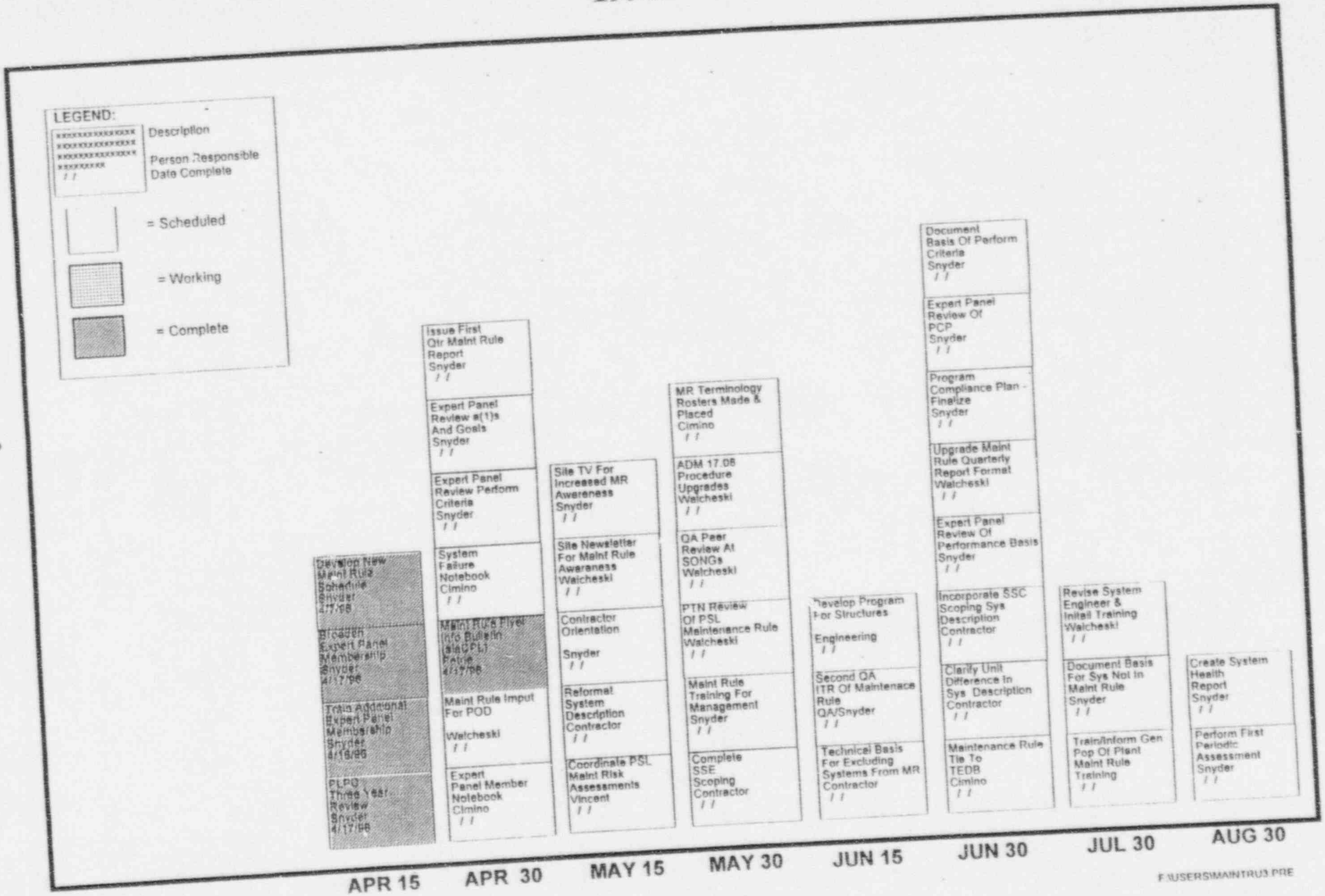
Limerick MRule Peer review

NEI MRule conference (CE peer discussions)

NEI peer review at PSL

REVISED IMPLEMENTATION MAINTENANCE RULE SCHEDULE 1996

Updated 4/17/96



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REMAINING TASKS FOR MAINTENANCE RULE IMPLEMENTATION

RESOURCES FOR FINAL MRULE IMPLEMENTATION

Dedicated
- 3 SCE engineers
- 1 ERIN contract engineer

Supporting
- 3 SCE technicians
- System Owners
- Expert Panel members
- Engineering (Civil, PSA)

PROGRAM IMPROVEMENTS

Expand scope of systems in MRule

Update scoping documentation

System Descriptions improvements

On-line risk assessments

CONTINUED IMPLEMENTATION

General plant population awareness - Flyers, posters, TV, newsletter, post outage training

Evaluate a(1)s w/ System Owners & Expert Panel

Documentation - System Failure History, Expert Panel notebooks

Periodic Assessment

BENCHMARKING

April - ERIN contractor (MRule experience at Diablo Canyon, Limerick, Peach Bottom)

May - Turkey Point critique of PSL MRule program
- San Onofre QA ITR exchange

June - St. Lucie QA ITR

July - Palo Verde NRC MRule baseline inspection

STORES INVENTORY REDUCTION

INVENTORY REDUCTION SUMMARY

- Review $8,700,000 Identified as DME Without Plant Review (Rogers-indicator)

- Walkdown Warehouses to Identify Additional Large DME Items (Rogers)

- Inventory Bench Mark (Rogers)

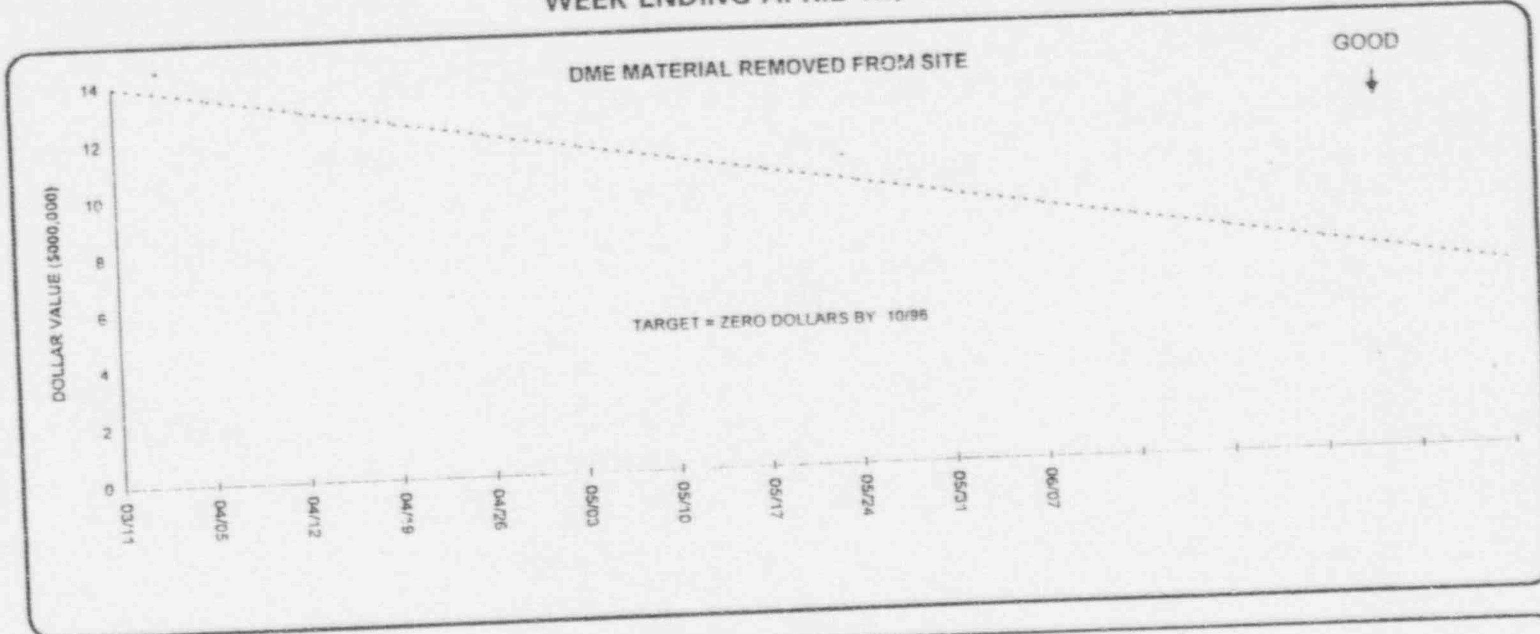
- Identify Problem Areas and Apply Additional Resources (Rogers - valve & I&C parts)

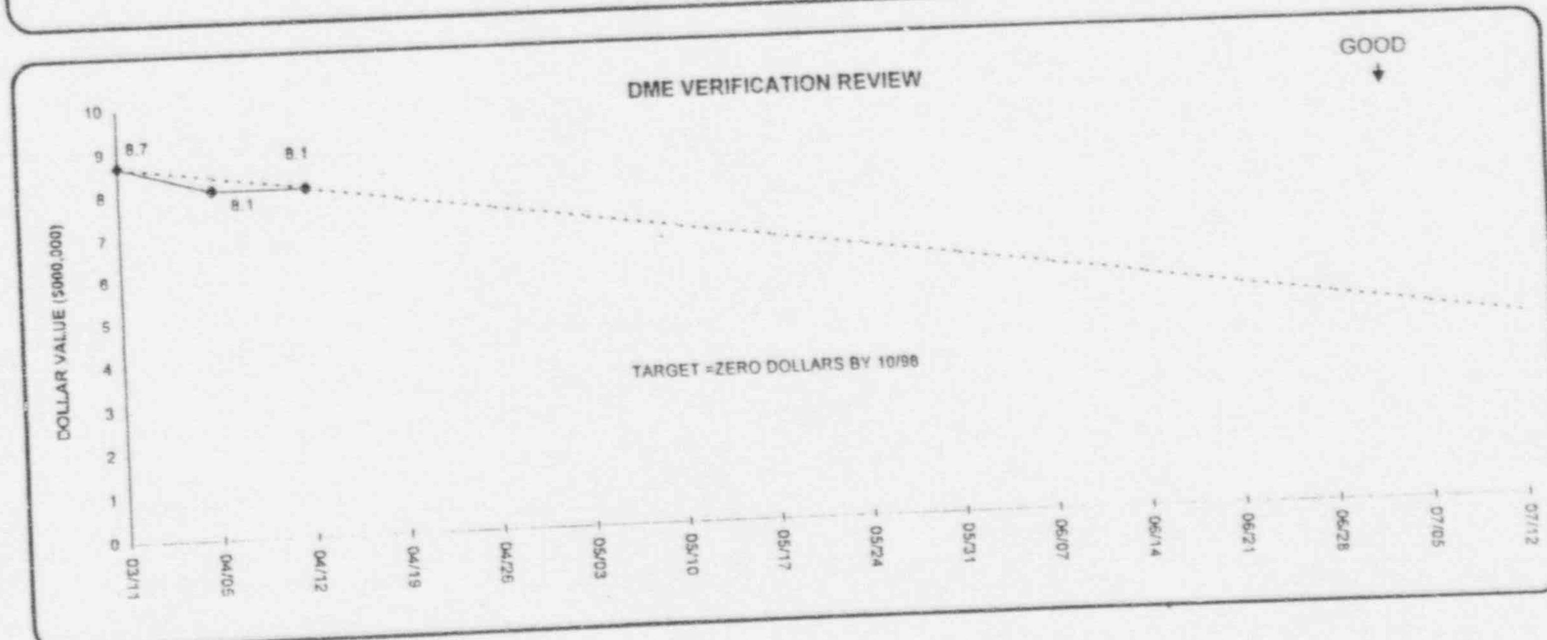
- Auction $14 Million Approved DME Material July/November 1996 (Quilty - indicator)

- Track Effectiveness of Reviewed DME Material Removal form Site (Quilty - indicator)

LAR 4-17-96
dmesumry

NUCLEAR MATERIALS MANAGEMENT
WEEK ENDING APRIL 12, 1996





DME.XLS

UPDATED AND SUBMITTED BY: MATERIALS MANAGEMENT - N. QUESADA

IHE 96-030
RCS LEAKAGE/
E-PLAN REPORTING

Unit 2 RCS Inventory Loss Greater than Technical Specifications

Problem: An Unusual Event was declared on March 31 at 1430 after Operations discovered and secured an approximate 30 GPM inventory loss from the CVCS System.

Root Cause:

-Relief Valve V2531 lifted to the HUTs due to high pressure in the ion exchanger supply header.

-The high back pressure was the result of V2382 being in a throttled position versus fully open.

-V2382 was not adequately confirmed to be in the full open position after a routine de-lithiating evolution.

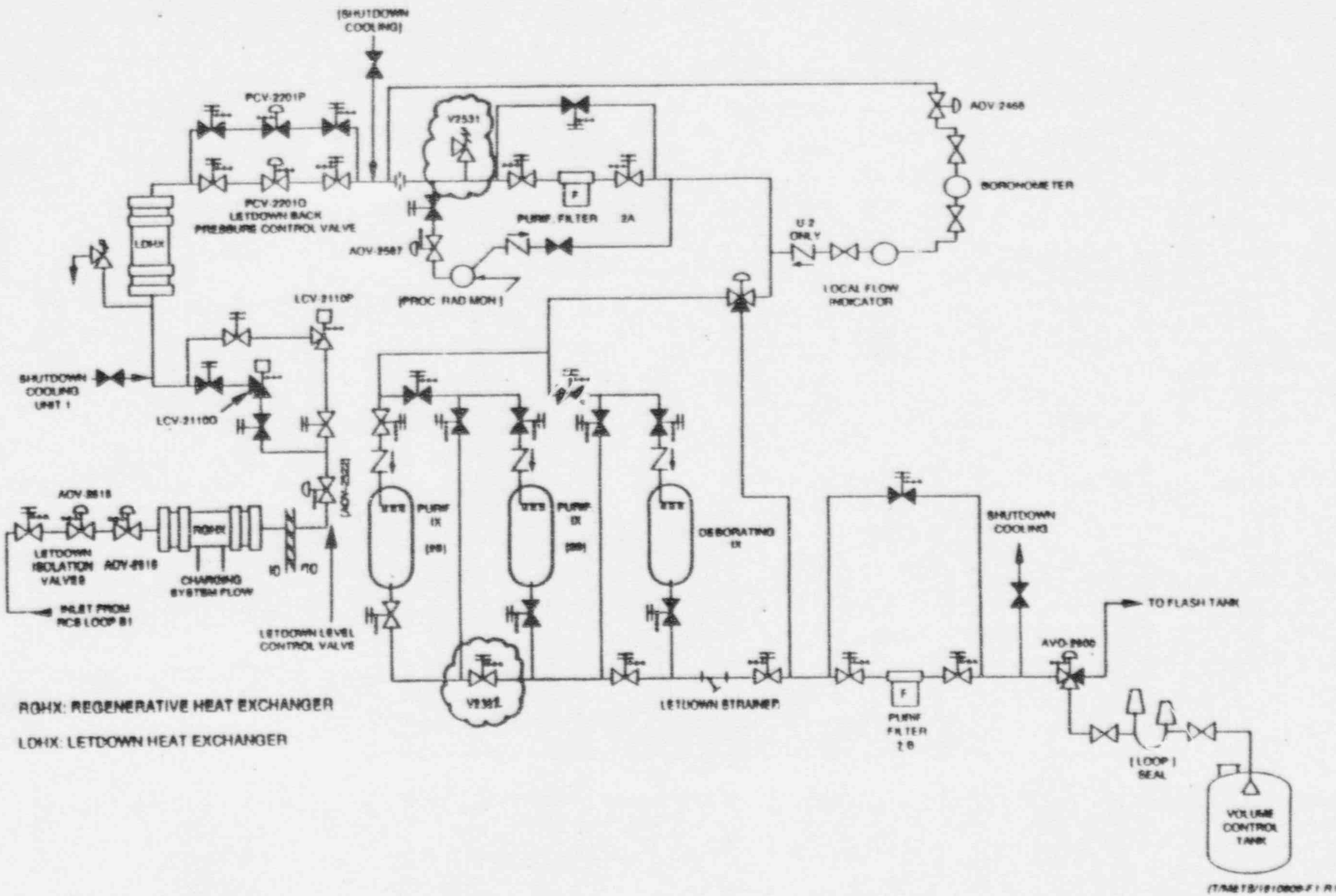
Corrective Actions:

-Add a pressure gage to the ion exchanger inlet header to improve method of confirming proper system operation.

-Review plant policy on use and maintenance of valve position indicators.

-Revise operating procedures to improve understanding of proper methods for valve position verification.

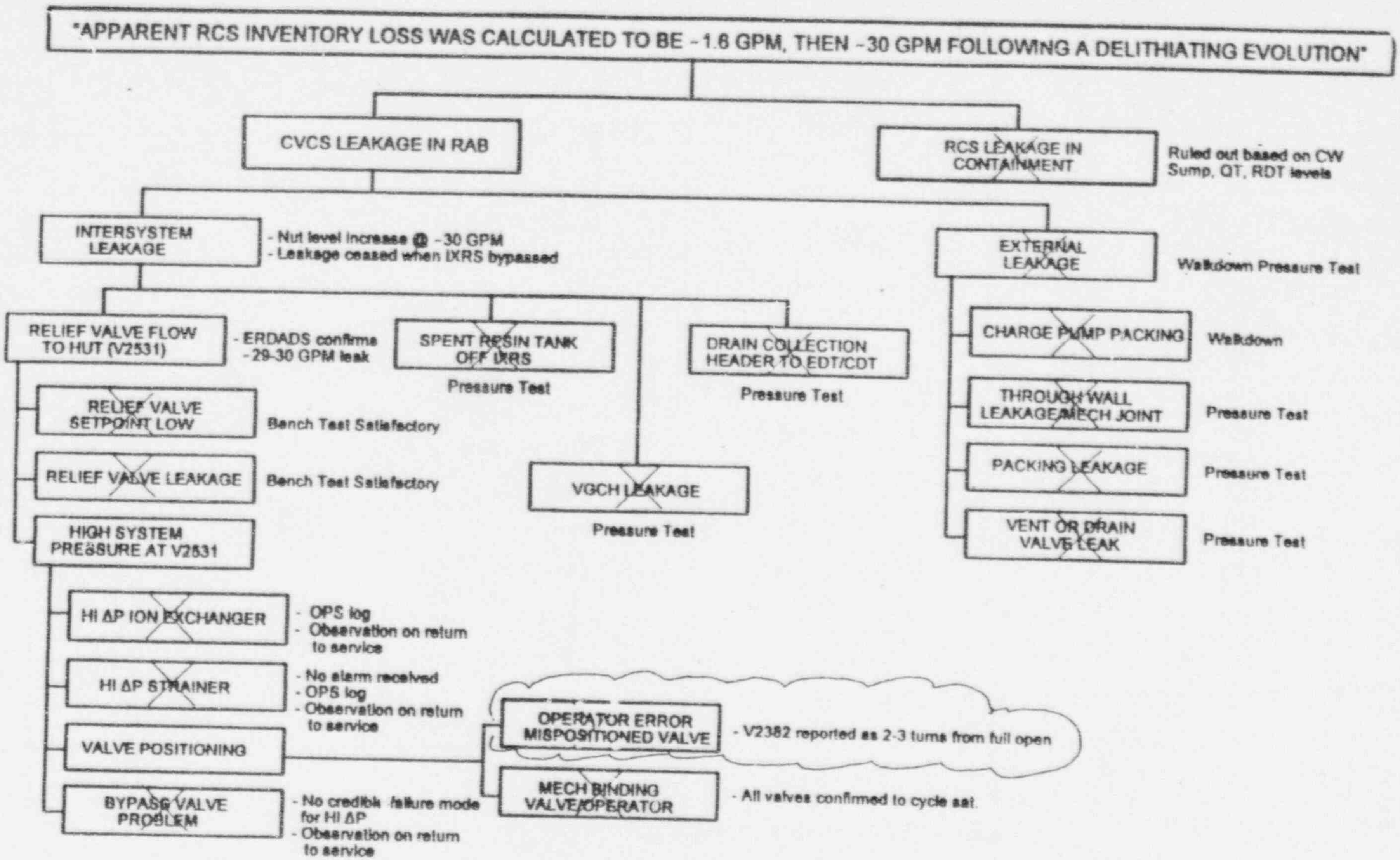
CVCS LETDOWN



RGHX: REGENERATIVE HEAT EXCHANGER

LDHX: LETDOWN HEAT EXCHANGER

Fault Tree
Unit 2 RCS Inventory Loss of 3/31/96



Text/Plant/SCE/Fault Tree 4/5/96

IHE 96-030 E-Plan Event

Conflicting Views of the Leakage Situation:

1. Tech Spec RCS leakage detection systems did not indicate leakage and it was thought to be isolable.

2. PSL historically has not considered it RCS leakage if it is known to be isolable.

Telecon with NRC on 4/4/96, PSL stated:

1. The UE declaration was based on valid criteria because leakage did exist, but procedural criteria were not clear.

2. Declaration was not timely.

3. Procedures will be changed to ensure consistency.

4. We will instill culture "if unsure...you are in the E-Plan".

Corrective Actions:

1. Reinforce management expectations.

2. Develop procedural guidance to define RCS leakage.

3. Evaluate the training program E-Plan content and frequency on event declaration, timeliness and communications with off-site agencies.

4. Revise EPIP EAL for Unusual Event on RCS leakage.

6. Revise RCS Inventory Balance Data Sheet 1.

FFD AUDIT SUMMARY

FITNESS FOR DUTY/ACCESS AUTHORIZATION AUDIT

Summary: The audit acknowledged that we are in compliance with regulations, but have numerous opportunities to improve our program and comply with our internal implementation documents.

Findings regarding site implementation activities:

Finding 1. Follow up testing for personnel in the conditional access program has not been administered consistently.

Response: The tracking mechanism for the site FFD coordinator will be improved to require monthly verification of program compliance. A cross check by Security supervision will be performed.

Finding 2. The implementation of random testing has been inconsistent. Some people selected for testing have not been tested, and the reason for not testing has not been properly documented.

Response: The random test process will be improved to verify that the selected employee is on site, before any test form is issued. Adherance to documentation requirements will be improved through revision of the test form, and a routine review of test forms by Security Supervision.

Finding 3. The Site FFD Coordinator did not have a 3 year background check performed.

Response: This check has now been performed. The mechanism for ensuring compliance with this program requirement in the future is under review.

MODIFICATION CONTROL

Modification Control Improvements

Actions Complete

Reestablished Configuration Control group

Revised Procedures to implement NP - 703

Generated 1996 Top 20 List

Generate 1996 top 30 list

Initiate Real Time Engineering List

Present Initiatives

Generate 1997 Top20/30 List

Future Initiatives

Improve PCM closeout process

OUTAGE PREPARATIONS

IMPROVEMENTS/ACTIONS

OUTAGE MANAGEMENT

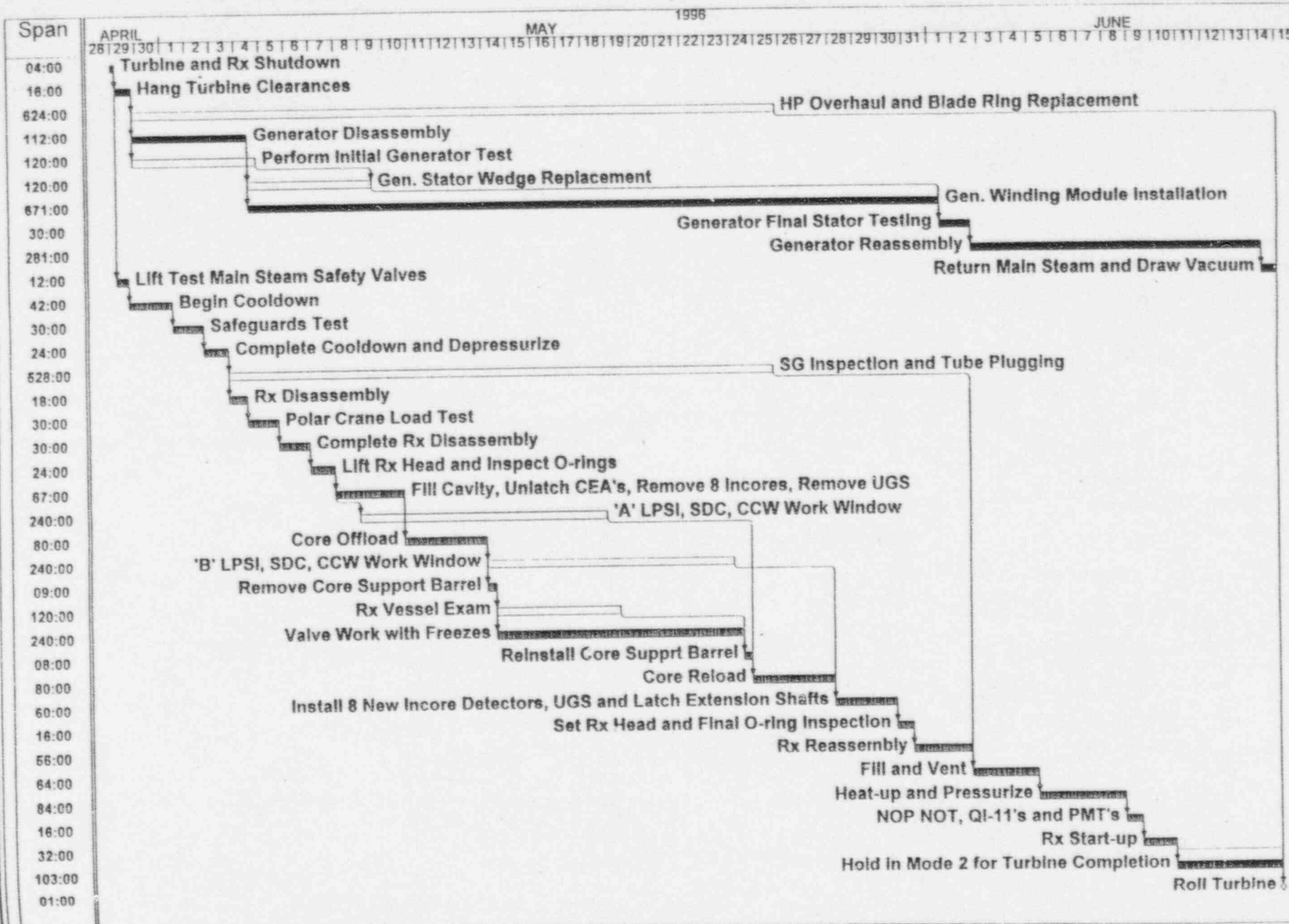
Major Improvement Areas

Complete Unit 2 Refueling Outage Self-Assessment/Critique and identify additional improvement actions		Complete
Establish contingency plans for significant outage activities:		
• Core Barrel Examination		4/23/96
• Westinghouse SG Tube Plugs		4/23/96
• Pressurizer Code Safety Valves		4/23/96
• Reactor Vessel O-Ping Replacements		4/23/96
• Main Generator Inspection		4/23/96
Issue Operations and Maintenance procedure upgrades	Due:	3/29/96
	Maint Target:	Complete
	Ops Target:	4/26/96
Improve Outage Management:		
• Complete the addition of Schedulers for future outage planning		Complete
• Re-Establish use of Critical Maintenance Management Process		Complete
• Institute outage work scope controls for Unit 1 1996 Outage		Complete
• Assess other plants' OM processes		4/20/96
• Upgrade site-wide scheduling system		8/30/96

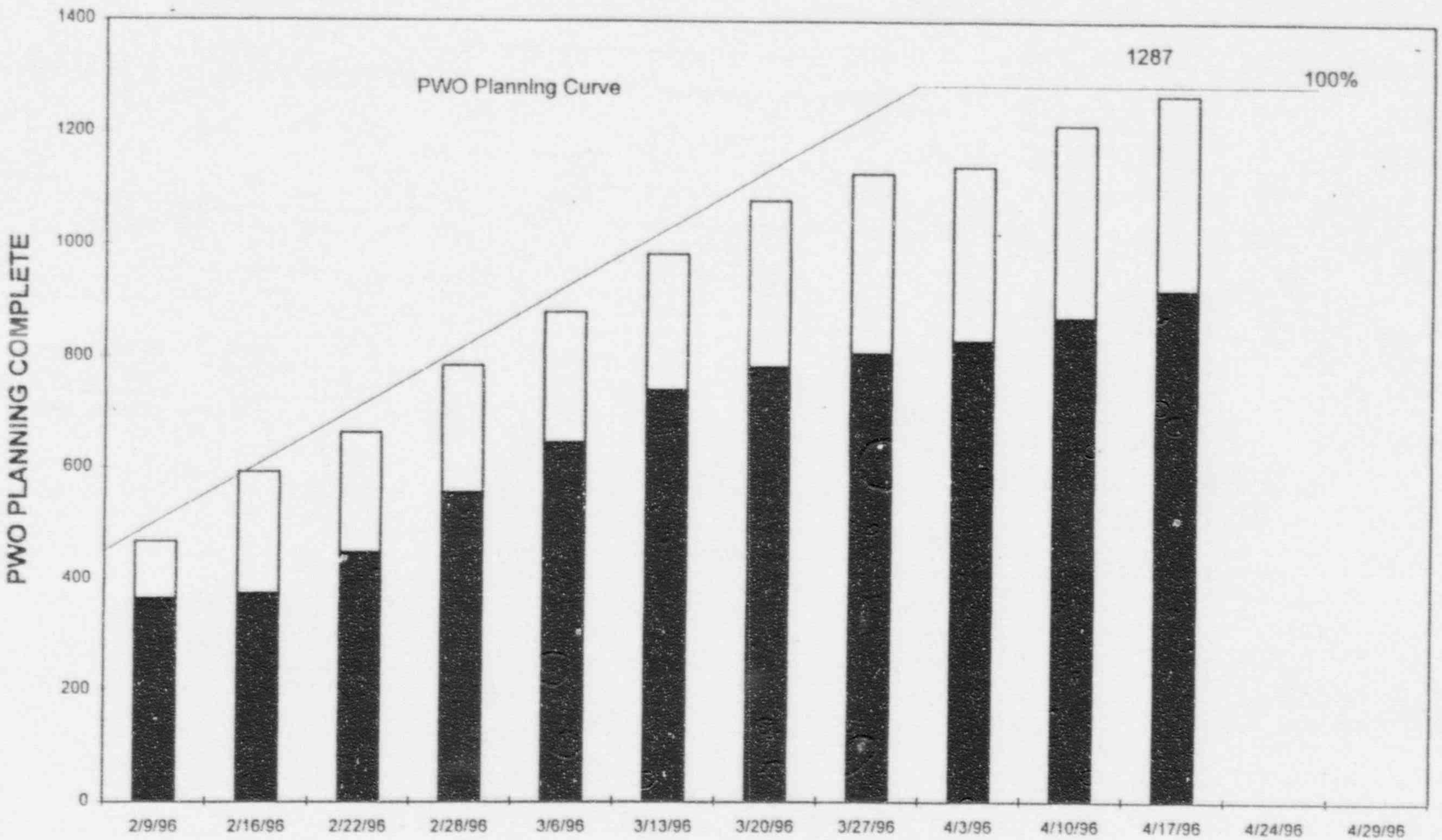
17APR96

Draft Outline PSL Unit 1 Refueling Outage 1996

47 Days



UNIT 1 1996 OUTAGE



SL1-14 EMERGENT WORK TRACKING FOR NPWOs
OUTAGE MANAGEMENT

Report Date:	16-Apr-96
Data From:	16-Apr-96

LMD	Department	NPWO's 16-Apr-96 A = APPROVED	E = E-WORK	U = UNAPPROVED	To Date Totals A	E	U	GRAND TOTALS After 27 FEB 96
1	MECHANICAL MAINTENANCE	0	0	0	40	16	11	67
2	INSTRUMENT & CONTROLS	0	0	0	30	5	5	40
3	ELECTRICAL MAINTENANCE	0	0	0	13	10	2	25
C	PROJECTS / MAINTENANCE SUPT.	0	0	0	12	2	7	21
	TOTALS	0	0	0	95	33	25	153

	A	E	TOTAL
EMERGENT NPWOs PLANNED (Status >=30):	92	21	113

Note: EWORK requires evaluation and approval prior to being APPROVED

Unit 1 Outage PCMs

Total for outage 68

Major Packages 13

Minor Packages 55

Total Delivered 49

Not Yet Delivered 19

ST. LUCIE NUCLEAR ENGINEERING

UNIT 1 1996 OUTAGE SCHEDULE

BASELINE SCHEDULE JAN. 2, 1996

UPDATE AS OF APR 12, 1996 R. ENSLEY

LEGEND:

- xxx xx-xxx-xx ► REA Number
- xxxxxxxxxxxxx ► Description
- xx xx xx ► Date Due
- xxx xxx F ► Resp. Disc.
- Future Item ▲ ► Engr'd Matls. Ordered
- △ ► Engr'd Matls. Required
- □ ► Original Plant List
- ■ ► Emergent Packages
- ▒ ► By Outage Start/During Outage
- ◆ ► PC/M Not Required
- C ► Capital
- ► Shaded Box Represents Completed Package

APR

- SLN 95-013-10 NONDEPINCORE 4-12-96 FUELS
- STAR 94110486 RWT INSP 4-12-96 PEG CIV
- U1 RELOAD 4-8-96 PEG FUELS
- STAR 951886 DEH DP SWTCH 4-8-96 SITE ELE

- PMAI 96-03-777 EDG COP TUBE 4-19-96 SITE MEC
- REWIND CWP 4-19-96 PEG ELE
- PMAI 96-03-370 24" SPOOL PCE 4-19-96 SITE MEC
- SLN 93-061-11 A/D CRN'S 4-15-96 SITE MEC/CIV
- STAR 951667 SNUBBER CRIT 4-15-96 SITE CIV

- PMAI 96-02-392 EDG UNLD VLV 4-26-96 SITE MEC
- STAR 951049 1A2 DIESEL TK 4-26-96 SITE MEC
- CIAS EDG START 4-26-96 PEG ELE
- STAR 950970 POLAR CRANE 4-24-96 SITE CIV
- STAR 950323A RCP LKOFF 4-19-96 SITE MEC

- EDG RAD PLNM 4-29-96 SITE MEC
- STAR 951080 RTGB GR ALRM 4-29-96 SITE ELE
- PMAI 96-03-379 D/G IND LIGHTS 4-29-96 SITE ELE/SCE
- PMAI 96-03-453 DBL JAC BONET 4-30-96 SITE MEC
- PMAI 96-02-352 480V LC LIFT 4-26-96 SITE CIV

- PMAI 96-03-785 CNTMT RNG LGT 4-30-96 PEG ELE
- PMAI 96-02-146 EDG EXHAUST 4-30-96 SITE CIV
- STAR 951283 RCP SWEEPS 4-30-96 SITE LIC
- STAR 951136 MV 08-1B MTR 4-30-96 SITE ELE
- MSIV BKUP 4-29-96 PEG MEC

MAY

- PMAI 96-03-726 1B EDG VLT REG 5-30-96 SITE ELE
- PMAI 96-03-115 RCP VIB PROB 5-30-96 SITE ELE
- STAR 951197 1A1 RCP CCW 5-30-96 SITE MEC
- PMAI 96-03-277 LCV-11-24 A/B 5-17-96 SITE MEC

- PRESS INSL 5-30-96 SITE MEC
- STAR 950565 1B2 ANN A-13 5-30-96 PEG ELE
- STAR 950426 MV 09-13 ST NUT 5-30-96 PEG MEC
- STAR 950882 EXCORE POS 5-30-96 SITE MEC

G:\COMMON\DRE\SKYLINES\1996P1E.PRE

Operations Outage Preparations

Procedures;

-13 procedures remain to be revised to support"Verbatim Compliance" for outage.

-Operations outage procedures will be FRG approved prior to 29 April.

Clearances:

-237 Clearances have been identified to Operations as of 17 April 1996

-111 Clearances have been created for the outage as of 0800, 17 April 1996.

-100% of clearances are expected to be complete prior to start of outage.

1996 SPRING OUTAGE GOALS
UNIT 1

1. Personnel Safety - Lost Time Injuries 0
2. Doctor Case Injuries . . . . ≤6
3. NRC Violations 0
4. Outage Duration . . . . ≤49
5. Personnel Radiation Exposure . . . . ≤316 MRem
6. Personnel Contaminations (any Contamination Resulting in a Skin Dose) . . . . ≤10
7. Contaminated Floor Space within 14 Days Post Outage . . . . <1,500 ft^2
8. Cubic Feet of Radiological Waste Gen. . . . . <6,300 ft^3
9. Outage Budget . . . . ≤$25 Million
10. Unit Performance
    - 60 days Post Outage Availability . . . . ≥93%

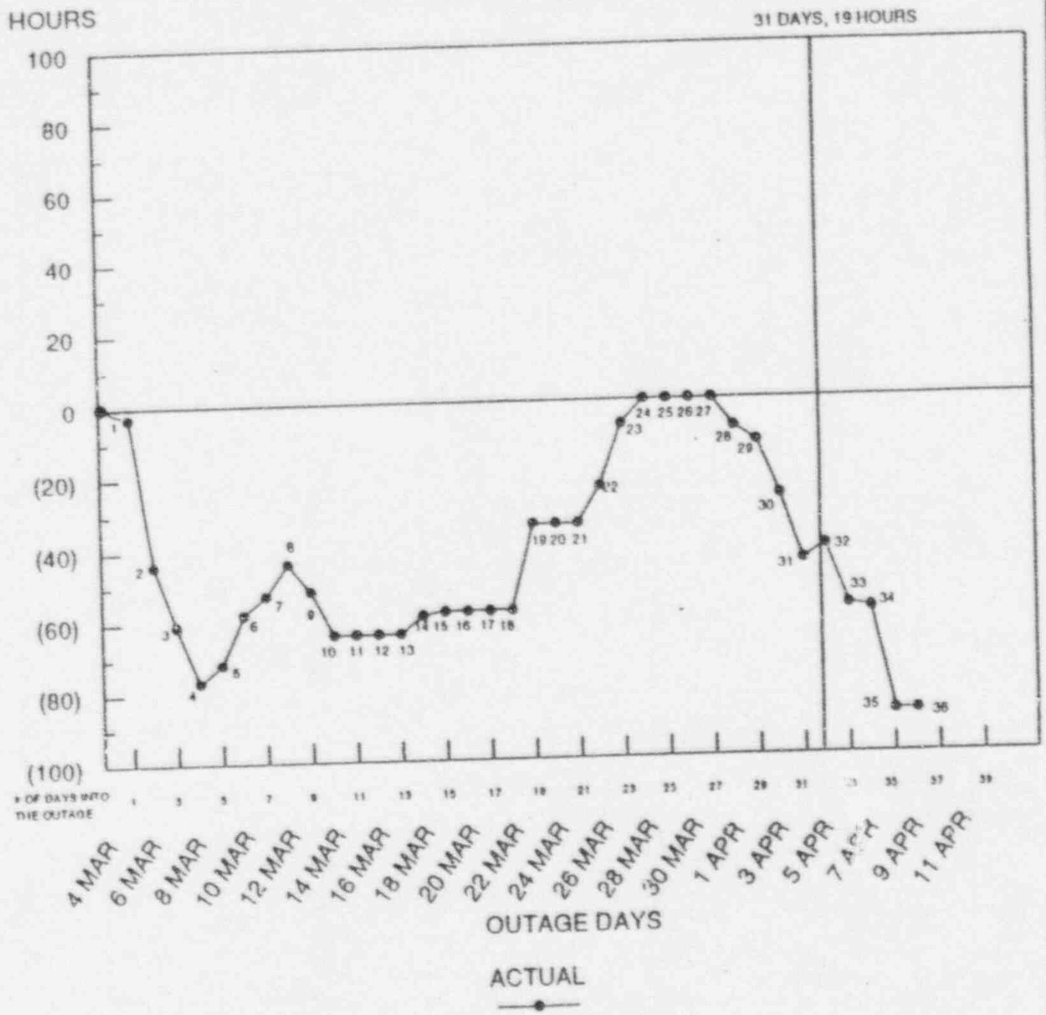
FIGURE I-2

UNIT 4 '96 REFUELING
OUTAGE GOALS

	GOAL	ACTUAL
1. NUCLEAR SAFETY PROBLEM	- ZERO	- ZERO
2. PERSONNEL SAFETY		
- LOST TIME ACCIDENTS	- ZERO	- ZERO
3. DOCTOR CASE INJURIES	- $\leq$ 6	- 1
4. MEET OR BEAT THE OUTAGE		
- SCHEDULE DURATION	- < 40 DAYS	- 35 DAYS 11 HOURS 21 MINUTES
5. MEET OR BEAT THE OUTAGE		
- BUDGET	- $\leq$ $22.5 MILLION	- < 22.5 MILLION
6. PERSONNEL EXPOSURE LIMITS	- $\leq$ 215 MANREM	- 163 MANREM by dosimeter
7. PERSONNEL CONTAMINATIONS (ANY CONTAMINATION RESULTING IN A SKIN DOSE)	- $\leq$ 10	- 3
8. CONTAMINATED FLOOR SPACE		
WITHIN 14 DAYS POST OUTAGE	- <1750 ft^2	- 469 ft^2
9. CUBIC FEET OF WASTE GENERATED	- <6400 ft^3	- 2400 ft^3
10. OUTAGE RELATED SIGNIFICANT		
CONDITION REPORTS	- < 10	- 6

UNIT 4 1996 REFUELING

AHEAD OR BEHIND SCHEDULE



1) 3 Loss Polar Crane Inspection/Torque Rail Clips
2) 44 Loss Polar Crane Large Hook Impacted Stops/ Caused Damage
3) 14 Loss Polar Crane cable replacement on the main hoist
4) 16 Loss Polar Crane cable replacement/rework the slack cable limit switch
5) 5 gain CRDM ductwork removal/condseals
6) 14 gain Rx vessel detensioning set up
7) 5 gain Rx head detension & stud removal
8) 9 gain Rx stud equipment/cavity seal ring
9) 8 loss polar crane repair aux hoist gear box gasket replacement moving equipment into containment
10) 12 loss as found rod drag test duretion extenddded/ SFG crane south hoist load cable torn from its termination
11) Core unload progressing on schedule
12) S/G tube plugging is critical path
13) S/G tube plugs ahead of schedule/ CRDM canopy seals have the critical path
14) 5 gain canopy seal clamps on critical path
15) 1 gain canopy seal clamps ahead
16) 4A RHR Hx repair now has critical path
17) 4A RHR Hx on critical path
18) MOV-750 packing gland damage and movats testing has critical path
19) 24 gain commenced core on load/bulk work activities finished
20) core on load progressing
21) core on load progressing
22) Rx cavity drain/Rx head set/rx cavity decon & paint
23) Rx head stud hold plug removal & cleaning set up for tensioning
24) 7 gain Rx head stud insertion & tensioning
25) On schedule
26) On schedule
27) On schedule
28) 8 loss Safeguards testing - Bus clearing relay failed
29) 4 loss Safeguards testing/MG-6 relay/Kesavi relay failed
30) 15 loss CV-2906/2908 failed to stroke - 4A CSP alignment & IST/TE-432 RSC TC replacement
31) 18 loss RHR interlock test failed - MOV 863 A/B fuse blown/ TE-432 RCS TC replacement
32) 4 gain Reschedule Rx protection test & RCP coast down data
33) 17 loss CV-2908 pilot valve failed
34) 1 loss RPI's K-8/D-10 signal conditioner/connector cleaning delayed start of lower power physics
35) 29 loss turbine lube oil system malfunction & repair
36) UNIT ON LINE

SHIFT DIRECTORS

	SHIFT DIRECTORS	DEPUTIES	ALTERNATE SHIFT DIRECTOR
DAYS	JEFF WEST	FRANK McGLYNN JOHN BRADY DONNA CALABRESE	CHRIS BURTON
NIGHTS	BOB FRECHETTE	LEE LARGE HARRY BISHOP ROBIN MIXON	TONY MENOCAL

**UNIT 2 - FRED GIGELE, CARL CRIDER*

Outage Projects - SL1-14

	Project Lead/ Task Manager	Responsible Manager
10 Year Reactor Vessel and Core Barrel inspections Contingency plan for repairs	K. Mayhew (Supv:G. Pustover)	Marchese Denver
Pressurizer Code Safety Valve replacements Flange work/mods	C. Ward	Denver
RPS NIS Upgrade Repair detector positioning devices Hardware replacement (detectors, drawers, etc.)	 G. Pustover R. Olson	 Marchese
Steam Generators(Overall) Westinghouse SG Tube Plugging & PAP	R. Ball (Supv:Flowers)	Marchese
RWT bottom inspection water management plan	R. Frechette	H. Johnson
RCGVS Valve replacements and piping modification	G. Rodgers	Marchese
Incore Instrument Assembly replacements	R. Olson	Marchese
V07161 and bypass replacement	G. Rodgers	Marchese
Polar crane load test	D. English	Marchese
TCV-14-4B replacement	H. Fagley	Marchese
1A &1B LPSI common piping valve work	N. Motley	Marchese
EDGs overall	McLaughlin/Ware	Wood
Charging header isolation valves repair SE-02-1,2,3	T. Sanders	Marchese
FCV-07-1A/1B maintenance Springs, Air press s.p., elastomers	T. Sanders	Marchese
SIT valve maintenance Quantify leakage pre-outage V3634 stem replacement	N. Motley P. Fulford N. Motley	Marchese
ICW piping at intake structure external corrosion inspection Repair contingency	R. Ball (Supv:Yates)	Marchese
Purge Valves	C. Swiatek	Wood
RCB permanent A/C modification	H. Fagley	Marchese
HJTC replacements	R. Olson	Marchese
HP turbine & seal ring replacement	R. Ball	Marchese

Condenser Tube Cleaning System and Debris Filter installation	D. Sipos	D. Sipos
Atmospheric Steam Dump valves seat repair	N. Motley	Marchese
Main Generator Maintenance/Modification	R. Ball Nichols/Wolaver	Marchese
Turbine turning gear auto/remote engagement repair	Wolaver	Wood
RCPs (all issues)	B. Haines	Marchese
ESF testing	P. Fulford	H. Johnson
SIT dump testing	J. Hallem	H. Johnson
ECCS full flow testing	P. Fulford	H. Johnson
OPS-reduced inventory/mid loop mgr	R. Weller	H. Johnson
OPS-refueling	R. Weller	H. Johnson
Clearances	R. Lamb	H. Johnson
OPS procedures	R. Weller	H. Johnson
OPS-vent and drain hoses	C. Johnson	H. Johnson
MOV Coordinator-Ops	A. Hall	H. Johnson
Pressurizer(Overall)	C. Ward	Marchese
Reactor Maintenance	B. Haines	Marchese
Pre/Early and Post RCS & RCB Inspections	R. Riha	H. Johnson
Relief Valves	N. Motley	Marchese
Cranes	English	Marchese
RCB Cleanup	M. Goodiel	Marchese
Reactor Cavity Seal Ring	T. Kreinberg	Dawson
Maintenance Procedures	Menocal	Menocal
Engineering Packages	Denver	Denver
NPWO Planning	Menocal	Menocal

OUTAGE PROJECTS

S/G INSPECTION

ST. LUCIE STATUS MEETING
APRIL 18, 1996

STEAM GENERATOR INSPECTION

I EDDY CURRENT TESTING

SCOPE OF TESTING

Bobbin Coil Testing: - all active tubes full length

MRPC Testing:
- all active hot leg tube expansion transitions.
- 20% of cold leg tube expansion transitions.
- 20% of dented hot leg tube support inter.
- selected bobbin coil indications (diagnostic).
    - ~ 1200 indications at drilled supports.

CONTINGENCY PLANNING

Back up equipment & components

Data analysis personnel scheduled for 8 hr shifts

24 hr LAN support for transfer of examination data.

Qualified Bobbin Coil Sizing for IGA/SCC damage

Applies to tube damage except at drilled supports

Review Inspection Plans with NRC next week

SG4-18.WPD

ST. LUCIE STATUS MEETING
APRIL 18, 1996

STEAM GENERATOR INSPECTION

II MECHANICAL & WELDED TUBE PLUGGING

SCOPE OF PLUGGING

Mechanical Plugging: 400-500 tubes expected

Welded Tube Plugging: None Expected

CONTINGENCY PLANNING

Welded tube plugging

Plug repair/replacement - drilling and EDM.

Plugs in sufficient numbers to meet site needs

- Mechanical & welded tube & tubesheet plugs
- Oversize welded tube and tubesheet plugs

Tube stabilizer cables for circumferential cracks at:

- Top of the Tubesheet
- Upper Drilled Support Plates

ST. LUCIE STATUS MEETING
APRIL 18, 1996

STEAM GENERATOR INSPECTION

III REPAIRS FOR WESTINGHOUSE ALLOY 600 PLUGS

REASON FOR REPAIRS

WCAP-12245 Revision 3, Addendum 4 to "Steam Generator Tube Plug Integrity Summary Report", May 1995.

Prevent tube perforation due to plug top release

SCOPE OF PLUG REPAIRS (Framatome)

Install Plug-A-Plug (PAP) into base of plugs

A S/G Hot Leg - 254 PAPs
B S/G Hot Leg - 234 PAPs

PC/M in place for PAP Installation

PAP also limits leakage through plug & perforated tube

CONTINGENCY PLANNING

Cleaning & tapping plug threads for installation.

Replace any plugs not suitable for PAP installation

PAPs acceptable without final crimp to lock cup & cap scre

W Plug Top Remnants can remain in the tube

ST. LUCIE STATUS MEETING
APRIL 18, 1996

STEAM GENERATOR INSPECTION

IV IN-SITU HYDRO TESTING OF S/G TUBE DEFECTS

<u>REASON:</u> NRC Concern - Plants operating with IGA/SCC Flaws.
Demonstrate Structural Integrity of Tubing.
Demonstrate Adequacy of Inspection Program.

<u>SCOPE OF IN-SITU HYDRO TESTING</u>

4-6 Most Severe Flaws - Circumferential & Axial Orientation

<u>CONTINGENCY PLANNING</u>

Industry Results Favorable

Flaws at PSL-1 not as Severe

Test Pressures Limited: P 1.4P 3P

Adjusted for Temperature & Locked Support Plates

Bladder Installation to Mitigate Leakage during Test

Bladder Tested for Extrusion Through Fracture Face

If Tube Burst Occurs:

Stabilize Tube & Evaluate Adjacent Tubes for Plugging
Evaluate Inspection Program & Implement Repairs

SG4-18.WPD

STEAM GENERATOR INSPECTION

V SECONDARY SIDE ISSUES

SCOPE OF WORK

NONE: Last Cycle of Operation for S/Gs

Additional Sludge Loading is a Long Term Concern

Prior Inspections for Steam Separation & Feedring Equipment Acceptable

PROJECTED SAVINGS

$350,000 (Contractor Costs)

RX VESSEL/CORE SUPPORT BARREL INSPECTION

REACTOR VESSEL EXAMINATION

TOTAL SCHEDULED DURATION: 144 HOURS (6 DAYS)

EXAM SERVICES PROVIDED BY: SOUTHWEST RESEARCH INSTITUTE

- **EXAMINATION SCOPE:**

  - VESSEL EXAMINATION REQUIRED EACH 10 YEAR INTERVAL (ASME SECTION XI & REG. GUIDE 1.150)

  - CIRCUMFERENTIAL, LONGITUDINAL AND MERIDIONAL WELDS

  - INLET AND OUTLET NOZZLE TO SHELL WELDS

  - INLET AND OUTLET NOZZLE INNER RADIUS

  - INLET AND OUTLET PIPING WELDS

- **EXAMINATION METHOD**

  - ALL EXAMINATIONS WILL BE PERFORMED FROM THE ID OF THE VESSEL

  - EXAMINATION EQUIPMENT: " PAR DEVICE" OPERATED BY SWRI

  - SUSCEPTIBLE AREAS WILL BE EXAMINED FIRST (IE NOZZLE TO VESSEL WELDS)

- **PREVIOUS ULTRASONIC EXAMS PERFORMED:**

  - BASELINE EXAMINATION (PRIOR TO OPERATION)

  - FIRST 10 YEAR INTERVAL (APRIL 1983)

- **CONTINGENCY PLANNING**

  - SWRI EXAMINATION EQUIPMENT FAILURES / CORRECTIVE ACTION

  - FLAW EVALUATIONS (FRACTURE MECHANICS):

    JPN : SUBHASH KURANA

    OTHER SUPPORT: STRUCTURAL INTEGRITY ASSOCIATES OR APTECH

- **KNOWN INDICATION**

  - A PREVIOUSLY UNRECORDED ASME SECTION III REJECTABLE FLAW HAS BEEN DETECTED DURING A REVIEW OF RADIOGRAPHS.

  - LOCATION: CIRC. WELD 10-203 (LOWER SHELL TO BOTTOM HEAD WELD) ADJACENT TO THE CORE BARREL LUG @ 60 DEG.

  - FLAW HAS BEEN CHARACTERIZED BY CSI AND IDENTIFIED ON STAR 951893.

  - WELD AREA CONTAINING FLAW WILL BE EXAMINED FIRST TO ALLOW FOR FURTHER EVALUATION.

<u>1984 CORE SUPPORT BARREL REPAIR</u>

- REPAIRS PERFORMED ON 8 OF 9 LUG AREAS
- REPAIRS CONSISTED OF CRACK ARRESTING HOLES AND BYPASS LIMITING PLUGS AND PATCHES
- DESIGN MET ASME CODE AND CSB DESIGN BASIS REQUIREMENTS
- REPAIR NOT STRUCTURAL

<u>CSB INSPECTION SCOPE/PLAN</u>

- <u>VISUAL INSPECTION</u>
    - TO PERFORM VISUAL INSPECTION PER NRC COMMITMENTS
    - ABB TO PERFORM USING HIGH RESOLUTION CAMERA MOUNTED IN SUB
    - EXPECTED DURATION 2 DAYS
- <u>INSPECTION CONTINGENCY</u>
    - FPL SUB FOR VISUAL EXAMINATION
    - USE OF ECT AND/OR UT FOR FURTHER CHARACTERIZATION OF INDICATIONS
- <u>RECORDABLE OBSERVATIONS</u>
    - CSB PER ASME SECTION XI VT 3
    - REPAIR CONSISTENT TO 1986 VISUAL

INITIAL ENGINEERING EVALUATION

- CSB INDICATIONS
  - PREVIOUSLY DISPOSITIONED CRACKS ACCEPTABLE
  - NEW CRACKS TO 3" ACCEPTABLE FOR AT LEAST ONE OPERATING CYCLE.
  - CRACKS IN EXCESS OF 3" REQUIRE ADDITIONAL EVALUATION. MAY NOT BE ACCEPTABLE.
- PLUGS AND PATCHES
  - CRACKS IN PLUGS ACCEPTABLE.
  - CRACKS IN PATCH PLATES ACCEPTABLE
  - COMPLETE LOSS OF PATCH PLATE NOT ACCEPTABLE
  - LOSS OF ONE PLUG TO 8' ACCEPTABLE FOR CYCLE 14
  - PLUG ROTATION ACCEPTABLE

CONTINGENCIES

- ABB REACTOR INTERNALS ENGINEER WILL BE ON SITE
- MOST CONDITIONS CAN BE EVALUATED FOR AT LEAST ONE CYCLE
- MAJOR FINDINGS REQUIRE FURTHER ANALYSIS/POSSIBLE REPAIR
- COMPLETE PATCH FAILURE UNLIKELY. DESIGN REVERIFICATION REQUIRED. REPAIR REQUIRED.
- CSB CRACKS IN EXCESS OF 3" REQUIRE FURTHER EVALUATION INCLUDING FRACTURE MECHANICS. REPAIR MAY BE REQUIRED
- PHYSICAL REPAIRS THIS OUTAGE NOT REQUIRED UNLESS EXTENSIVE PROBLEM DISCOVERED.
- REPAIR BY WELDING NOT LIKELY
- REMOVAL AND REINSTALLATION OF PATCHES AND/OR PLUGS REQUIRE NEW TOOLING, TESTING ETC.

MAIN GENERATOR
INSPECTION

MAIN GENERATOR OVERVIEW

Work to be Performed:
- Stator Winding Improvement Modules Installation
- Generator Testing (Electrical and Mechanical)
- Complete Stator Rewedge - (all 42 slots)
- Core Torque Check

Project Durations:

• Generator Clearance (including Hydrogen Purge, Main Steam, Generator)	(2 Days)
• Remove Generator Rotor (Craft Labor)	(5 Days)
• Generator Work(by Westinghouse)	(27.5 Days)
• Reassembly of Generator/Exciter (Craft Labor)	(10 days)

Bases For Work:
- Vibration Levels on Coil Ends are moving in an upward level. Started at 3 mils, presently at 13.4 mils, Target is 20 mils in which it is recommended to reduce power until vibration levels go below 20 mils, which could be approximately 1 to 30 percent power reduction.
- Based on Trending of End Turn Baskets, they are no longer functioning as a consolidated unit.
- We are only monitoring 6 Coil Ends on each end of the generator out of a total of 42 coils or 84 End Turns.

Options:
- Install RF Monitor per Factory Mutual if we do nothing (Cost Approx. 100K)
- Do partial module installation of module package (Cost Approx 750K plus labor)
  - No one has had success doing a partial
  - Westinghouse has never performed a partial of this type based on their proposal to us.
- Do complete Module Mod. (Cost 2.3 Mil)
- Do Rigi-Flex Rewind which includes modules - new Design - (Cost approx. 6 Mil)

Keys to Success:
- Main Steam and Generator Clearance in 24 hours, with Generator Degassed & Purged.
- Develop Contingencies for what could happen.
- Westinghouse to start work prior to rotor removal to initiate work on critical path item.
- Pre-job planning and setup.
  - Hydrogen Leak Rate Test Prior to Shutdown
- Pre-job material staging on turbine deck
- Staging contingency material in Orlando

Why Westinghouse:
- They have performed same modification on numerous other units with success
- ABB wanted a 6 month lead time
- ABB has never done a 4 pole end turn modification on a Nuclear Unit.
- Keystone could only install Westinghouse Materials but has no Nuclear Experience or Nuclear background.

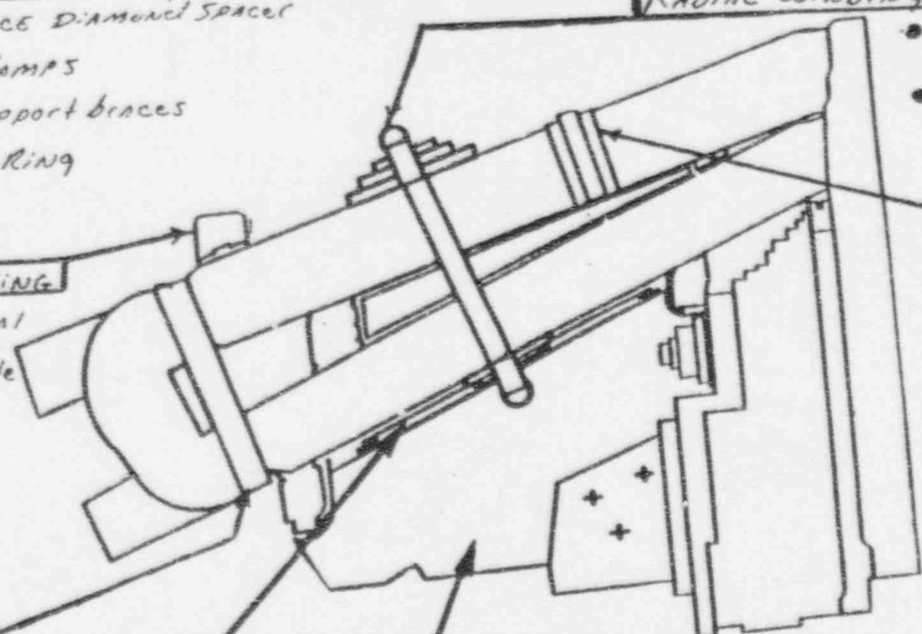
Contingencies:

See Attached List

4- POLE WINDING MODULES

Principal Components Comprising the Modules Hardware

- Banded Three piece Diamond Spacer
- Radial winding Clamps
- Decoupling Coil Support braces
- Top Coil Support Ring
- End Blocking



Top Coil Support Ring

- Utilized to provide Radial Restraint of the Coil Ends which will help consolidate the winding structure

End Blocking

- Key element in stiffing the windings and raising its natural freq. well above 120 HZ.
- Consolidate the end winding for Reduced coil end vibration

Rubber flex layer bonded to coils

- Thermally Decoupled

Radial Winding Basket Clamps

- Key element in consolidating the end winding structure Radially.
- Clamps exert Radial force on top and bottom coil pairs and greatly reduces individual coil vibration.

3 - Piece Diamond Spacer

- Replaces existing Diamond spacer at selected locations between adjacent coils to consolidate the end winding circumferentially
- Helps avoid local Resonances and will control large outward forces that would occur during a sudden short circuit.
- Allows tight bracing of the coils and helps prevent diamond spacer looseness.
- Verification tests have shown banded Diamond spacer assemblies to be several times stronger than conventional assemblies in both the shear and tension strength.

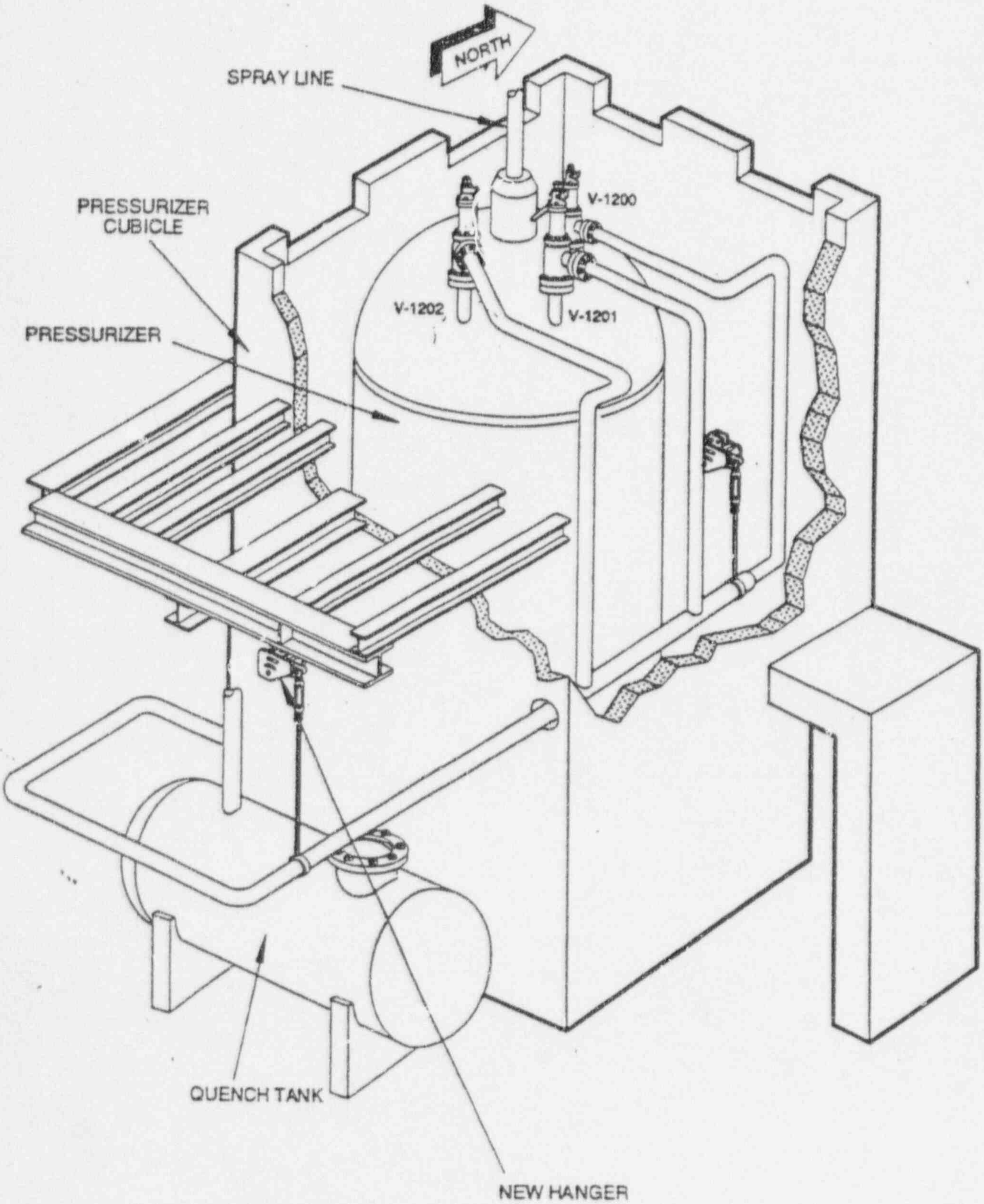
Decoupled Brace & Bracket

- Replaces existing support brace and allows the end winding to move axially during thermal expansion and contraction, thus minimizing stresses on the end winding structure.
- Radial stiffness is controlled to help tune the windings fourlobe mode natural frequency well above the 120 HZ. exciting frequency.
- Provides Radial Rigidity during a fault to withstand short circuit forces without excessive coil deflection and strain on the ground wall insulation

PRESSURIZER CODE SAFETY VALVES

ST. LUCIE UNIT 1

PRESSURIZER SAFETY VALVE



ST LUCIE PRESSURIZER SAFETY VALVE

SEAT LEAKAGE ELIMINATION

ACTIONS

1 MAINTENANCE PRACTICES

SEAT LAPPING
INCREASED DIMENSIONAL CHECKS
STANDARDIZATION

2 TESTING PRACTICES

THERMAL BINDING CHECK
INCREASED TEST PRESSURE FOR LEAKAGE TEST
FINAL AIR TEST
MATCHED AMBIENT AIR TEMPERATURES AT TEST STANDS

3 SEAT DESIGN IMPROVEMENTS

INSTALLED FLEXIDISC

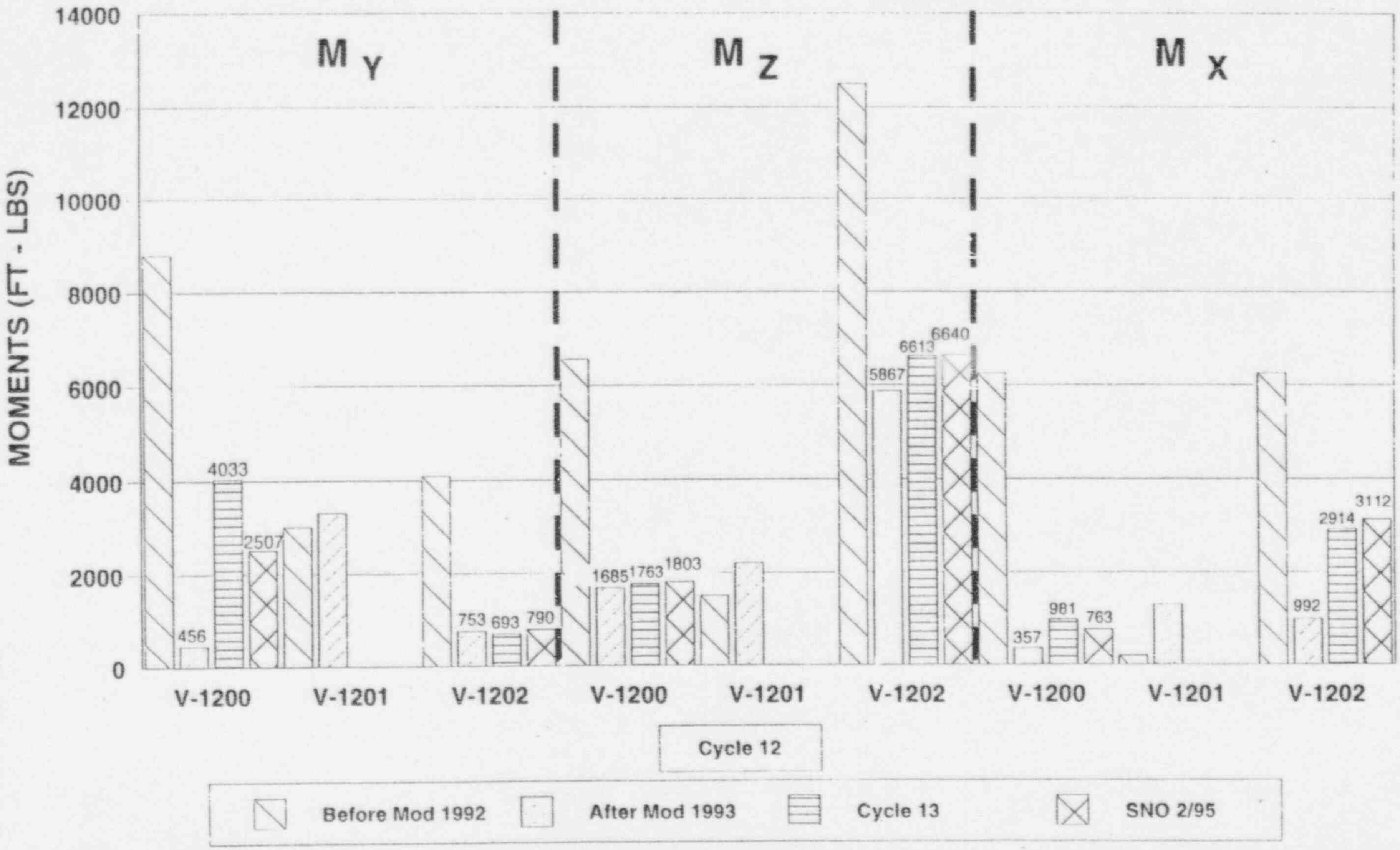
4 TAIL PIPE LOAD REDUCTION

MODIFIED TAIL PIPE LOADS TO NEAR CROSBY ALLOWABLE
MONITORED WITH INSTALLED STRAIN GAGES EACH OUTAGE
ADJUSTED LOADS WITH FLANGE WEDGE
CONTROLLED HEATUP RATE

5 STRENGTHENED VALVE BODIES- 1630 LBS TO 10000 LBS

PURCHASED NEW BLOCK VALVE BODIES
TESTED FOR THERMAL EFFECTS
TESTED FOR TAIL PIPE LOAD EFFECTS

PZR SAFETY VALVE NOZZLE LOADS



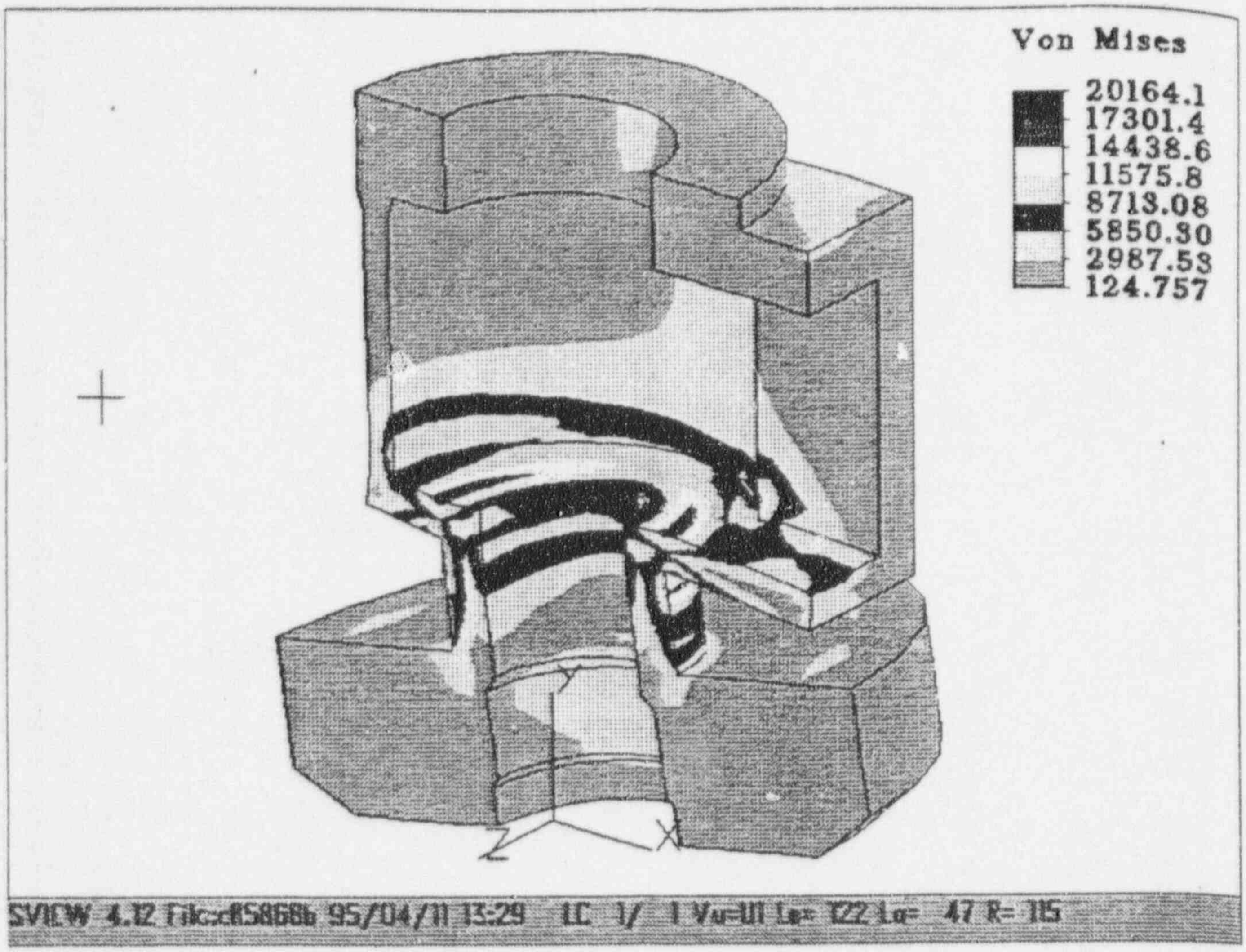

Von Mises
20164.1
17301.4
14438.6
11575.8
8713.08
5850.30
2987.53
124.757
SVIEW 4.12 File:cR5868b 95/04/11 13:29 LC 1/ 1 Va=U1 La= 122 Lo= 47 R= 115

FIGURE 3

HUMAN RESOURCES

IMPROVEMENTS/ACTIONS

HUMAN RESOURCES

Major Improvement Areas

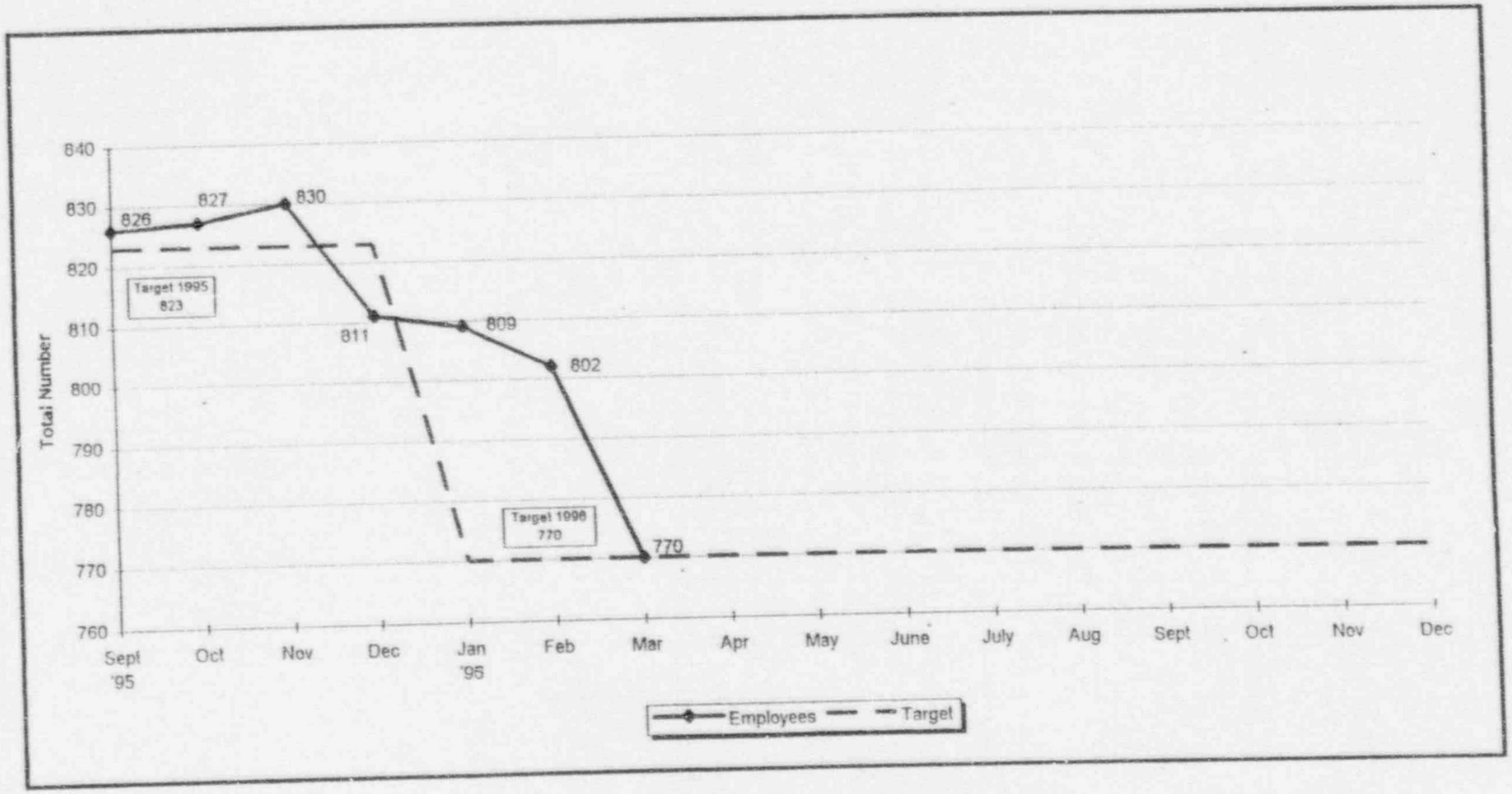
Strengthen the Management Skills of our Supervision:

• Include the following attributes in personnel performance appraisals: - Adherence to procedures - Compliance with Industrial Safety Program	Complete
• Develop and issue guidelines to foreman and supervisory personnel on assessing employee performance.	Complete
• Evaluate and modify, if necessary, accountabilities of foremen/ supervisors to ensure handling employee performance is a key responsibility. Ensure these accountabilities are clearly identified in the foreman/ supervisor selection process.	Complete
• Interview foreman and supervisor incumbents to ensure they are willing to meet the expectations of the position in handling employee performance issues.	6/30/96

Improve Labor Relations:

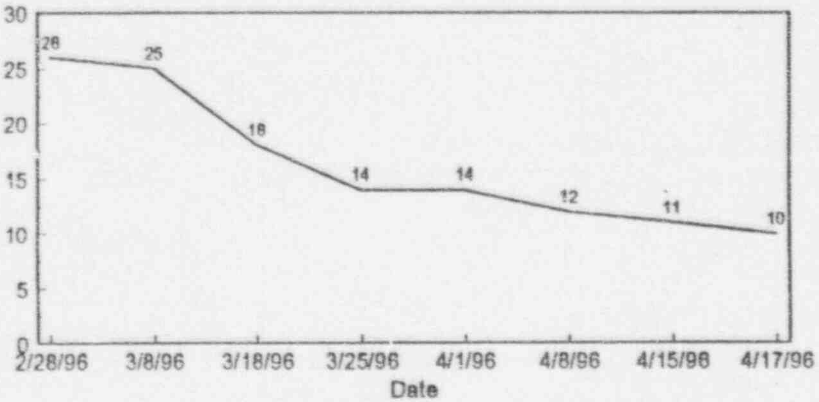
- Reduce number of union grievances not handled within 10 days. Include indicator for review.

ST LUCIE PLANT
Total Employees
Lynn Morgan - Human Resources

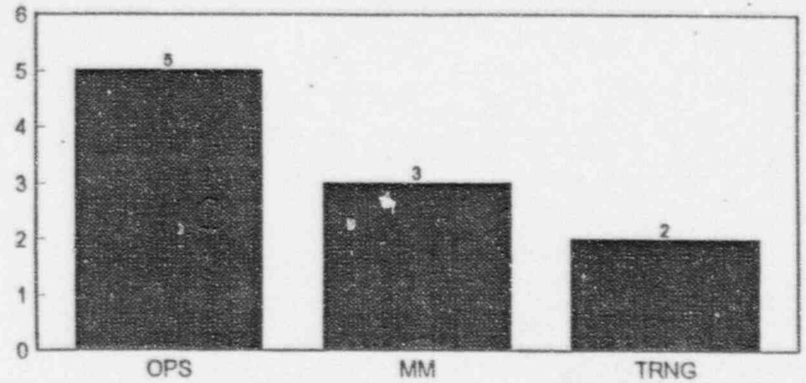


GRIEVANCES

Grievances > 10 Days - Total

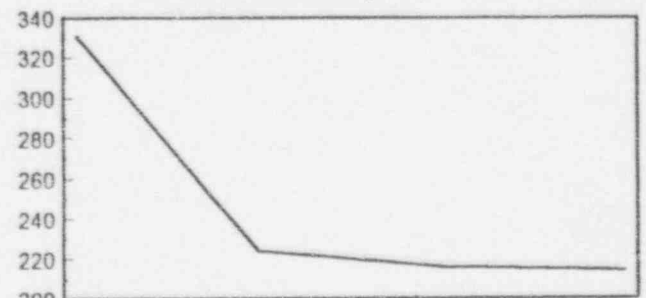


Grievances > 10 Days - by Dept



Data submitted by: CD Scott - HR

Download Population *



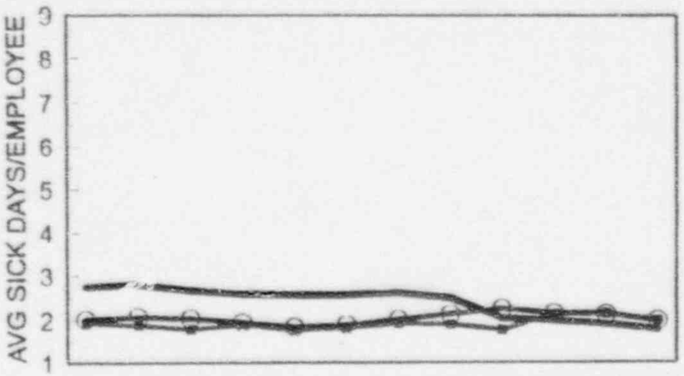
6/30/95	1/31/96	2/29/96	3/31/96
331	224	216	214

*GOAL - Complete by December 31, 1098

NUCLEAR DIVISION EXEMPT ABSENTEEISM

MARCH, 1996

12 Month Average

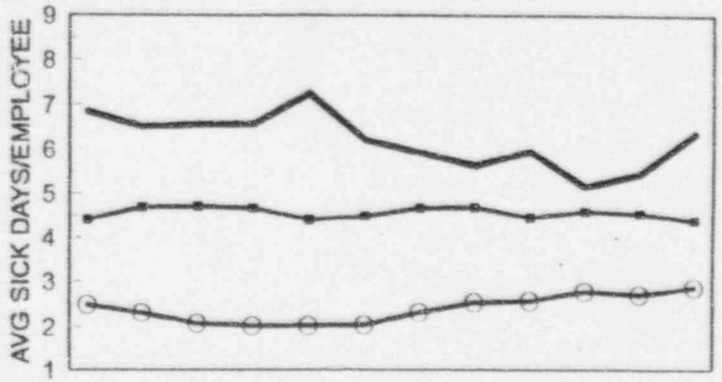


12 months ending	A	M	J	J	A	S	O	N	D	J	F	M
JB STAFF	2.74	2.80	2.66	2.59	2.57	2.57	2.61	2.49	2.04	1.98	1.91	1.78
PSL	2.01	2.07	2.03	1.95	1.84	1.89	2.01	2.13	2.25	2.15	2.13	1.99
PTN	1.93	1.88	1.79	1.90	1.77	1.83	1.92	1.90	1.77	2.13	2.14	1.99

NUCLEAR DIVISION NON-EXEMPT ABSENTEEISM

MARCH, 1996

12 Month Average

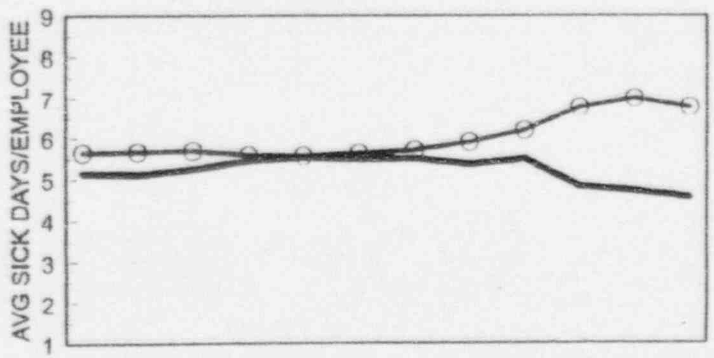


12 months ending	A	M	J	J	A	S	O	N	D	J	F	M
JB STAFF	6.85	6.51	6.56	6.57	7.24	6.21	5.93	5.64	5.95	5.16	5.45	6.37
PSL	2.48	2.30	2.07	2.02	2.03	2.04	2.32	2.54	2.57	2.78	2.71	2.87
PTN	4.41	4.69	4.71	4.67	4.41	4.49	4.68	4.69	4.46	4.60	4.55	4.40

NUCLEAR DIVISION BARGAINING UNIT ABSENTEEISM

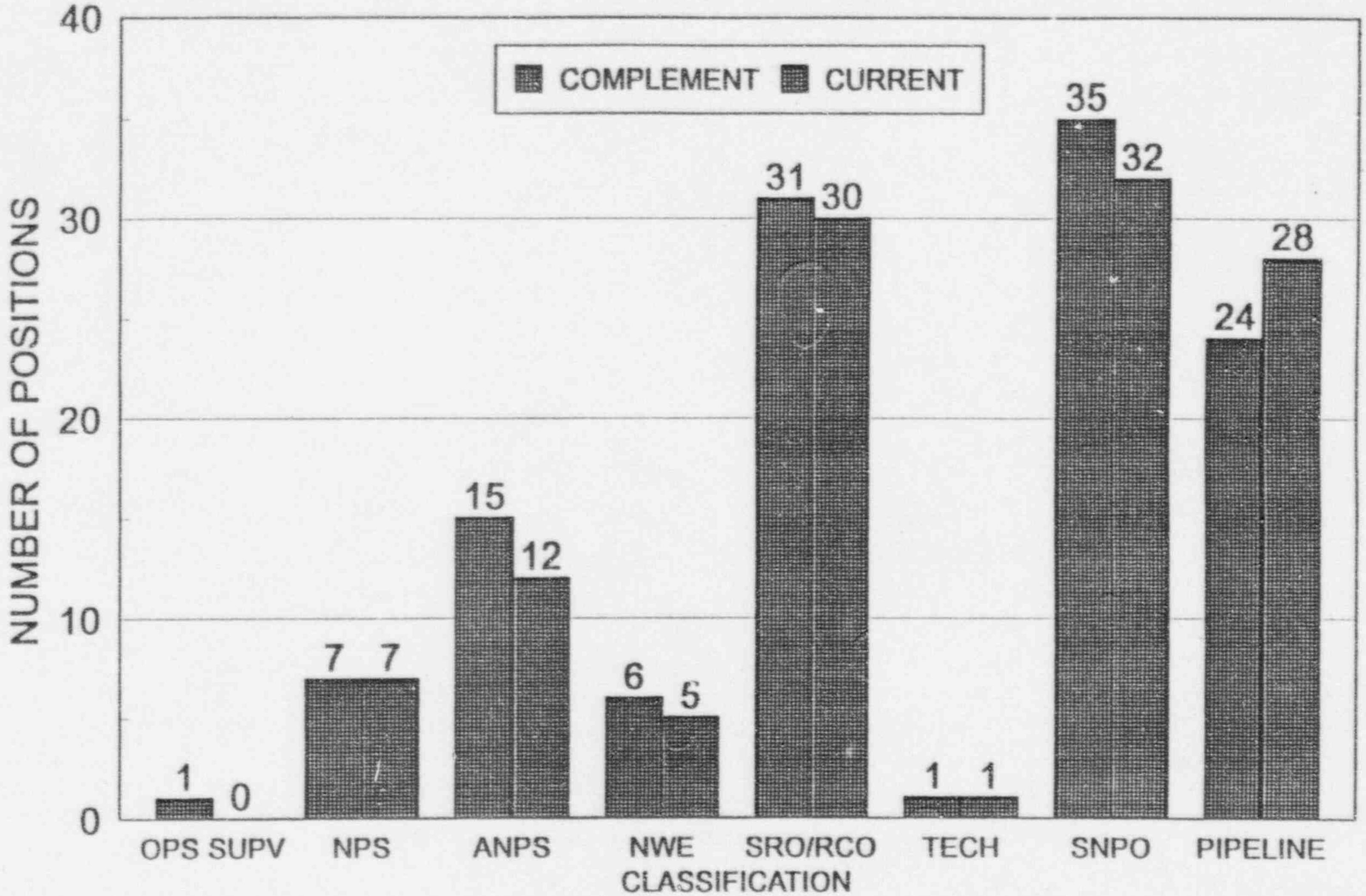
MARCH, 1996

12 Month Average



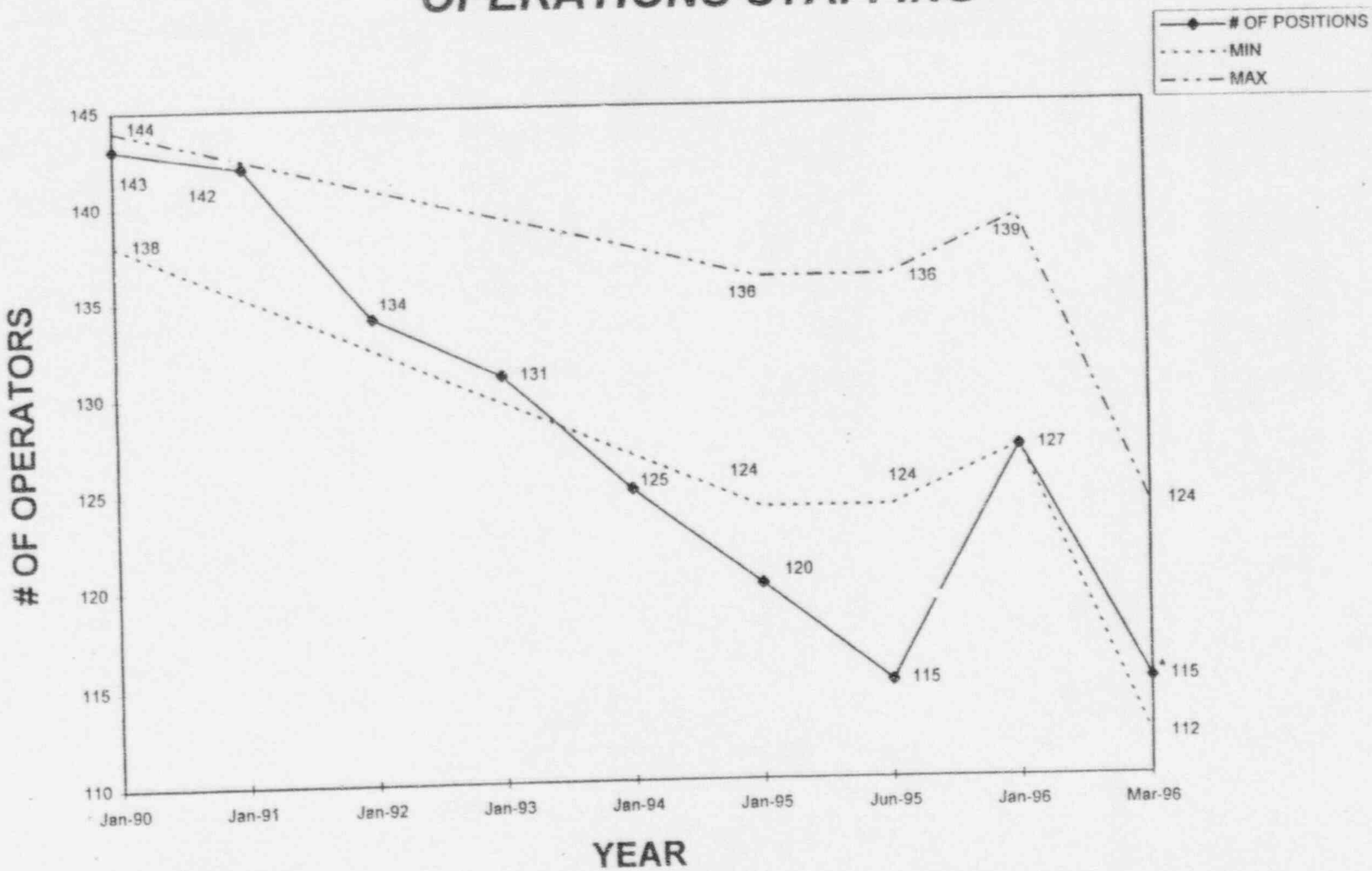
12 months ending	A	M	J	J	A	S	O	N	D	J	F	M
PTN	5.14	5.11	5.23	5.45	5.52	5.48	5.50	5.35	5.49	4.82	4.71	4.56
PSL	5.64	5.66	5.69	5.58	5.56	5.62	5.70	5.90	6.19	6.76	6.99	6.76

PSL OPERATIONS STAFFING COMPLEMENT



51

OPERATIONS STAFFING

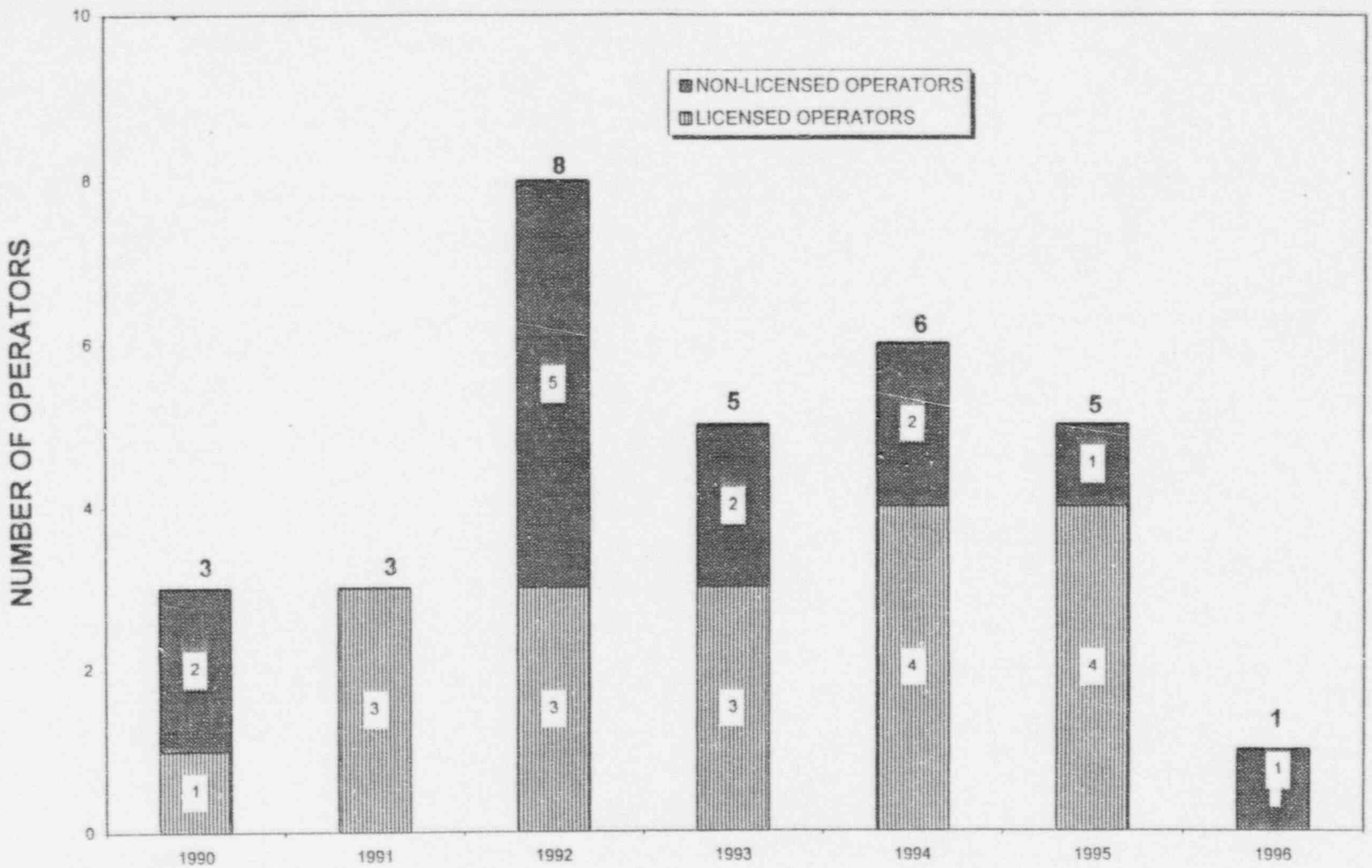


52

* 3/96 OPS Support Resources transferred to OST

OPS STAFFING DISK
A:\STAFF-R4.XLS
4/17/96

OPERATIONS ATTRITION



OPS STAFFING DISK
A:\ATTRIT.R4
4/17/96

OPERATIONS

IMPROVEMENTS/ACTIONS

OPERATIONS

Major Improvement Areas

Reduce the Number of Operator Work Arounds:

- Reduce the number of OWAs to less than 15 by December 31, 1996.

- Currently working off as per target goal.

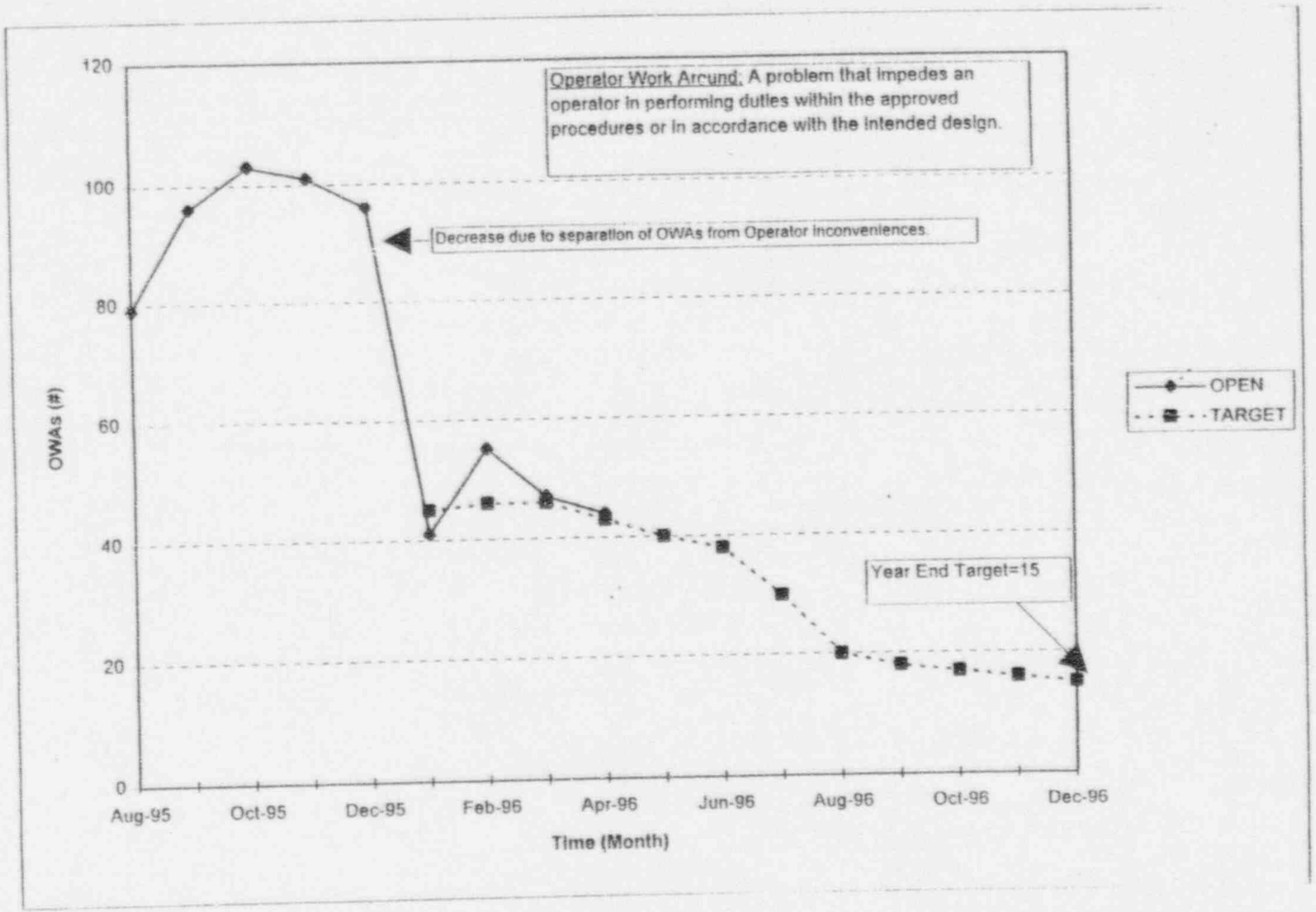
Improve Operator Procedures to ensure technical accuracy and ensure they can support operation under verbatim procedural compliance.

- Phase 1 procedures (16) are on schedule for completion date of 17 May 1996. Will be on track as of 4/19/96.
- Unit 1 procedures have been identified to support Unit 1 outage and have been prioritized to support schedule.

OPERATOR WORK AROUNDS

Updated and Submitted by: OST - Fulford

MONTH	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96
OPEN	79	96	103	101	96	41	55	47	44								
TARGET						45	46	46	43	40	38	30	20	18	17	16	15



ST. LUCIE NUCLEAR PLANT
OPERATIONS DEPARTMENT
PROCEDURE UPGRADE
PHASE 1

3/22/96	4/4/96	4/19/96	5/3/96	5/17/96
				1-0030121 Rx Plt Heatup D. Williams Subcommittee S
				2-0030121 Rx Plt Heatup D. Williams Subcommittee S
				1-0030122 Rx Startup M. Kogelschatz IND REVIEW R
				2-0030122 Rx Startup M. Kogelschatz Subcommittee S
				[illegible] D!
				[illegible] D!
[illegible] D!	[illegible] F	1-0030127 Rx Cooldown D. Williams 50.59 Req. F	1-0030120 Prestart Check-Off D. Brown DRAFT D	1-0030124 Turbine Startup D. Brown Subcommittee S
[illegible] D!	2-0030125 Turbine Shutdown D. Brown FRG Approv F	2-0030127 Rx Cooldown D. Williams IND REVIEW R	2-0030120 Prestart Check-Off D. Brown DRAFT D	2-0030124 Turbine Startup D. Brown Subcommittee S

LEGEND:

XXXXXXXX	PROCEDURE #
XXXXXX	DESCRIPTION
XXXXXX	DATE DUE
XXX	RESPONSIBLE

XXXXXXXX	SHADED BOX
XXXXXX	REPRESENTS
XX/XX/XX	COMPLETED PROCEDURE
XXX	UPGRADE

- D DRAFT
- S SUBCOMMITTEE
- R INDEPENDENT REVIEW
- F FRG APPROVAL
- D! DISTRIBUTION

ST. LUCIE NUCLEAR PLANT
OPERATIONS DEPARTMENT
PREOUTAGE PROCEDURE REVIEW

LEGEND:

XXXXXXXX	PROCEDURE #
XXXXXX	DESCRIPTION
XXXXXX	RESPONSIBLE
XXX [ ]	STATUS

[illegible] — SHADED BOX REPRESENTS COMPLETED PROCEDURE UPGRADE/REVISION

- D DRAFT
- C COMPLETE
- D1 DISTRIBUTION
- P Processing
- F AT FRG
- S SUBCOMMITTEE

3/15/96
- [illegible] (4 shaded boxes)

3/27/96
- [illegible] (2 shaded boxes)

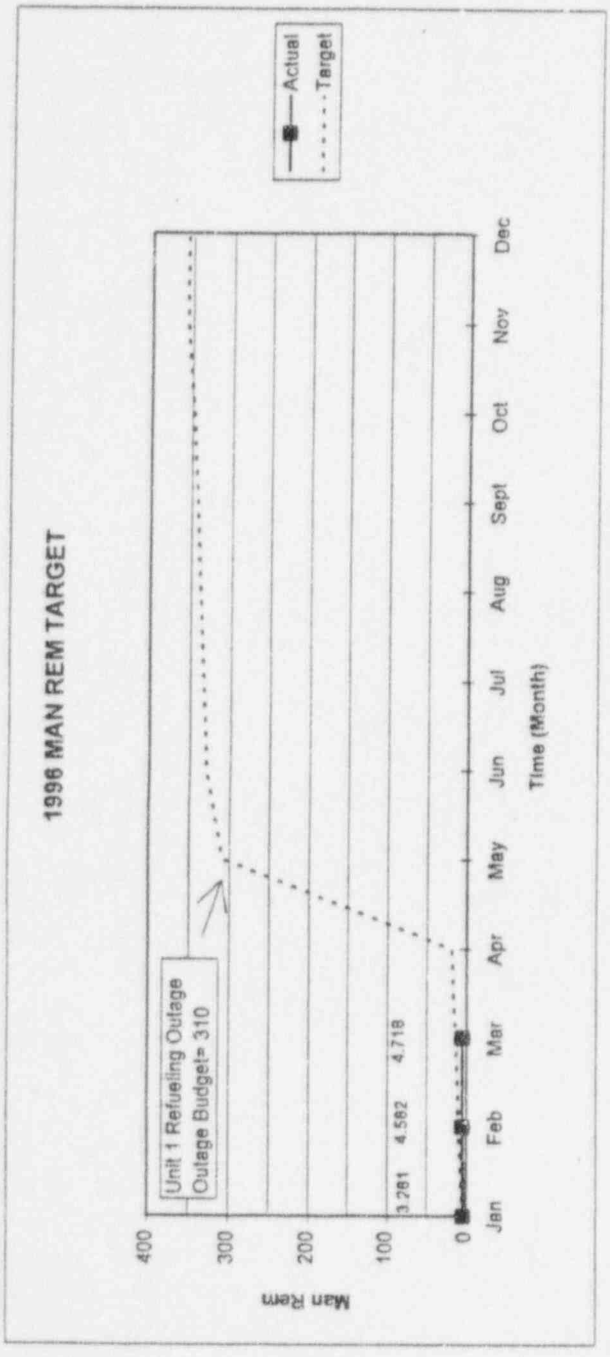
4/5/96
- [illegible] (5 shaded boxes)

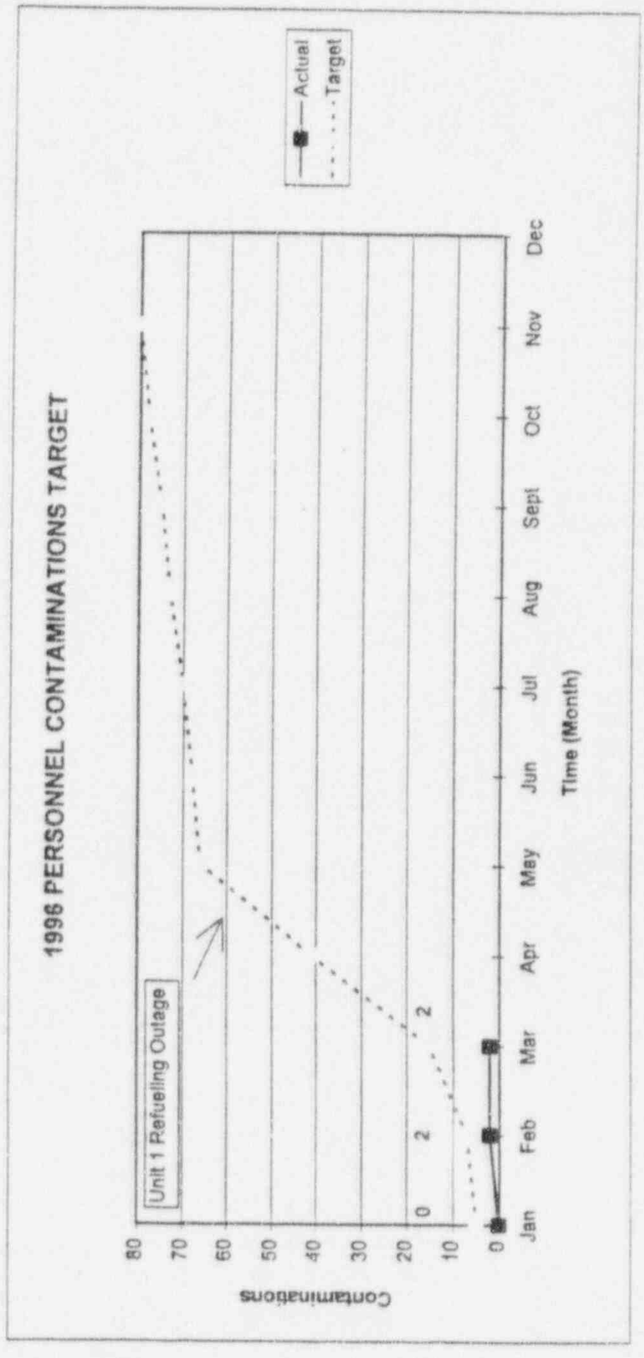
4/12/96
- 1-0120021 / Drain RCS / Kogelschatz / Processing P
- 1-0210021 / VCT H2/N2 / Bonsall / Processing P
- 1-0110022 C / CEA Exten Shaft / Kogelschatz / Processing P
- [illegible] (2 shaded boxes)

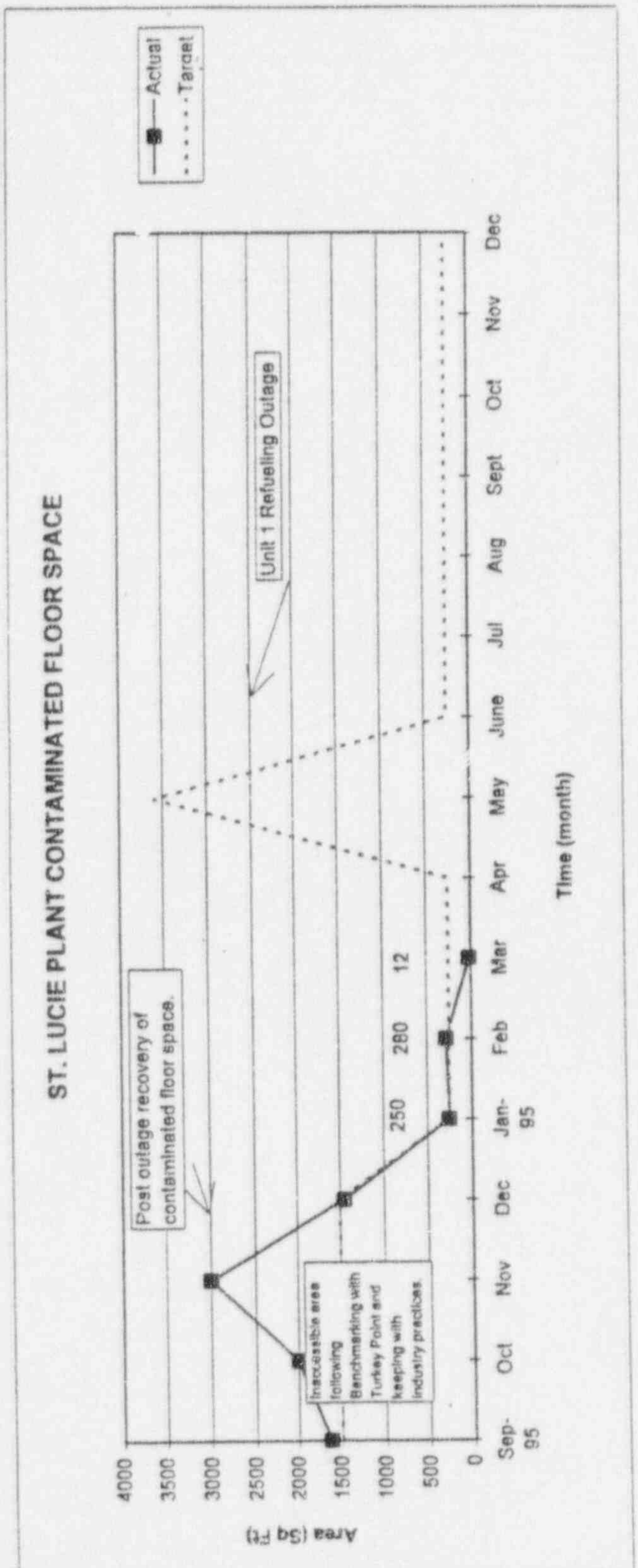
4/19/96
- 1-1600024 / Fill & Drn Cavity / Kogelschatz / Processing P
- 1-230020 / N2 Sys Normal / Bonsall / FRG F
- 1-080050 / MSIV Test / Scott / FRG F
- 1-0410021 / SIT Normal / Pennenga / Subcommittee D
- 1-1010020 / Inst Air Sys OP / Lorentzen / FRG F
- 1-0810021 / Aux Steam X-tie / Williams / Draft D
- 1-0910024 D / Bus Removal / Pennenga / Subcommittee S

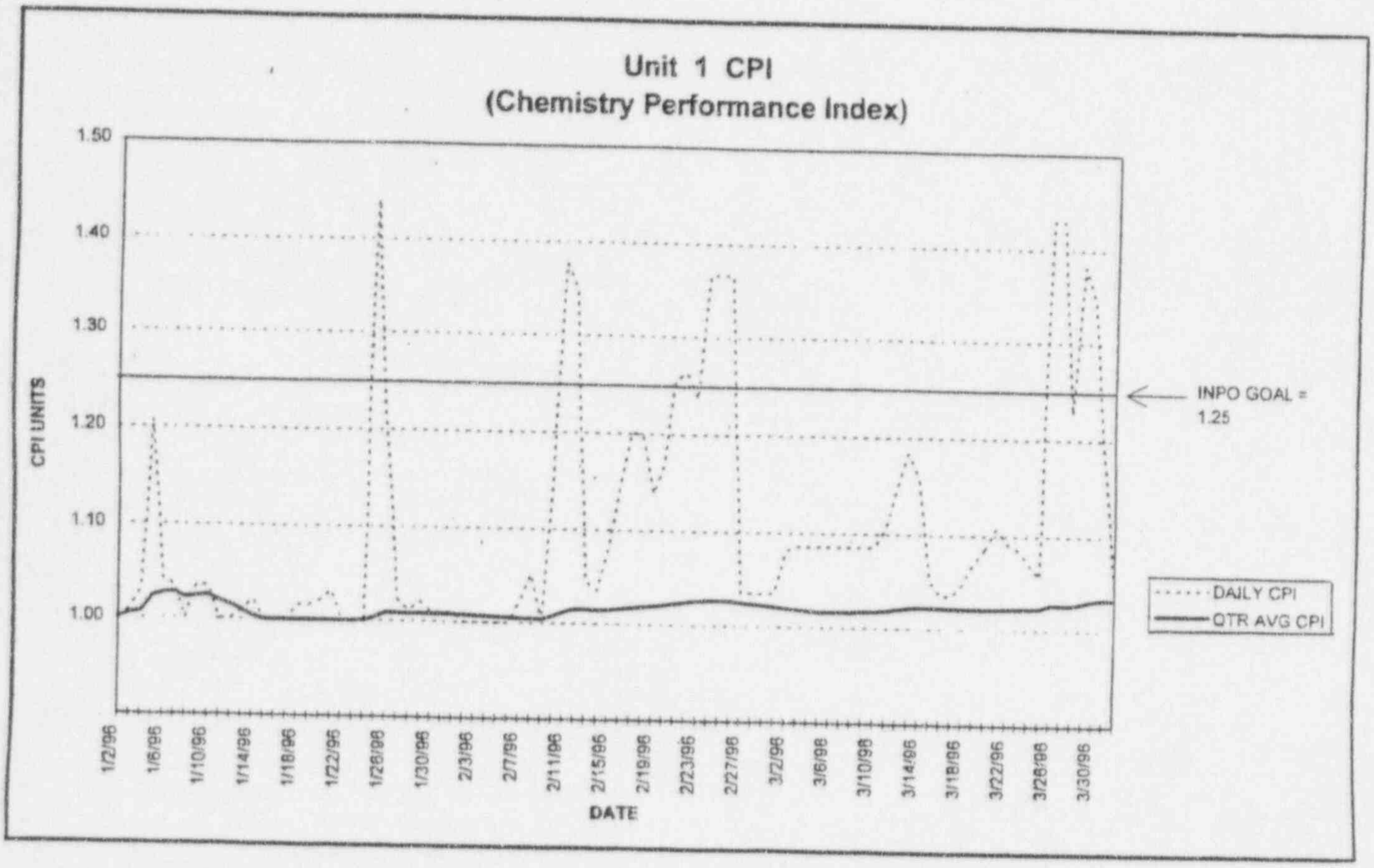
4/26/96
- 1-0120023 / RCP Normal / Lorentzen / Draft D
- 1-0700028 / Aux Fd Turb Test / Lorentzen / Draft D
- 1-0210020 / Chg-L/D Normal / Patterson / Draft D
- 1-0700021 / Cond/Feed Norm / Pennenga / Draft D
- 1-1210051 / WR NI Func / B. Scott / Draft D
- 1-0120020 / Fill & Vent RCS / D. Brown / Draft D

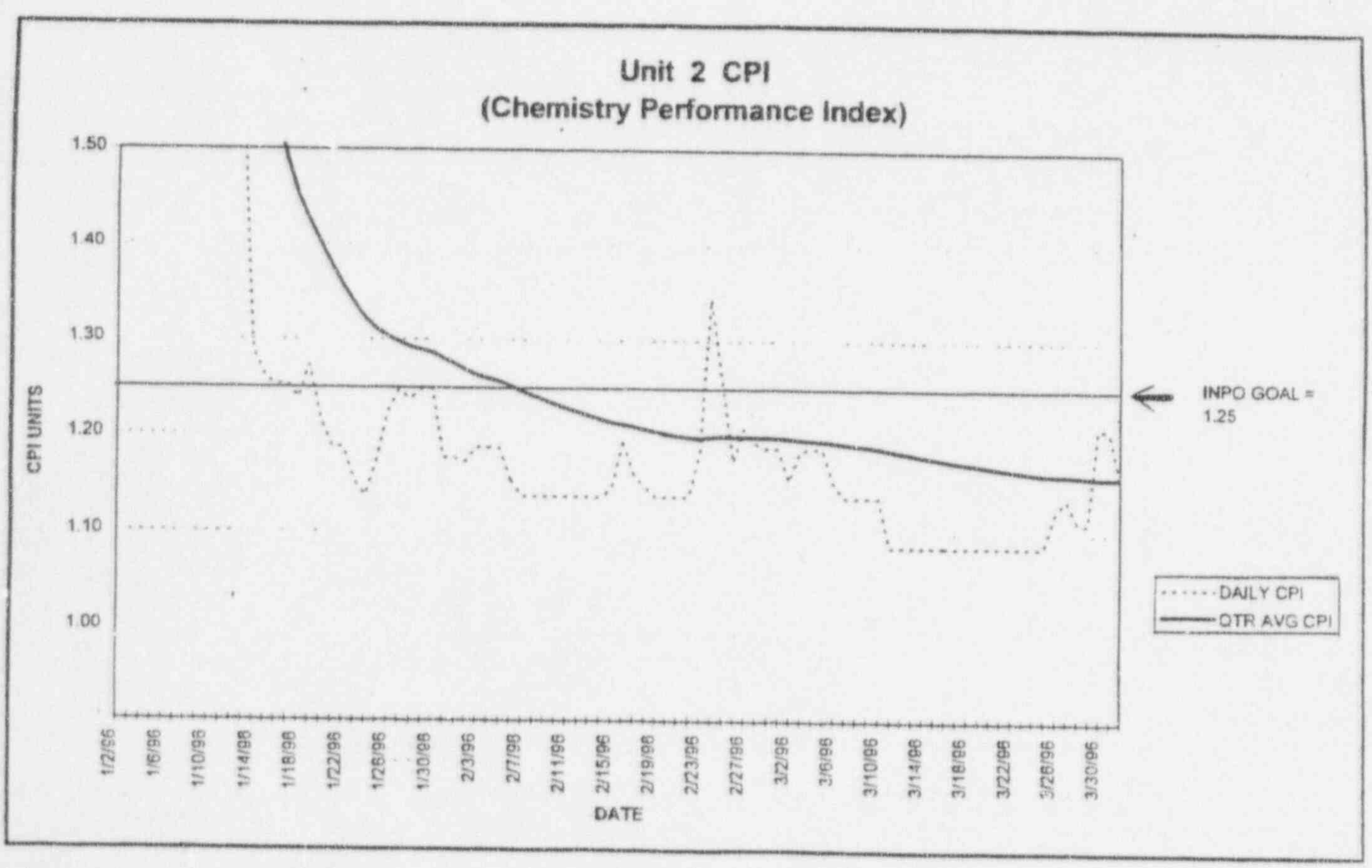
57


1996 MAN REM TARGET
Unit 1 Refueling Outage
Outage Budget= 310
Man Rem
400
300
200
100
0
3.281
4.582
4.718
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Time (Month)
Actual
Target


1996 PERSONNEL CONTAMINATIONS TARGET
Unit 1 Refueling Outage
Contaminations
80
70
60
50
40
30
20
10
0
0
2
2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Time (Month)
Actual
Target


ST. LUCIE PLANT CONTAMINATED FLOOR SPACE
Area (Sq Ft)
4000
3500
3000
2500
2000
1500
1000
500
0
Sep-95
Oct
Nov
Dec
Jan-95
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec
Time (month)
Actual
Target
Post outage recovery of contaminated floor space.
Inaccessible area following Benchmarking with Turkey Point and keeping with industry practices.
Unit 1 Refueling Outage
250
280
12


Unit 1 CPI
(Chemistry Performance Index)
1.50
1.40
1.30
1.20
1.10
1.00
CPI UNITS
INPO GOAL = 1.25
DAILY CPI
QTR AVG CPI
1/2/96
1/6/96
1/10/96
1/14/96
1/18/96
1/22/96
1/26/96
1/30/96
2/3/96
2/7/96
2/11/96
2/15/96
2/19/96
2/23/96
2/27/96
3/2/96
3/6/96
3/10/96
3/14/96
3/18/96
3/22/96
3/26/96
3/30/96
DATE


Unit 2 CPI
(Chemistry Performance Index)
1.50
1.40
1.30
1.20
1.10
1.00
CPI UNITS
INPO GOAL = 1.25
DAILY CPI
QTR AVG CPI
1/2/96
1/6/96
1/10/96
1/14/96
1/18/96
1/22/96
1/26/96
1/30/96
2/3/96
2/7/96
2/11/96
2/15/96
2/19/96
2/23/96
2/27/96
3/2/96
3/6/96
3/10/96
3/14/96
3/18/96
3/22/96
3/26/96
3/30/96
DATE

MAINTENANCE

IMPROVEMENTS/ACTIONS

MAINTENANCE

<u>Major Improvement Areas</u>

Program/Procedures Status Update:

- Maintenance Procedure Upgrade Project
- Programs/Procedures Group
- Minor Maintenance Process

Plant Material Condition (Key Performance Indicator):

- PWO Backlog
- Control Room Green Tags (C-Tags)
- Aged PWOs (>12 months - Golden Oldies)
- Leaks (Primary/Secondary)
- Temporary Leak Repairs

Valves:

- Integrated Crews
- Leaks
- Valve Program

ST. LUCIE PLANT
MAINTENANCE PROCEDURE UPGRADE PROJECT

TASK #1: DEVELOP PROCEDURES/GUIDELINES FOR FREQUENTLY PERFORMED MAINTENANCE ACTIVITIES WHICH CURRENTLY EMPLOY THE USE OF VENDOR TECHNICAL MANUALS

December	January	February	March	April	May	June	July	August	September	October	November	December	January	February
								I&C Versatile Ctrl Bd Indicators 8/31/96						
	I&C U-1 AFAS BATT.RM 1/31/96						I&C Spent Fuel Pit Level Switches 7/31/96	I&C Magnetrol Level Switches 8/31/96						
	I&C U-2 AFAS BATT. RM 1/31/96	I&C Rebuilding FW Reg Valves 2/29/96					I&C Fisher Level Controllers 7/31/96	I&C 1400065; Add New Equipment 8/31/96	I&C Rosemount Transmitters 9/30/96		I&C Bench Calibration 11/30/96			
	I&C Letdown Level Control Calib 1/31/96	I&C Rebuilding FCV-9011 & 9021 2/29/96	I&C U1 EDG Comb IMP 1-59-01, 2, 3, 3/29/96	I&C Foxboro Pneu Controllers 4/30/96	UNIT 1 REFUELING OUTAGE		I&C Ashcroft Press Switches 7/31/96	I&C U2 Gen. Atomic SSG Proc Monitor 8/31/96	I&C Setup Rod Drop Computer 9/30/96	I&C U1 & U2 Rebuildin FCV-12-1 10/31/96	I&C CEDM Cable Repair 11/30/96			
	I&C U1 Cond Air Eject Process Monit 1/31/96	I&C U1 Gaseous Rad waste Monit Cal 2/29/96	I&C U1 Cal of CNMT Process Monit 3/29/96	I&C U1 Cal SGBD Rad Monitors 4/30/96			I&C U1 Letdown Process Monitors 7/31/96	I&C U2 Gen. Atomic PIG Proc Monit 8/31/96	I&C U2 Gen Atomic WRGM Monitor 9/30/96	I&C U2 Cal Gen Atomic Gas, Liq, SL,WRGM 10/31/96	I&C Unit 2 LPM 11/30/96			
	MECH Teledyne Farris Relief Valves 1/31/96	I&C U1 Liq Waste Disc Rad Monit Cal 2/28/96	I&C U1 Plant Vent, FH Exh, ECCS, PING 3/29/96	I&C U1 Cal of CCW Rad Monitors 4/30/96			MECH Dragon Valves 7/31/96	MECH Borg Warner Valves 8/31/96	I&C U2 Gen Atomic SSL Proc Monit 9/30/96	I&C U2 Remote Op Gen Atom Proc Mon 10/31/96	I&C U1 & 2 Correl. of Proc Monit Rdng 11/30/96	I&C Tec Isolators Calibration 12/31/96	I&C OP-2-1600023 I&C Procedure 1/31/97	
	I&C U1 Process Monitoring Sys 1/31/96	MECH Fisher Control Valves 2/29/96	MECH Leslie Valves 3/29/96	MECH Pacific Valves 4/30/96			MECH Target Rock Valves 7/31/96	MECH Yarway Valves 8/31/96	MECH Westinghouse Valves 9/30/96	MECH Weston Hydraulic Valves 10/31/96	MECH Jamesbury Valves 11/30/96	I&C U2 Safeguards Meters Cal. 12/31/96	I&C ITT Barton Hyd. Actuators 1/31/97	
I&C U1 Eberline Process Flow 35061	MECH Crosby Relief Valves 1/31/96	MECH WKM Control Valves 2/29/96	MECH Velan Valves 3/29/96	MECH Anchor Darling 4/30/96			MECH Cont Comp. Letdown Vlvs 7/31/96	MECH Henry Pratt ValvesValves 8/31/96	MECH Dresser (Consolidated) 9/30/96	MECH Valcor Eng Valves 10/31/96	MECH Valtek Inc Valves 11/30/96	MECH Develop any remaining PSL-2 Plant Specific Procedures 12/31/96		

ST. LUCIE PLANT
MAINTENANCE PROCEDURE UPGRADE PROJECT

TASK #2: REVISE AND ENHANCE EXISTING MAINTENANCE PROGRAM AND EQUIPMENT PROCEDUREs KNOWN TO REQUIRE IMPROVEMENTS

* To Coincide with Division Work Process

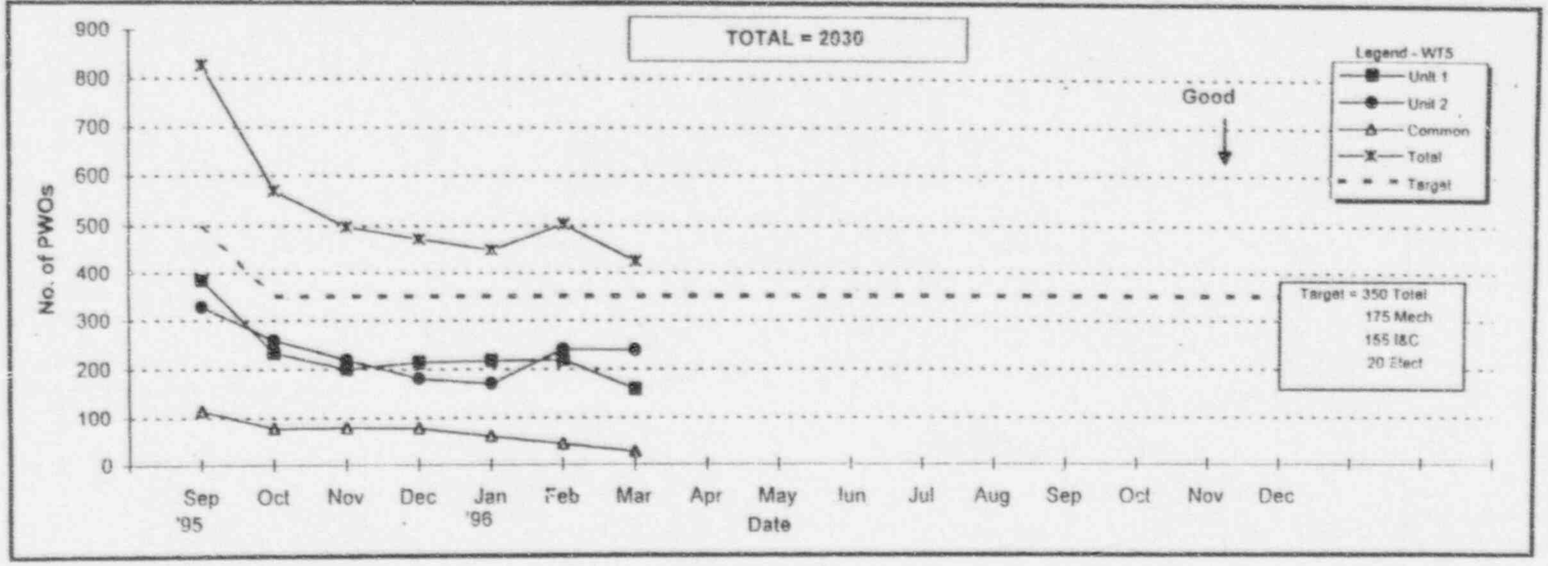
November	December	January	February	March	April	May	June
		Revise Control of Welding					
		ELECT Unit 1 - 920067 Temp Pwr/Jumper 1/31/96	Revise Sensitive System Procedures	* Develop WIN Team Guideline			
		ELECT Unit 2 - 920067 Temp Pwr/Jumper 1/31/96	Revise Jumper and Lifted Lead Procedure	Revise NPWO Procedure AP-00100432 3/29/96			
		ELECT 0920070 480V Ld Ctr Bkr 1/31/96	ELECT 0930060 6.9KV Swgr Bkr 2/29/96	ELECT 990060 Metering Equip 3/29/96			
Revise Maint Self Assessment		ELECT 0920068 4160V Swgr Bkr 1/31/96	ELECT 0940074 Molded Case Bkr 2/29/96	ELECT/I&C Raychem Proc 3/29/96	Revise Conduct of Maintenance ADM-08.02		

POWER BLOCK PWO BACKLOG

Joe Marchese - Maintenance

PWO Backlog:

- PWO backlog are non-outage corrective work orders (Work Type 5 status 22-48) on components/equipment in the power block. Total includes all Work Type 1, Work Type 3 & Work Type 5. (all hold codes)



Data Source: Passport

SUMMARY STATUS

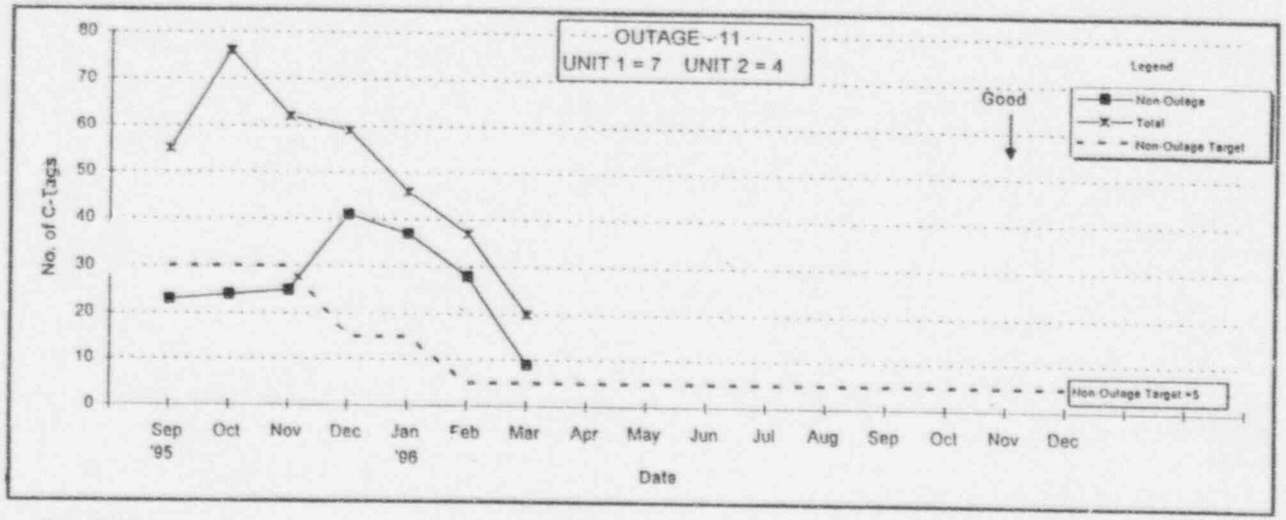
Discipline	Unit 1	Unit 2	Common	Total
Mechanical	71	117	13	201
Electrical	7	10	0	17
I&C	80	110	14	204
Projects	2	2	0	4
Total	160	239	27	426

CONTROL ROOM DEFICIENCIES (C-TAGS)

Randy Olson - I&C

C-Tags:

- The number of Control Room/Board Green Tags. It provides an indication of the attention given to maintaining control room instruments in an operable condition.



Data: M. Willis

SUMMARY STATUS

	Non-Outage	Outage	Total
Ready to Work or Working	5	7	12
Engineering/RTA	1	1	2
AWP	3	2	5
Other Holds	0	1	1
Total	9	11	20

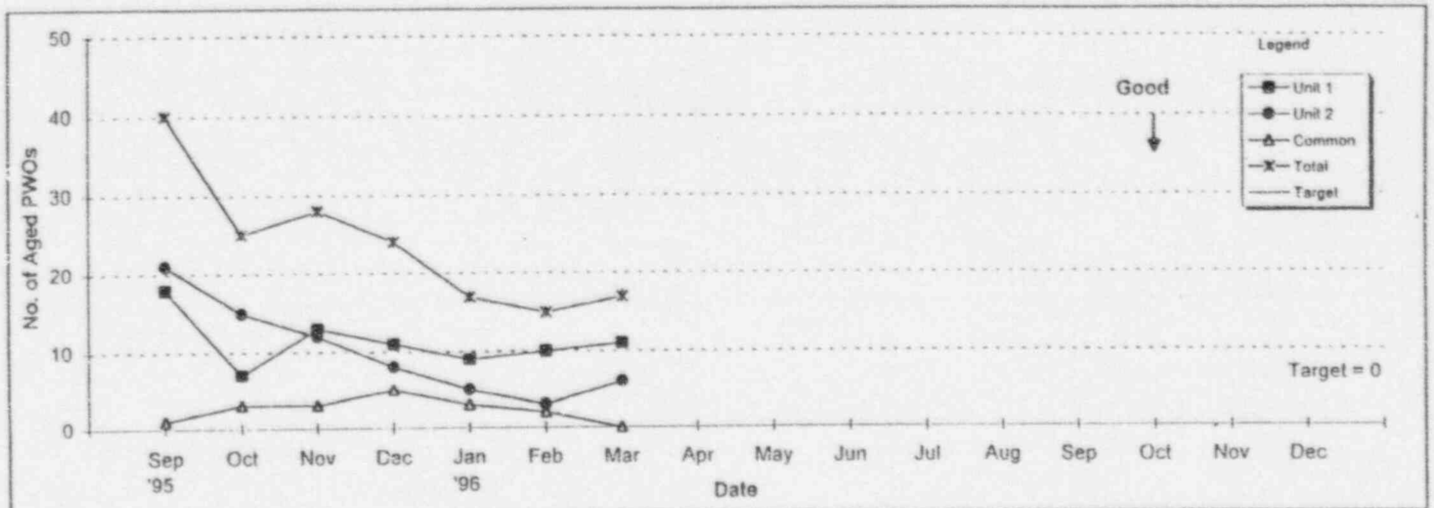
	Unit 1	Unit 2
Oldest	10/2/94	5/4/94
PWO #	0137	3017
Discipline	EM (OUTAGE)	I&C (OUTAGE)

AGED PWOs > 12 MONTHS (GOLDEN OLDIES)

Joe Marchese - Maintenance

Aged PWOs:

- Non-outage corrective maintenance work type 5 PWOs older than 12 months.



Data Source: Passport

SUMMARY STATUS

	Unit 1	Unit 2	Common	Total
Mechanical	6	1	0	7
Electrical	0	2	0	2
I&C	5	3	0	8
Construction	0	0	0	0
Total	11	6	0	17

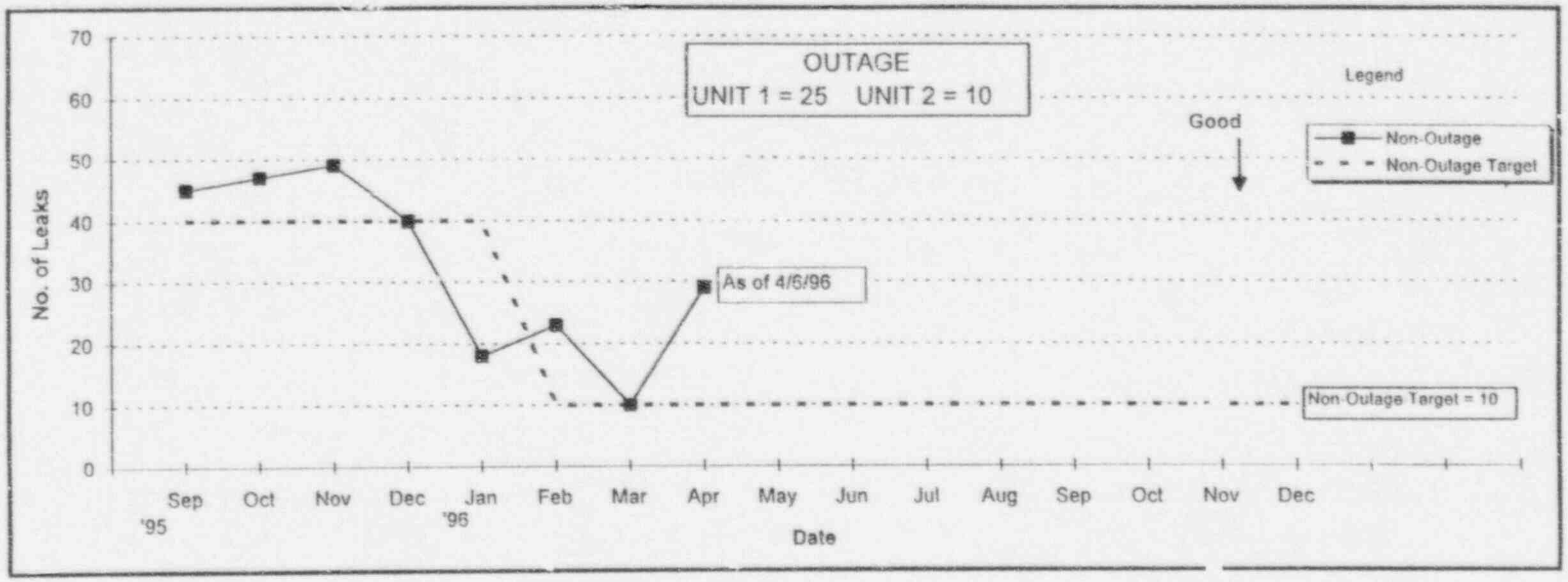
Oldest	8/11/94	7/25/94
PWO #	2093	0562
Discipline	Mech	Mech

LEAKS

N. Motley

Leaks:

- Active leaks (primary and secondary)



Date Source: Passport

SUMMARY STATUS

	Unit 1	Unit 2	Total
Non-Outage	21	8	29

Oldest (Non-Outage)	2/9/95	12/5/95
PWO #	4560	5730
Status	AWP	ENG

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LEAK REPAIRS (FITTINGS)

Greg Pustover - Programs

Leak Repairs:

- Leaks that have been temporarily repaired.

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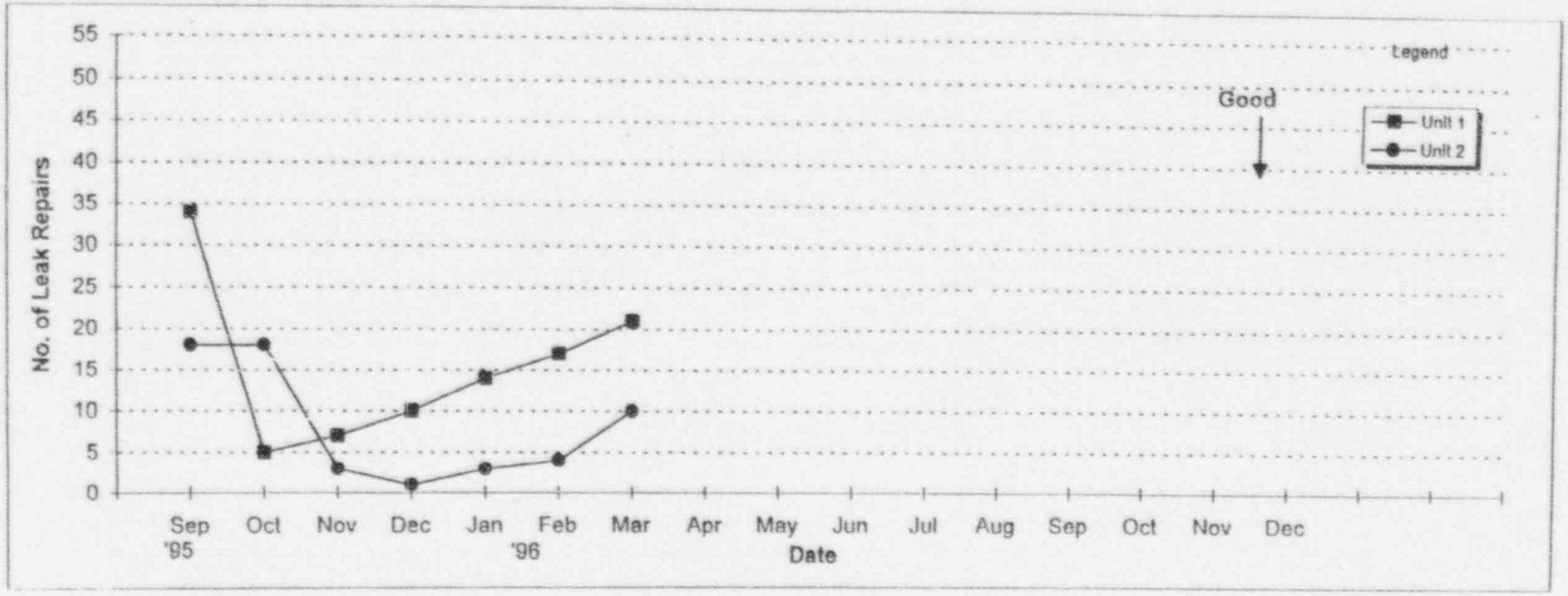


Data Source: Joel Kagan (SCE)

SUMMARY STATUS

	Unit 1	Unit 2	Total
Total	21	10	31

SYSTEMS & COMPONENTS ENGINEERING

IMPROVEMENTS/ACTIONS

SYSTEMS & COMPONENTS ENGINEERING

Major Improvement Areas

Improve Equipment Reliability:

• Emergency Diesel Generators	(Unit 1/Unit 2)	6/96
• Reactor Coolant Gas Vent Valves	(Unit 1)	6/96
• Pressurizer Code Safeties	(Unit 1/Unit 2)	5/97

Strengthen System Performance Monitoring:

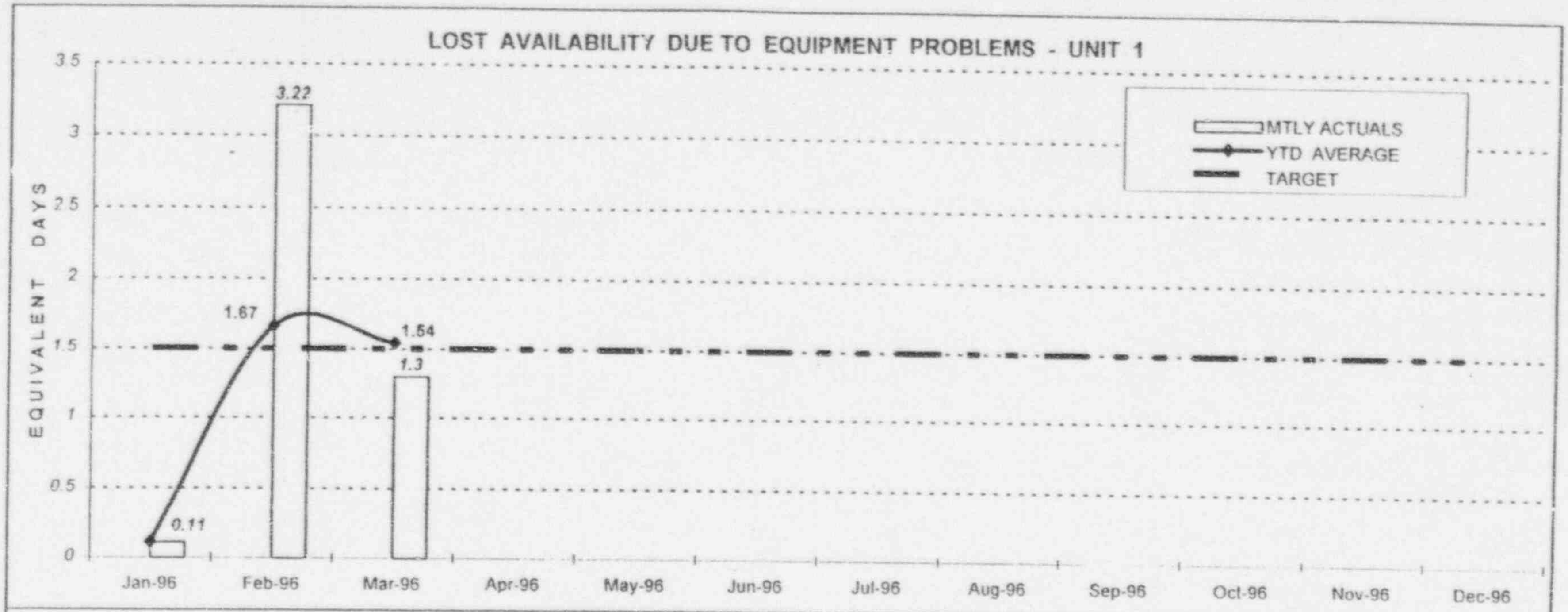
• Maintenance Rule	7/96
• PM Basis Program	12/96

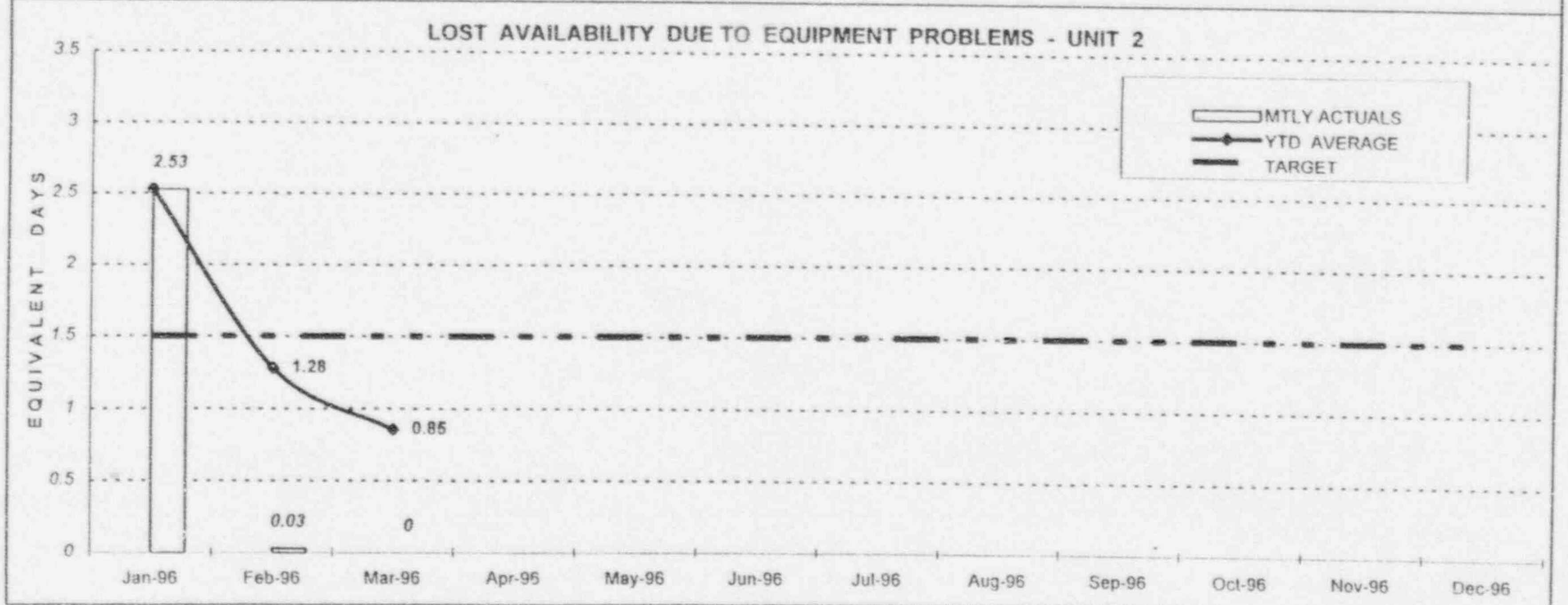
Strengthen Root Cause Analysis:

• System & Component Engineers Trained	Complete
• Event Response Guidelines	Complete
• Root Cause Analysis Guidelines	Complete

Plant St. Lucie Emergency Diesel Generator Reliability Improvement Plan Matrix

Problem	Root Cause	Corrective Actions	Status and Long Term Notes
Units 1 & 2 Governor Actuator failures	Vendor teardown: report identified fatigue due to length service; recommended 6 year periodic factory overhaul. STARS 950059 & 950529	Plant initiated 6 year overhaul Preventative Maint item.	All unit 2 actuators overhauled Nov-95. Unit 1 actuators replacement and set up May 96 outage. NOTE: EDG's are in MAINT RULE "A-1" due to governor actuator failures. This is the get well item.
Unit 1 EDG Governor unstable during surviellances (tied to grid)	Older design electronics very susceptible to "NOISE" "NOISY" inputs identified.	1. Replaced all suspect electronic components and optimized alignment with vendor rep support. NPWOs: 1A: 95026166 1B: 95026332	Engineering evaluating upgrade of governor system to more current design (Woodward 2301A) with proven noise rejection features.
Unit 1 & 2 EDG Governor Actuator Wiring grounds	Vendor design: governor wiring harness wires in contact with rough surface; vibration induced abrasion. STARs 951062 and 951055	Completed repairs and added Raychem sleeve covering for abrasion protection PWOs 95024478 95026057	Engineering developing improved design to eliminate abrasion concern: Unit 1: 97 outage Unit 2: April 97 outage
Unit 2 Control Relay sockets failures (Unit 1 has similar design)	Two failure modes identified: Pins relaxation and solder joint failure due to cracks. Removal / insertion (PM) and vibration. STAR 951721 Report JPN/CSI MET 95-223	All four EDGs inspected and suspect sockets replaced. NPWOs: 1A: 95031756 1B: 95031676 2A: 95031265 2B: 95032588	PC/M 030-196M issued for unit 1. New design relay and sockets. Work will be accomplished during the May 96 outage. Unit 2 PC/M to be issued and work accomplished during the April 97 unit 2 outage.
Unit 1 fuel oil piping failure	Fatigue due to vibration; this engine had underwent high vibration during 8-31-95 valve fail event. STAR 951322	Pipe replaced: others inspected NPWO: 6035	System engineer monitors engine piping closely; visual exam of fuel line components at least monthly.
Unit 1 Radiator performance	Identified during trend analysis of engine jacket water temp. STAR 951575 provided safety assessment to operate until May 96 outage replacement.	Radiator replacement is scheduled as an outage job	System engineer monitors and trends performance. All four PSL 1 EDG radiators to be replaced during the May 96 outage.
Unit 1 cooling water relief valves weeping and not seating.	Vendor design; valves placed in flow stream.	PC/M implemented on 1B1 (leaking)	Other three engines valves to be completed May 96 Unit 1 outage (PC/M 171-195 issued)
Units 1 and 2 diesel fuel transfer piping failures	Underground piping; corrosion of unprotected carbon steel.	PC/M implemented on 1A, 2A, and 2B: 92-225 & 95-096.	New design piping incorporates stainless steel guard pipe.
			4/17/96





4/17/96 SCE Dept.

ENGINEERING

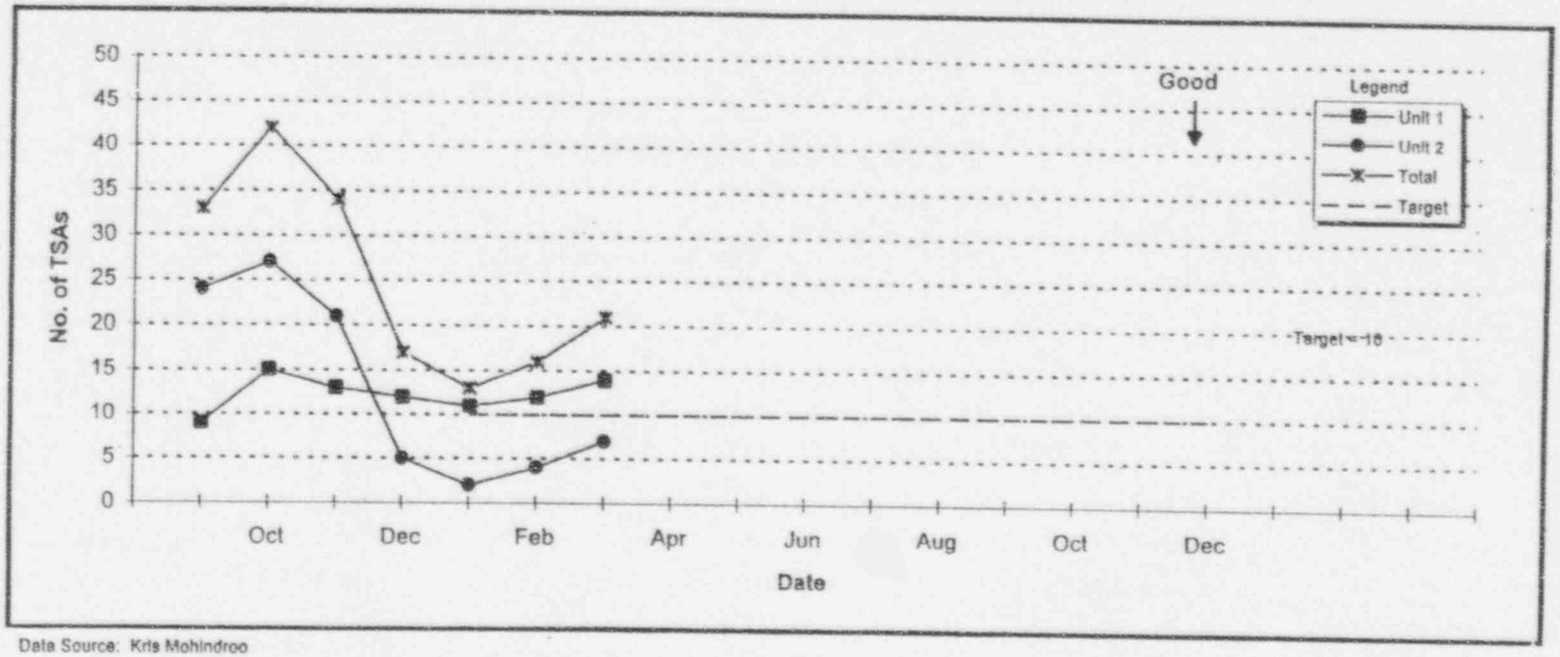
ENGINEERING

<u>Major Improvement Areas</u>

Improve Configuration Management Controls:	
Implement Temporary System Alteration	Complete
Reduce Open TSAs	6/30/96
Reduce Age of Oldest PCMs	12/31/96
Improve FSAR:	
Assessment Team Effort	Complete
Corrective Actions Unit 1	12/15/96
Corrective Actions Unit 2	9/30/96
Maintenance Procedure Review:	2/97
Program to review procedure for QC holdpoints in QI 7	
Site Contract Coordinator identifies target procedures	
SCE/JPN performs review	
Status being reviewed in Outage Meeting	
SL1-14 Outage Modifications	
68 PC/Ms approved for Outage	
49 PC/Ms issued by Engineering	
19 remaining PC/Ms to be issued	
LEFM	

TEMPORARY SYSTEM ALTERATIONS (TSA)

Kris Mohindroo - Engineering



Data Source: Kris Mohindroo

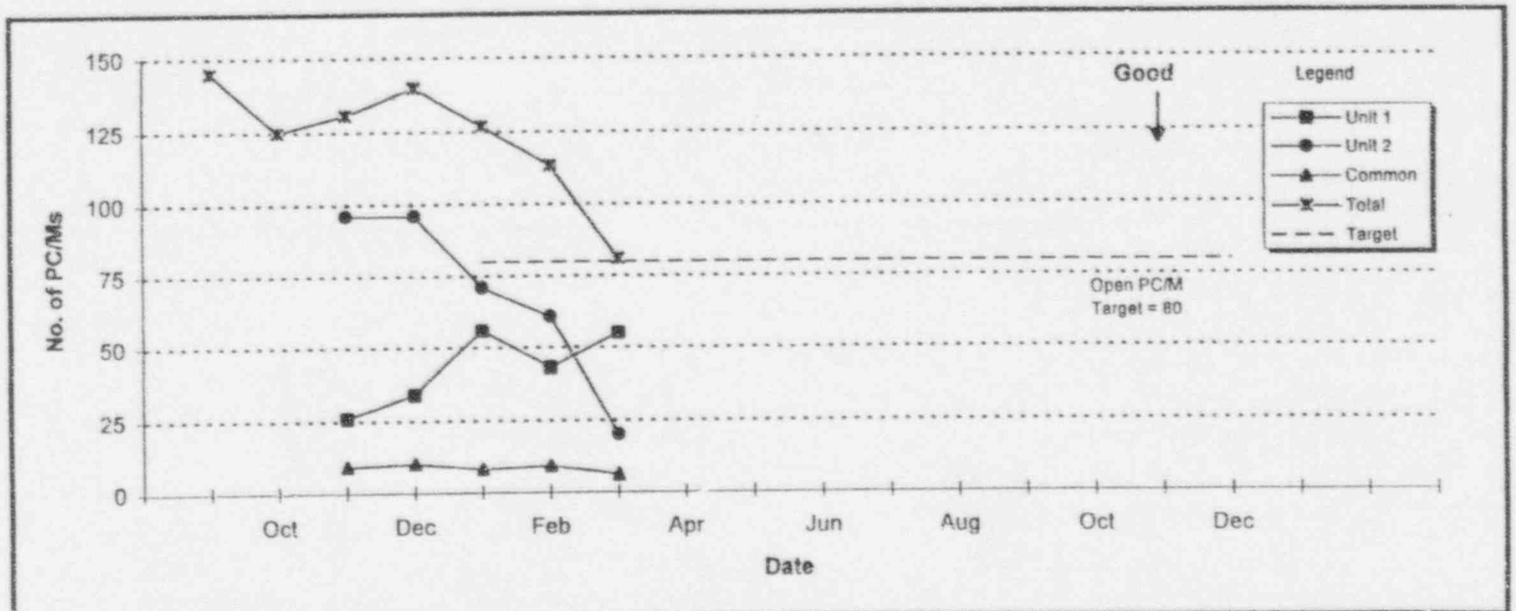
SUMMARY STATUS

Discipline	Unit 1	Unit 2	Total
Mechanical	1	0	1
Electrical	3	1	4
I&C	9	5	14
Engineering	1	1	2
Operations	0	0	0
Health Physics	0	0	0
Construction	0	0	1
SCE	0	0	0
Total	14	7	21

Oldest TSA	3/4/95	5/10/94
Discipline	I&C	I&C

PLANT CHANGE/MODIFICATIONS

Kris Mohindroo - Engineering



Data Source: Kris Mohindroo

SUMMARY STATUS-WORKING

Discipline	Unit 1	Unit 2	Common	Total
Open PC/M	55	20	6	81
PC/Ms >24 Mo.	6	4	1	11

ST. LUCIE PLANT - 10 OLDEST OPEN PC/M's

PC/M NUMBER	DESCRIPTION	DATE ISSUED	DATE FRG'D	SCH CLOSE DATE	STATUS AND ACTIONS REQUIRED TO CLOSE
193-189	Open Blowdown Cooling Water Heat Exchanger Vacuum Breaker Valve Changeout	2/11/89	12/11/89	5/30/96	PC/M implemented. Action plan to resolve slight periodic leakage problems with permanent drain catcher. Engr PC/M planned for 4/19/96
276-189	ICW Isolation Valve V21165 Relining	12/6/89	2/7/90	UNIT 1 OUTAGE	PC/M work activities placed on hold U194 fall outage due to required duration- work scope needs to be reviewed and planned for the upcoming U196 outage or PC/M cancelled.
335-190	Check Valve Hinge Pin and Bonnet Modifications on CCW pump discharge check valves V14143, V14147 and V14151	7/18/91-Sup 0 3/25/93-Sup 1	4/13/93-Sup 0 4/13/93-Sup 1	UNIT 1 OUTAGE	PC/M implemented on valves V14147 and V14151. Modifications to V14143 planned for next refueling outage. Will close PC/M upon completion of the work activity
171-191	Resizing and replacement of MOV Thermal Overload Devices on 137 MOV's	7/17/91	9/19/91	UNIT 1 OUTAGE	PC/M implemented on 122 valves. 15 valves remaining to be modified. EM needs to schedule remaining work. Will close PC/M upon completion of the work activity
186-191	Intake Cooling Water Support Modifications	7/1/92-Sup 1	Not FRG'd	UNIT 1 OUTAGE	Sup 0 Complete. Sup. 1 was budget approved at the MRB 1/30/96 for implementation during the 1996 Unit 1 outage.
086-292	Radiation Monitoring Computer Replacement	4/22/92	5/7/92	5/24/96	PC/M implemented. ICM has one PWO associated with two remaining CRN's which is required to be worked to close the PC/M. Will close PC/M upon completion of the work activity.
203-192	Replacement of 95 Sigma Meters in the Control Room and Hot Shutdown Panel do to obsolesence issues.	12/21/92	4/6/93	5/24/96	PC/M partially implemented with 15 instruments installed. Recommend as-building what work has been completed and close PC/M. New PC/M's can then be generated based on planned work activities.
235-992	Supp. 0 -Replace & remove Pax Phone Sys & install fiber optic cables	10/12/92	11/3/92	6/30/96	Partial implementation - Final scope to be reviewed and completed
235-992	Supp. 1 -Upgrading of Communication System	5/13/93	5/14/93	6/30/96	Partial implementation - Final scope to be reviewed and completed
094-293	Thermal Overload replace, EMT for condenser sampling pumps	5/17/93	6/15/93	6/30/96	Replace incorrectly sized thermal overload (TOL) heaters for Condenser Sampling Pmps 2A1,2A2,2B1,& 2B2

ST. LUCIE NUCLEAR ENGINEERING

UNIT 1 1996 OUTAGE SCHEDULE

BASELINE SCHEDULE JAN. 2, 1996

UPDATE AS OF APR 8, 1996 R. ENSLEY

LEGEND:

- xxx xx-xxx-xx ► REA Number
- xxxxxxxxxxxxxx ► Description
- xx-xx-xx ► Date Due
- xxx xxx ► Resp. Disc.
- F — Future Item
- ▲ ► Engr'd Matls. Ordered
- △ ► Engr'd Matls. Required
- □ ► Original Plant List
- ► Emergent Packages
- ► By Outage Start/During Outage
- ◆ ► PC/M Not Required
- C ► Capital
- ► Shaded Box Represents Completed Package

APR	APR	APR	APR	APR	MAY	MAY
SLN 95-013-10 NONDEPINCORE 4-12-96 FUELS	PMAI 96-03-777 EDG COP TUBE 4-19-96 SITE MEC	PMAI 96-02-392 EDG UNLD VLV 4-26-96 SITE MEC	EDG RAD PLNM 4-29-96 SITE MEC	PMAI 96-03-785 CNTMT RNG LGT 4-30-96 PEG ELE		
STAR 951089 SB 13306 KEYWY 4-12-96 SITE MEC	REWIND CWP 4-19-96 PEG ELE	STAR 951049 1A2 DIESEL TK 4-26-96 SITE MEC	STAR 951080 RTGB GR ALRM 4-29-96 SITE ELE	PMAI 96-02-146 EDG EXHAUST 4-30-96 SITE CIV	PMAI 96-03-726 1B EDG VLT REG 5-30-96 SITE ELE	PRESS INSL 5-30-96 SITE MEC
STAR 94110486 RWT INSP 4-12-96 PEG CIV	PMAI 96-03-370 24" SPOOL PCE 4-19-96 SITE MEC	CIAS EDG START 4-26-96 PEG ELE	PMAI 96-03-379 D/G IND LIGHTS 4-29-96 SITE ELE/SCE	STAR 951283 RCP SWEEPS 4-30-96 SITE LIC	PMAI 96-03-115 RCP VIB PROB 5-30-96 SITE ELE	STAR 950565 1B2 ANN A-13 5-30-96 PEG ELE
U1 RELOAD 4-8-96 PEG FUELS	SLN 93-061-11 A/D CRN'S 4-15-96 SITE MEC/CIV	STAR 950970 POLAR CRANE 4-24-96 SITE CIV	PMAI 96-03-453 DBL JAC BONET 4-30-96 SITE MEC	STAR 951136 MV 08-1B MTR 4-30-96 SITE ELE	STAR 951197 1A1 RCP CCW 5-30-96 SITE MEC	STAR 950428 MV 09-13 ST NUT 5-30-96 PEG MEC
STAR 961666 DEH DP SWTCH 4-8-96 SITE ELE	STAR 951667 SNUBBER CRIT 4-15-96 SITE CIV	STAR 950323A RCP LKOFF 4-19-96 SITE MEC	PMAI 96-02-352 480V LC LIFT 4-26-96 SITE CIV	MSIV BKUP 4-29-96 PEG MEC	PMAI 96-03-277 LCV-11-24 A/B 5-17-96 SITE MEC	STAR 950882 EXCORE POS 5-30-96 SITE MEC

APR MAY

O:\COMMON\DRE\SKYLINES\1996P1E.PRE

CORRECTIVE ACTION PROGRAM

IMPROVEMENTS/ACTIONS

CORRECTIVE ACTION PROGRAM

Major Improvement Areas

Standardize Process:

- Implement PMAI process — Complete
- Implement CR process — Complete
- Transfer all STARs to CR process — Complete

Status as of 4/15/96:

- Only 5 original STARs remain (none are overdue)
- No overdue CRs
- 120 overdue PMAIs

CONVERSION PROCESS
QA FINDINGS (QSL-CA-96-05):

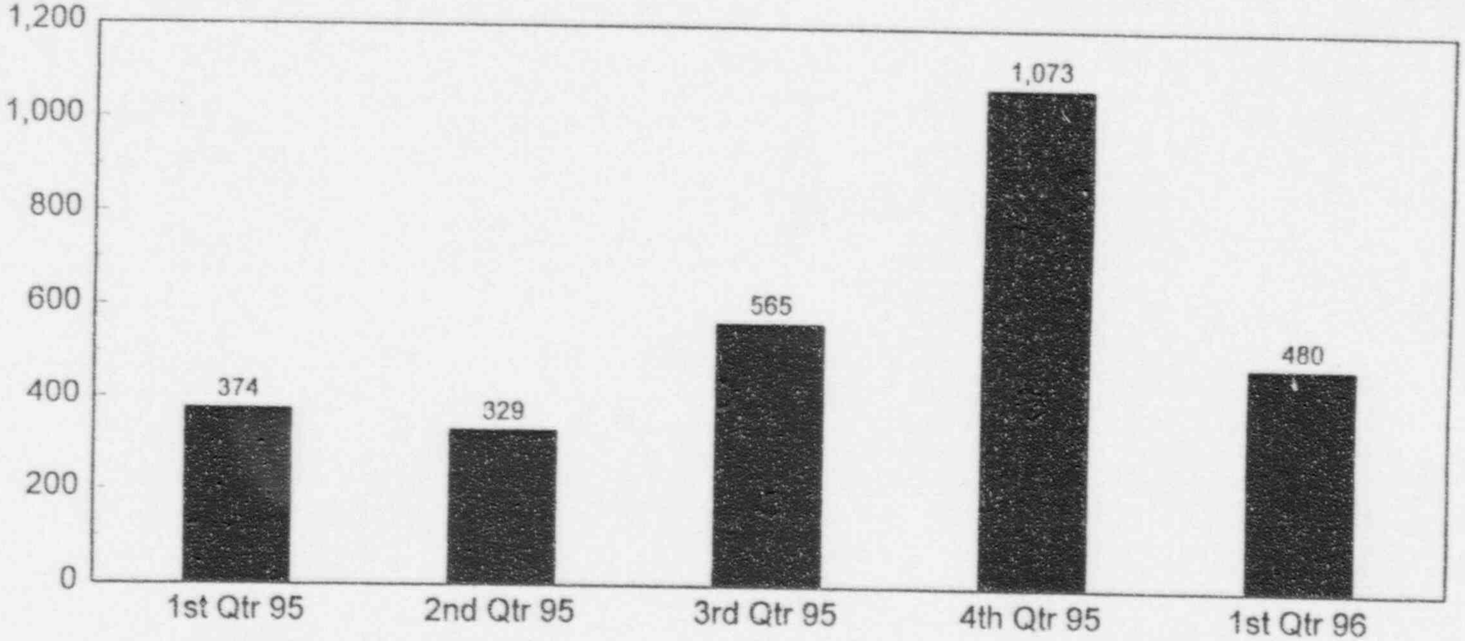
FINDING	ACTIONS
1. PMAI procedure (AP0006129) lacks instructions necessary for successful use by plant personnel/training not conducted.	* Training conducted. * Procedure revised.
2. STARs were closed without initiating department concurrence.	* Licensing/QA/PGM/ concurrence maintained. * Independent Review substituted. * PCR was never approved. * Controlled copy distribution of CR/PMAI procedure. * Implemented CR process (CR process does not require the concurrence)
3. Technical issues requiring near term corrective action are currently documented on PMAI's with extended due dates.	* Technical issues identified have been corrected. * Review a random sample of closed STARs to ensure no unresolved technical issues associated with nuclear safety.

ST. LUCIE NUCLEAR PLANT

CORRECTIVE ACTION PROGRAM

1st QTR 1996 REPORT

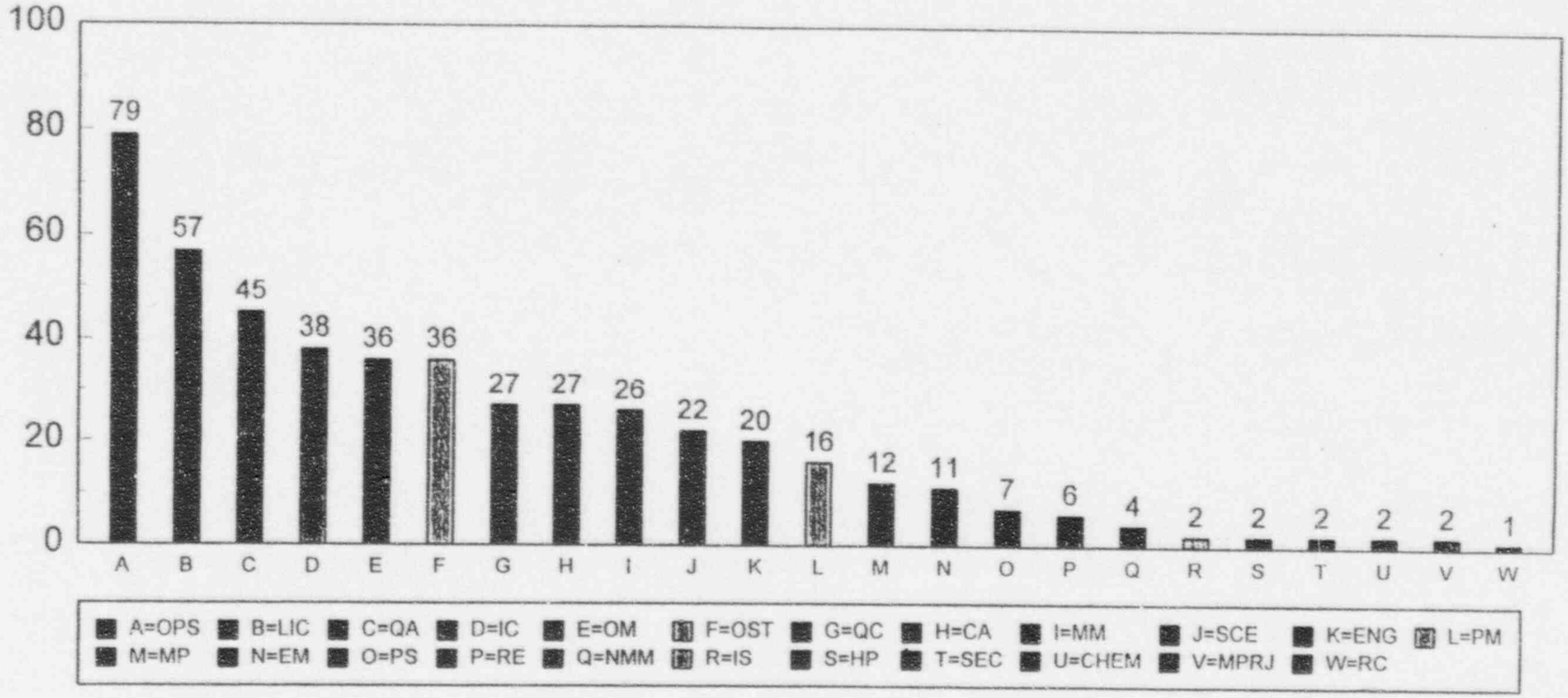
CRs Generated By Quarter



- 130/Month - Non outage
- 360/Month - Outage

1QTR015.pre

CRs Stratified By Initiating Department
1st Qtr 1996



- Operations was the highest contributor
- QA/Licensing participate fully

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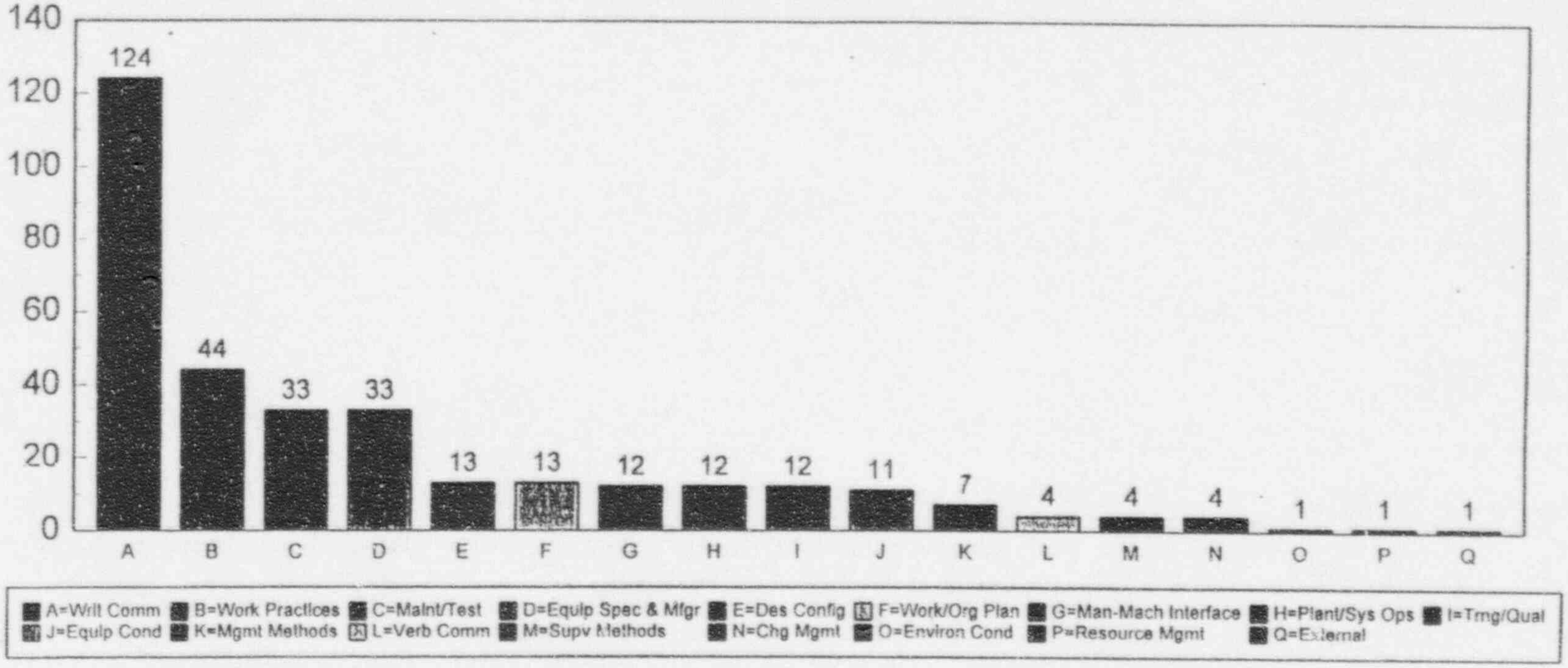
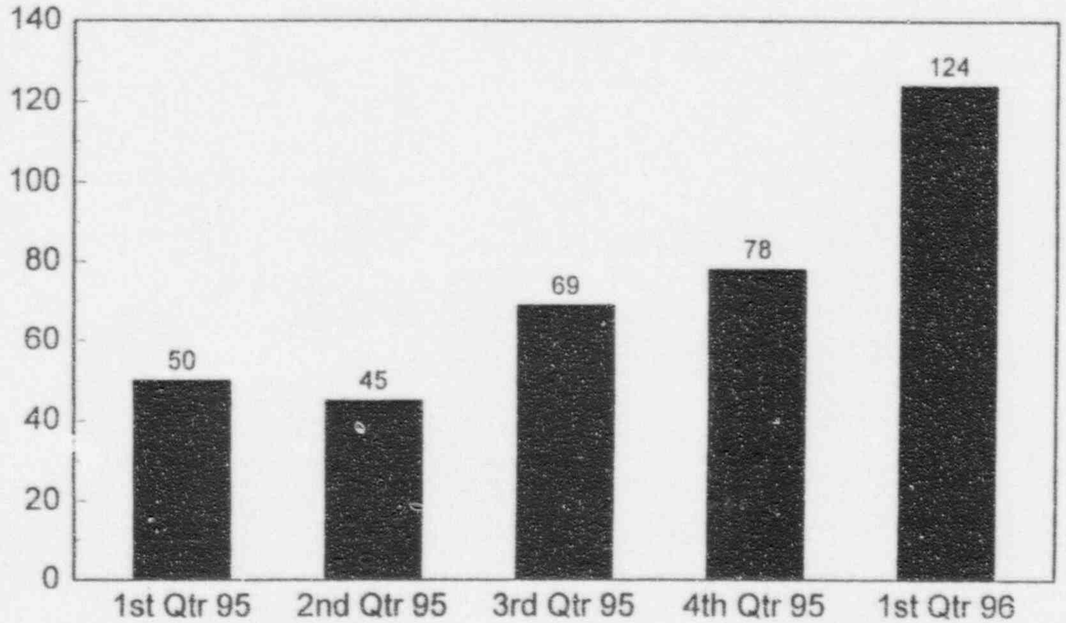
CRs Stratified By Causal Factors
1st Qtr 1996



- The top four causal factors or root causes for all CRs issued in the 1st Qtr of 1996 were:
  - Written Communication - Deficiencies in the written presentation or exchange of information; e.g., procedures, drawings, vendors manuals, Tech Specs, etc.
  - Work Practices - The method a worker routinely uses to ensure the safe and successful performance of a task; e.g., lack of self checking, failure to use/follow procedures, etc.
  - Maintenance/Testing - The process of ensuring that components/systems are maintained in optimum condition and tested for operability; e.g., inadequate PM, improper reassembly, etc.
  - Equipment Specification, Manufacture, and Construction - The process that includes the manufacture and installation of equipment in the plant; e.g., inadequate/incorrect spare parts, inappropriate service req'mts., etc.

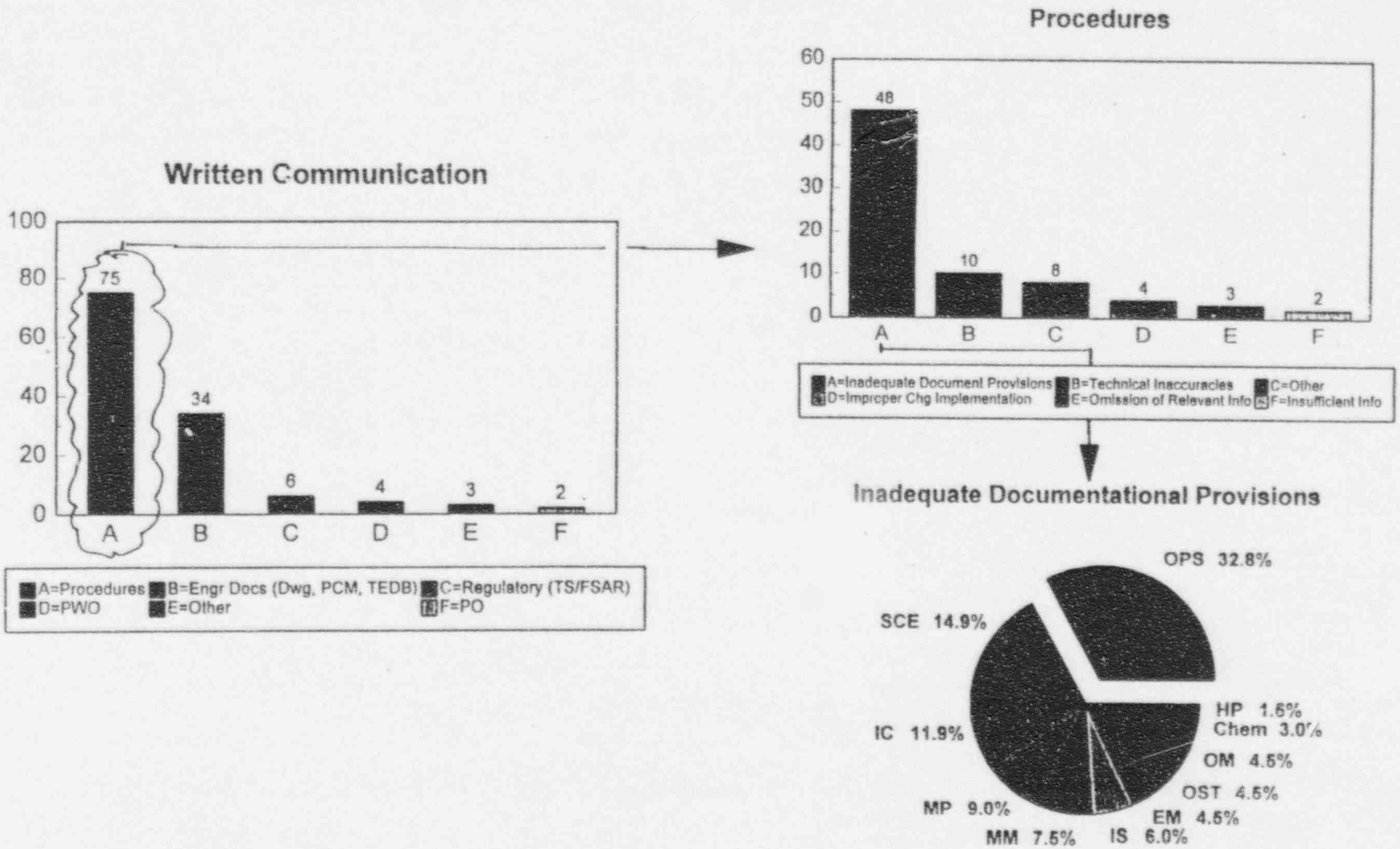
1QTR002.pre

Written Communication Trend
1st Qtr 1996



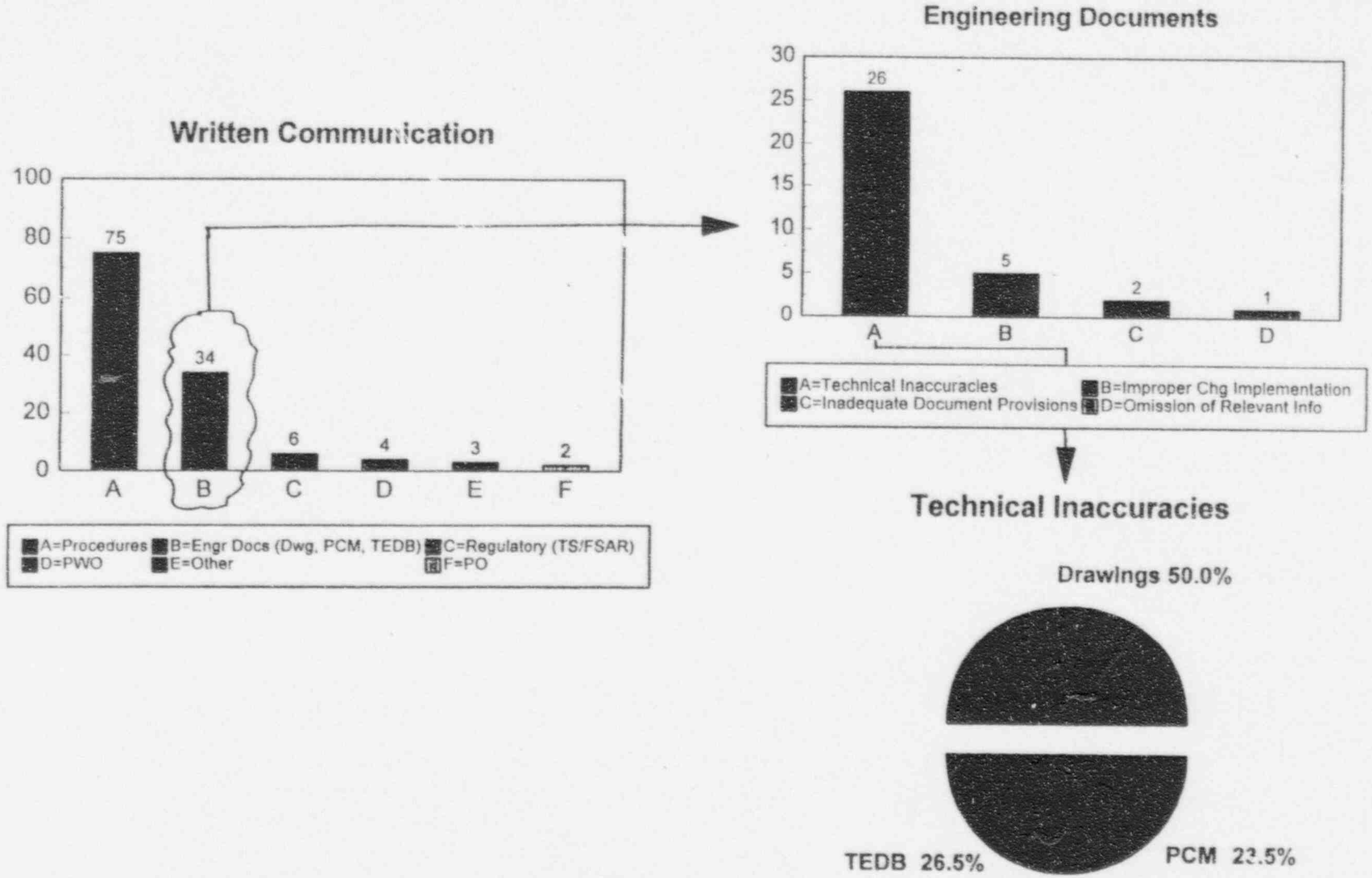
- Written Communication - Deficiencies in the written presentation or exchange of information; e.g., procedures, drawings, vendor manuals, Tech Specs, etc.

Written Communication Stratified by Document Type and Department
1st Qtr 1996



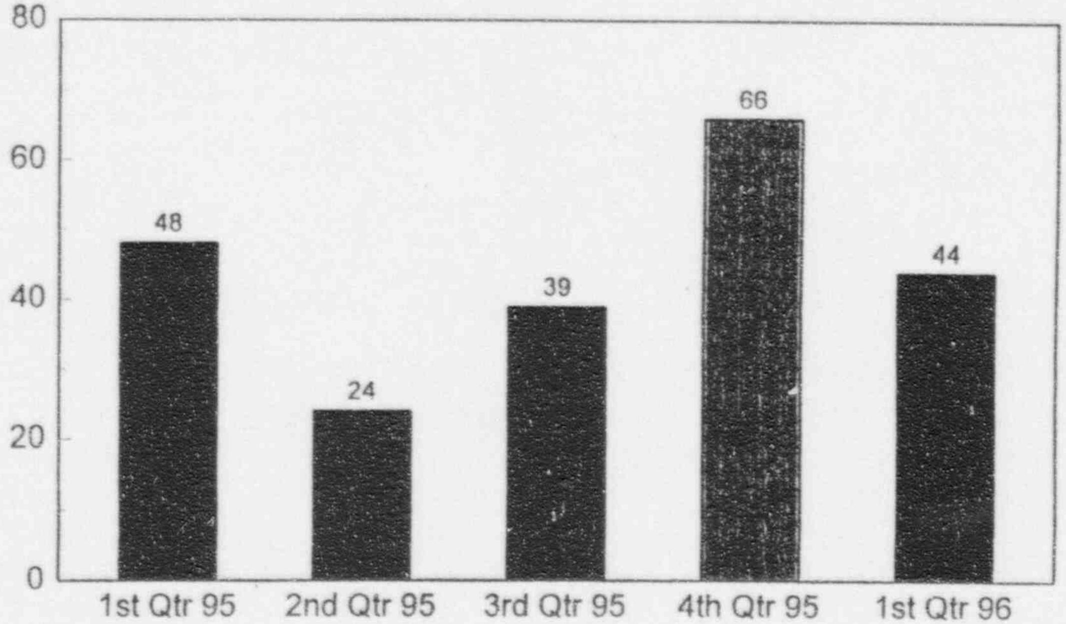
1QTR005.pre

Written Communication-Engineering Documents "Technical Inaccuracies" Causal Sub-Factor Stratified By Document Type



1QTR006.pre

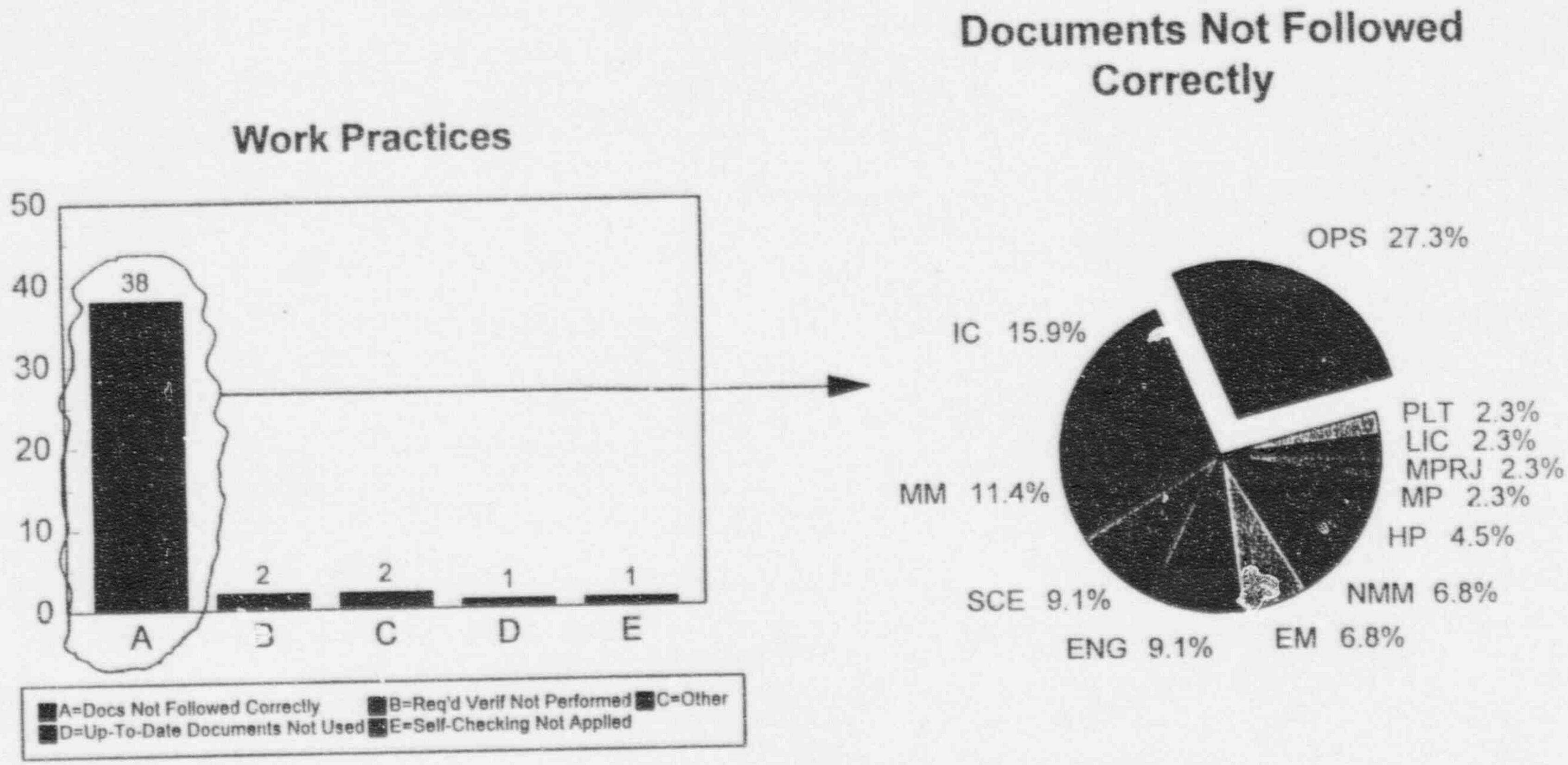
Work Practices Trend
1st QTR 1996



- Work Practices - The method a worker routinely uses to ensure the safe and successful performance of a task; e.g., lack of self checking, failure to use/follow procedures, etc.

1QTR012.pre

Work Practices Stratified By Department
1st Qtr 1996



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CONDITION REPORTS
CONSOLIDATION OF PROCESSES

**FROM STAR PROCESS

CORRECTIVE ACTION REQUEST
QUALITY CONTROL(form 3900)
NON CONFORMANCE REPORT
DEFICIENCY REPORT
OPEN ITEM NOTICE
DISCREPANT FIELD CONDITION REPORT
CONSTRUCTION CORRECTIVE ACTION NOTICE
QA AUDIT FINDINGS
ISEG RECOMMENDATIONS
10 CFR21 NOTIFICATIONS
OPERATING EXPERIENCE FEEDBACK(FOP)
OUTAGE CRITIQUE ITEMS
POST TRIP REVIEW ITEMS
FIELD CHANGE NOTICE
DRAWING DISCREPANCIES
IN HOUSE EVENTS
ENVIORNMENTAL CORRECTIVE ACTION REPORT
PLANT LABELLING DEFICIENCIES

**ADDED ON 4/1

OPERATIONS FEEDBACK(Data Sheet 7)
RADIOLOGICAL OCCURRENCES/INCIDENTS/TRENDS
NRC SPECIAL REPORTS
PERSONNEL SAFETY(Doctor cases/LTI/trends)

**NOT INCLUDED IN CR PROCESS

PLANT WORK ORDERS
RELAY WORK ORDERS
NUCLEAR SAFETY SPEAKOUT CONCERNS
REQUEST FOR ENGINEERING ASSISTANCE
PERSONNEL SAFETY FORM 1880/1880A
TRAINING TSARS
LOGGABLE SECURITY EVENTS
RADIOLOGICAL DEFICIENCIES

QUALITY ASSURANCE

QUALITY ASSURANCE

- **QA AUDITS/PERFORMANCE MONITORING**
  5 findings and 1 weakness identified:
  - Finding; Program deficiencies for tracking component cycles and transient events. Repeat from 1993.
  - Finding; Failure to strictly adhere to plant procedural compliance in Operations and Maintenance.
  - 3 Findings; STAR/PMAI transition implementation.
  - Weakness; Failure to self-assess error in estimating critical condition.

- **INDEPENDENT TECHNICAL REVIEWS**
  - HVE 41-B PM parts availability, preparation and staging.
  - Reviewing IHE-96-030, Unit 2 RCS leakage and letdown system relief valve lift.
  - Ongoing assessment of OEF program compliance and effectiveness.
  - Facilitating plant self-assessment with support from outside PSL technical specialist.
  - A series of 24 hour Conduct of Operations observations.

- **QC INSPECTION PROGRAM**
  - 93 surveillances were conducted during the 1st quarter '96 resulting in an 8% error rate for the Maintenance Dept. Procedural non-compliance was the principal cause, split between EM, MM & Project Groups, I&C 0% error. (5 STARs, 3 unsat/sat reports were written by QC).

- **OTHER QA ACTIVITIES**
  - Follow-up audit/survey on Plan to Improve Operational Performance.
  - Unit 1 outage safety review.
  - Peak shift Maintenance Performance Assessment.

- **OVERALL ASSESSMENT**
  - Need to continue to focus on procedural compliance and attention to detail.
  - Maintenance rule implementation, July 10, 1996; we are behind the industry.

LICENSING

IMPROVEMENTS/ACTIONS

LICENSING

<u>Major Improvement Areas</u>

Improve Support to Operations in the Use and Interpretation of the PSL Technical Specifications:	
• Further evaluate cost/benefit of implementation of Improved Standard Technical Specifications (ISTS).	6/30/96
• Improve the Technical Specifications BASES:	
- Submit PLAs to remove the BASES from the PSL Technical Specifications Index	6/30/96
- Use the ISTS BASES for PSL BASES improvements.	On-going (post-PLA approval)
• Evaluate the need for Technical Specifications position statements.	6/30/96
Address and improve the implementation of the Operating Experience Feedback (OEF) Program.	Complete
Determine the need to track both 10 CFR §50.72 and 10 CFR §50.73. Reportable Event notifications.	Complete

REGULATORY STATUS

Recent NRC Inspections

RESIDENTS' PERIODIC: 2-21-96 to 3-30-96 (3 inspectors)

HEALTH PHYSICS/RADIATION PROTECTION: 2-26-96 to 3-1-96 (1 inspector)

SPECIAL INSPECTION - UNIT 1 DROPPED CEA AND REACTOR TRIP: 2-24-96 to 2-29-96 (3 inspectors)

MAINTENANCE/SURVEILLANCE: 3-4-96 to 3-8-96 (1 inspector)

MAINTENANCE/SURVEILLANCE: 3-25-96 to 3-29-96 (1 inspector)

OPERATOR LICENSING: 3-25-96 to 3-29-96 (1 inspector)

OPERATOR LICENSING EXAMS: 3-25-96 to 3-39-96 (2 inspectors)

PHYSICAL SECURITY PROGRAM FOR POWER REACTORS: 4-1-96 to 4-5-96 (CANCELLED)

Estimated NRC inspector man-hours as of March 31, 1996: 1904

Violations Status

Four Cited Violations as of March 31, 1996
One Non-Cited Violation as of March 31, 1996

Potential Violations

1) LER 96-03; Failure to acces procedure when sampling containment
2) LER 96-03; Failure to conduct adequate log readings and reviews
3) LER 96-03; Violation of Technical Specification 3.0.4
4) IHE 96-02; Failure to access procedure
5) IHE 96-02; Failure to report completion of procedure
6) Failure to properly disposition out of specification CEDM coil stack readings
7) Reactivity manipulations not properly logged

Potential Non-Cited Violations

1) Improper Health Physics Practices
2) Control of contaminated tools in Hot Tool Room

Upcoming Inspections (through June 1996)

EMPLOYEE CONCERNS PROGRAM: 4-29-96 to 5-3-96 (2 inspectors)

MAINTENANCE IMPLEMENTATION: 5-6-96 to 5-10-96 (2 inspectors)

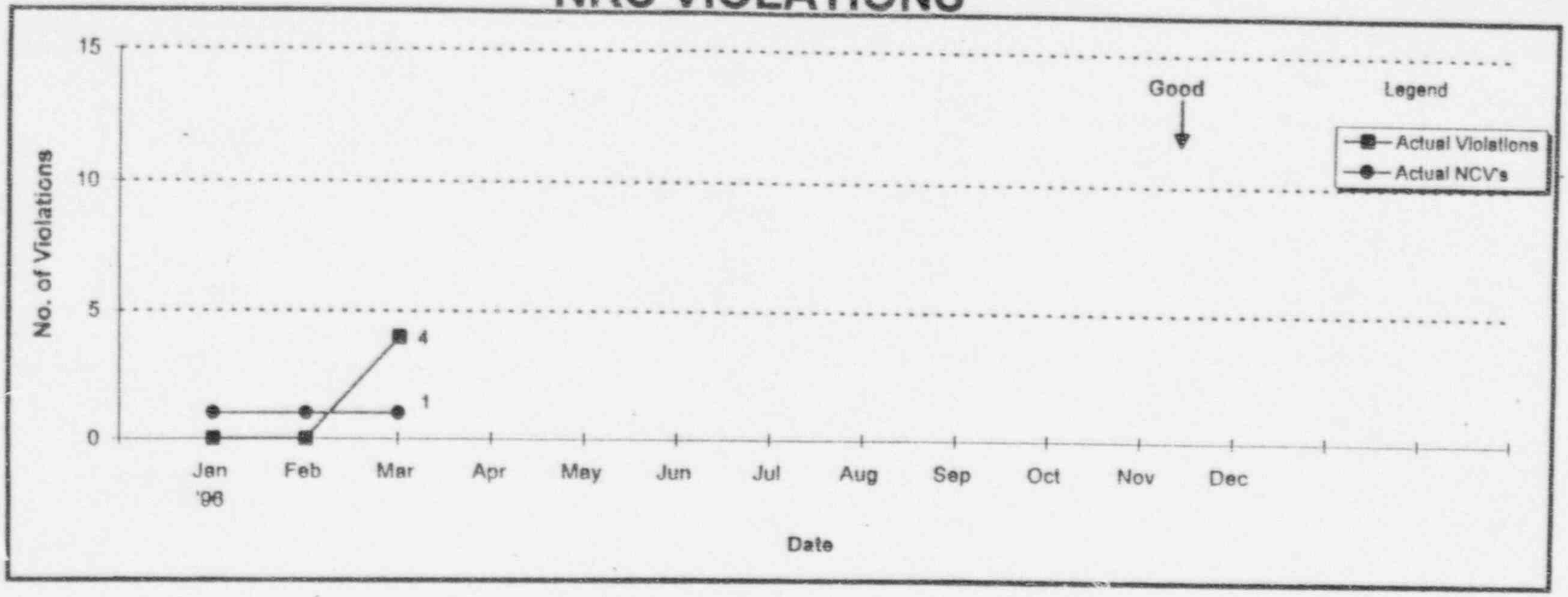
ENGINEERING/10 CFR 50.59: 5-13-96 to 5-17-96 (1 inspector)

INSERVICE INSPECTION: 5-13-96 to 5-17-96 (1 inspector)

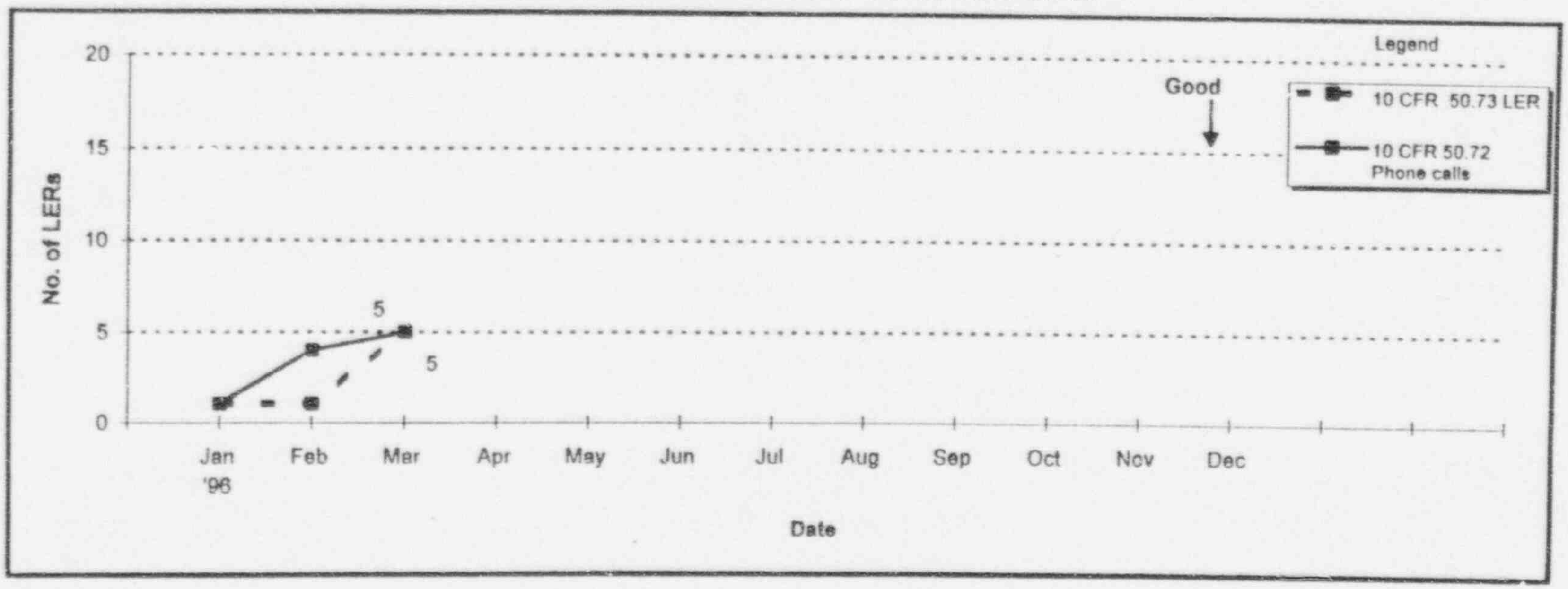
CORRECTIVE ACTION PROGRAM: 6-24-96 to 6-28-96 (3 inspectors)

MAINTENANCE/SURVEILLANCE OBSERVATION: 6-24-96 to 6-28-96 (1 inspector)

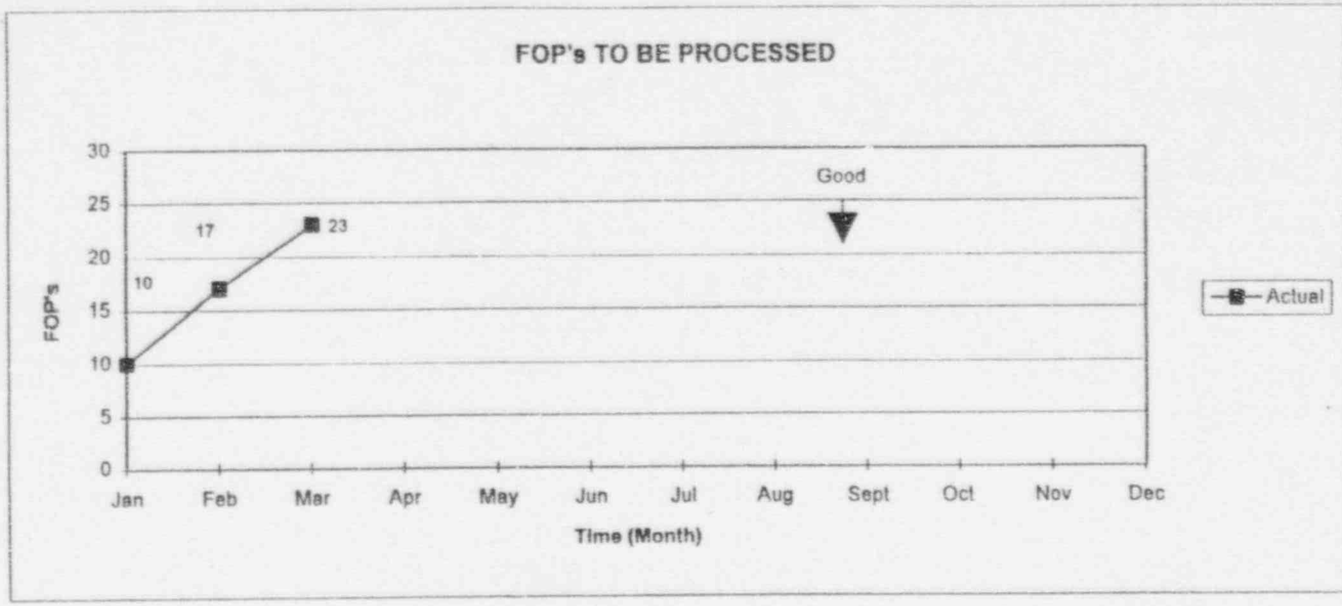
NRC VIOLATIONS

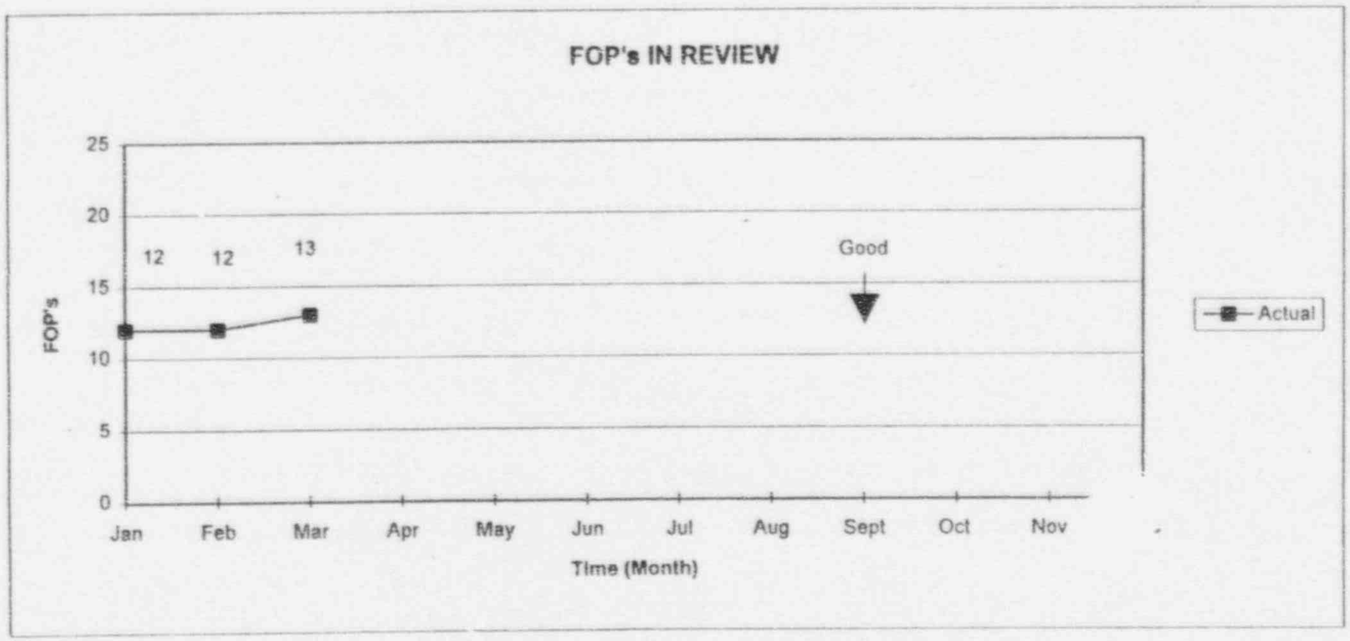


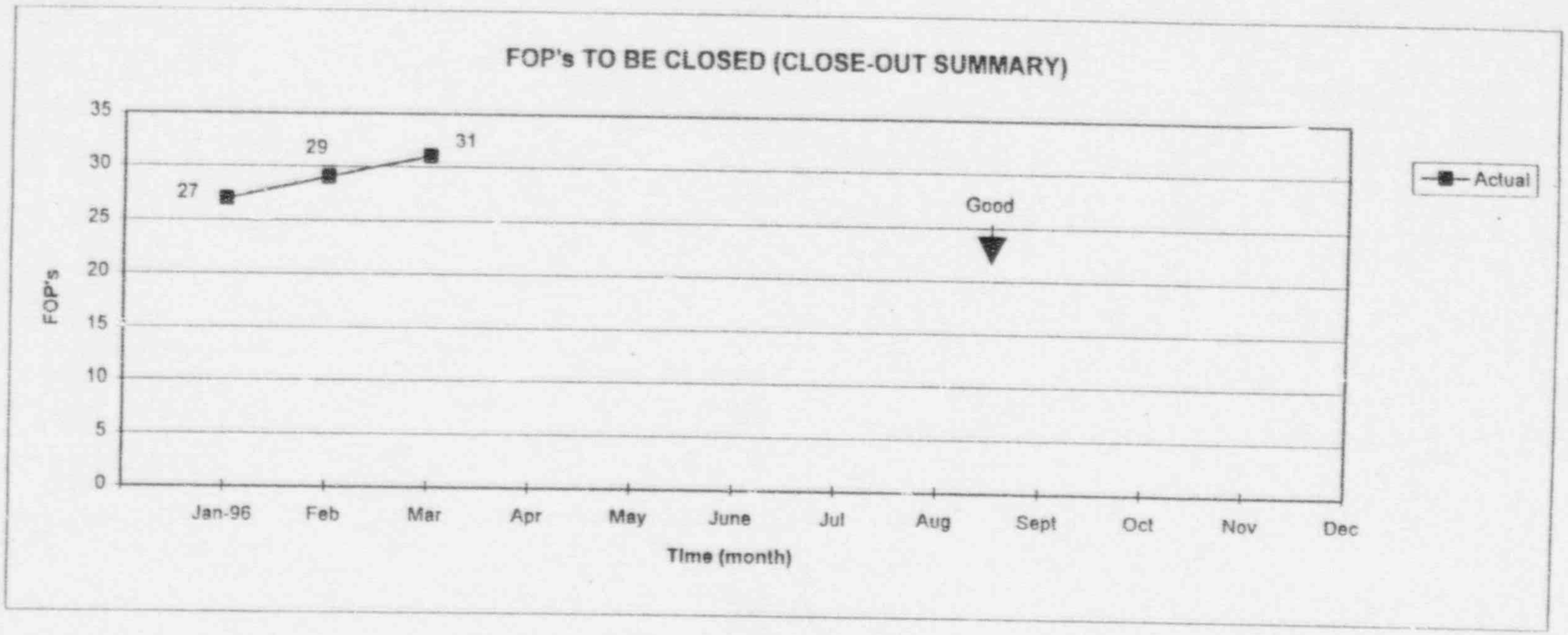
LICENSEE EVENT REPORTS



Data Source: Ed Weinkam


FOP's TO BE PROCESSED
30
25
20
15
10
5
0
FOP's
10
17
23
Good
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Time (Month)
Actual


FOP's IN REVIEW
25
20
15
10
5
0
FOP's
12
12
13
Good
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Time (Month)
Actual


FOP's TO BE CLOSED (CLOSE-OUT SUMMARY)
FOP's
35
30
25
20
15
10
5
0
27
29
31
Good
Jan-96
Feb
Mar
Apr
May
June
Jul
Aug
Sept
Oct
Nov
Dec
Time (month)
Actual

SERVICES

IMPROVEMENTS/ACTIONS

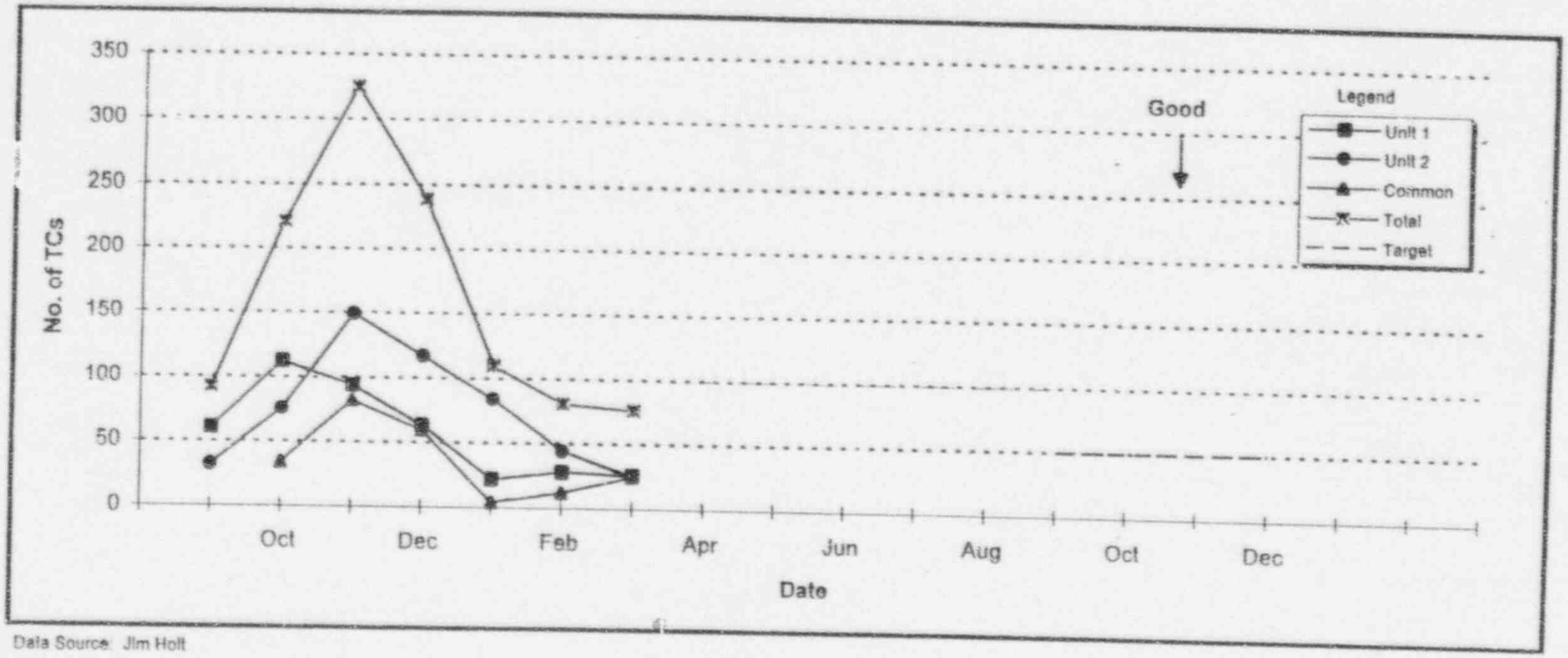
SERVICES

Major Improvement Areas

Improve the Procedure Administration Process to Ensure Quality Procedures:		
•	Temporary Change Action Plan	Complete
•	Convert Procedures to Guidelines	Complete
Improve the Safety Focus of the FRG:		
•	Tech Spec Improvement	6/96
•	All other items	Complete
Improve Training Dept Contribution to Conservative Plant Ops		
•	IHE Training Review Team	4/25/96
•	Nuclear Policy 914 implementation	4/25/96
•	Enhance L.O. Requal Exam Practices	4/18/96
Improve Plant's ability to implement the E-Plan efficiently		
•	Upgrade and Revise the ERO	3rd Qtr/96
•	More frequent limited scope drills	7/96
•	Validate/Update EP Training Content	9/96
Implement Configuration Control process		
•	Reestablish Configuration Management Group	Complete
•	Revise AP 0005745 "Request for Engineering Assistance"	Complete
•	Initiate Real Time List for Minor Modifications	4/15/96
Develop 20/30 Lists		
•	1996 Top 20 list	Complete
•	1996 Top 30 list	4/18/96
•	1997 Top 20/30 list	5/5/96

TEMPORARY CHANGES TO PROCEDURES

Jim Holt - Information Services



Data Source: Jim Holt

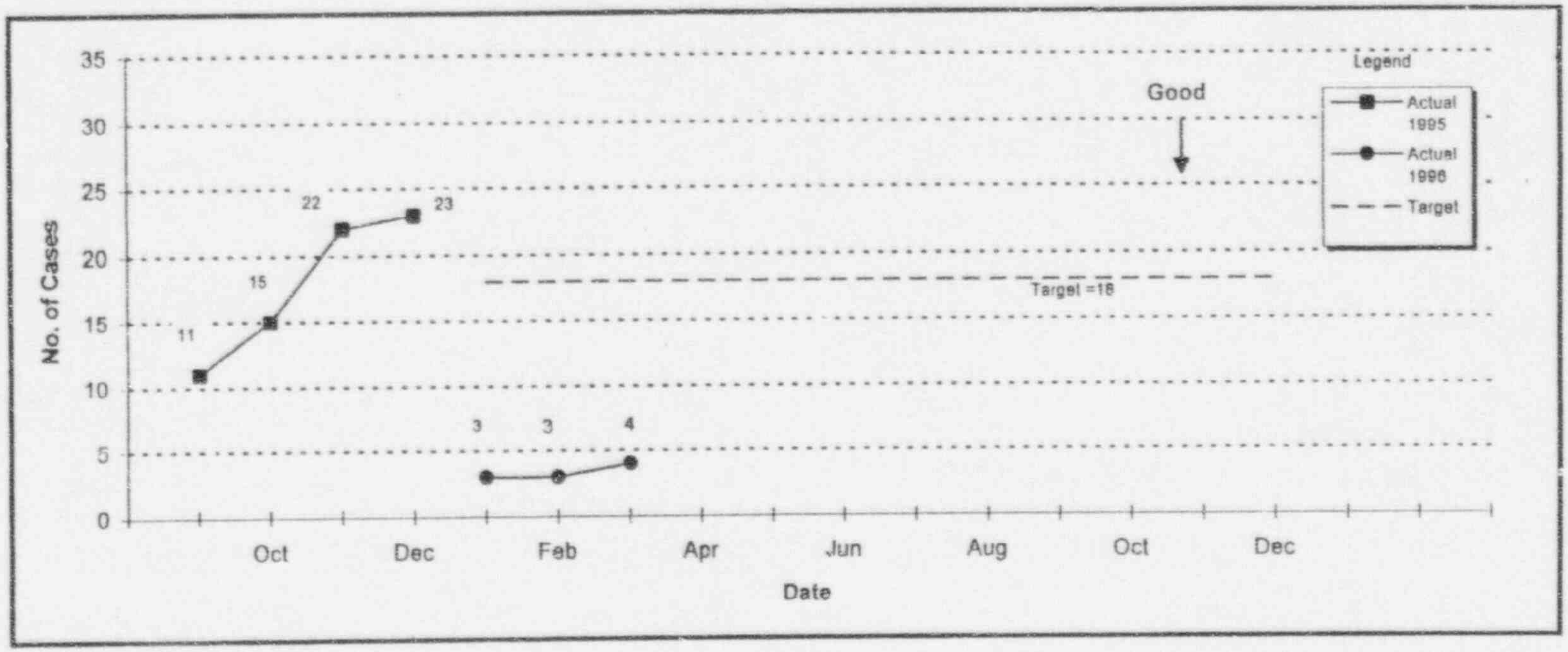
SUMMARY STATUS

Oldest TC (days)
89
89
89
89
67
68
9

Discipline	Unit 1	Unit 2	Common	Total
Operations	23	18	9	50
Mechanical	1	1	6	8
Electrical	0	0	5	5
I&C	1	5	2	8
Reactor Eng.	1	0	2	3
SCE	0	1	0	1
HP	0	0	1	1
Total	26	25	25	76

INDUSTRIAL SAFETY - RECORDABLE DOCTOR CASES

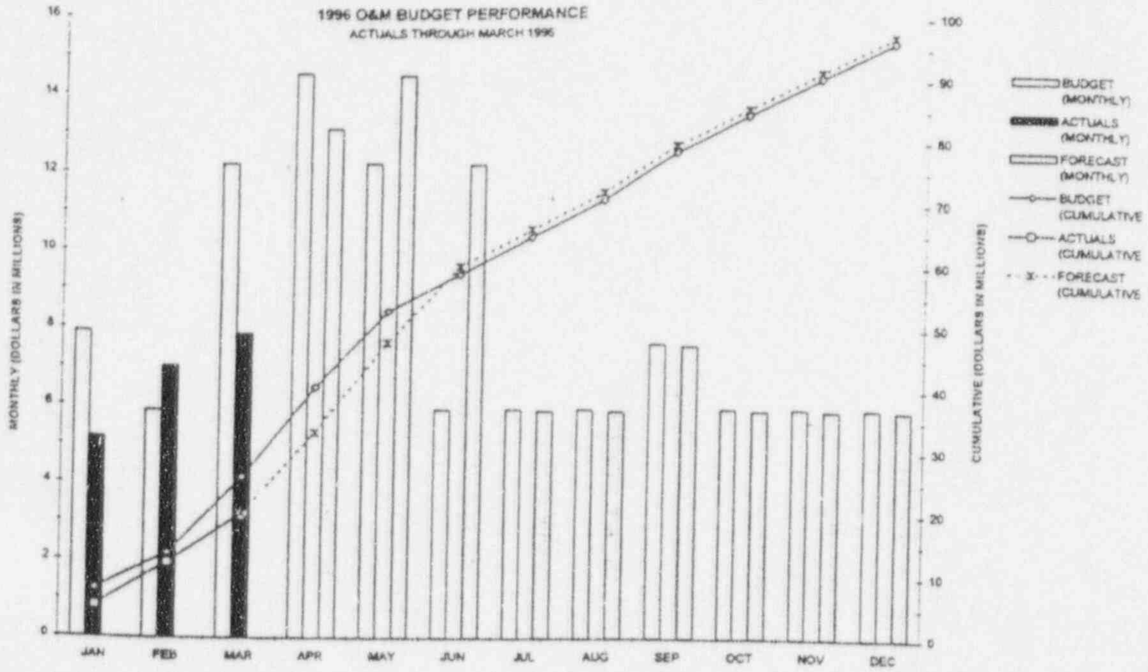
Kim Heffelfinger - Protection Services

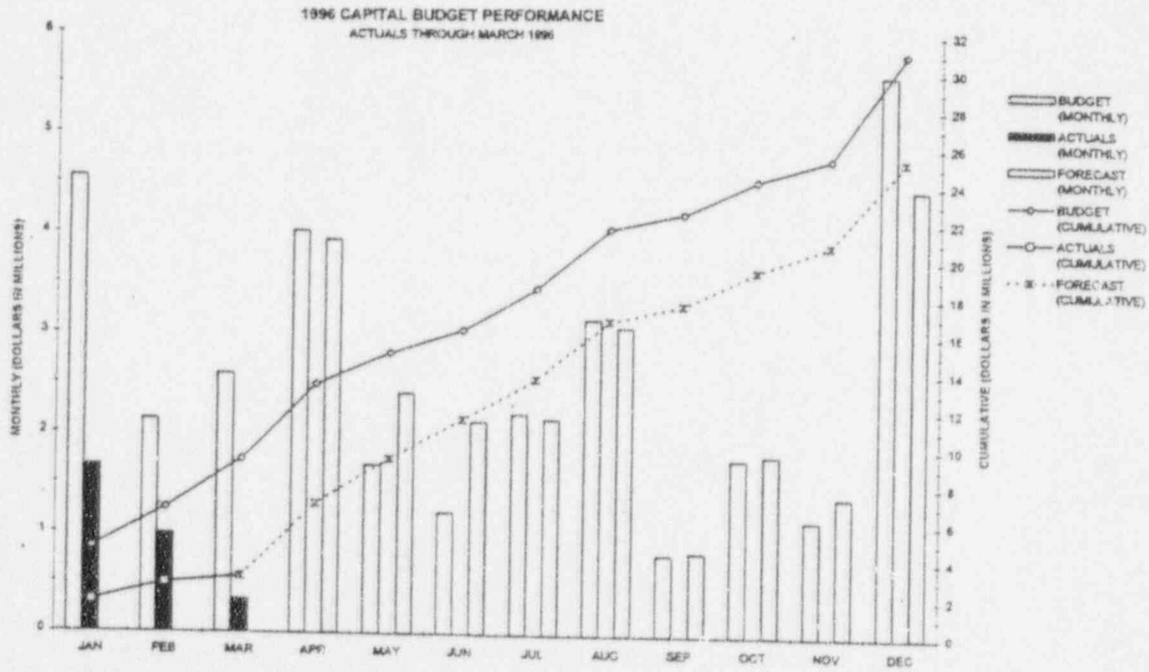


Data Source: Kim Heffelfinger

96

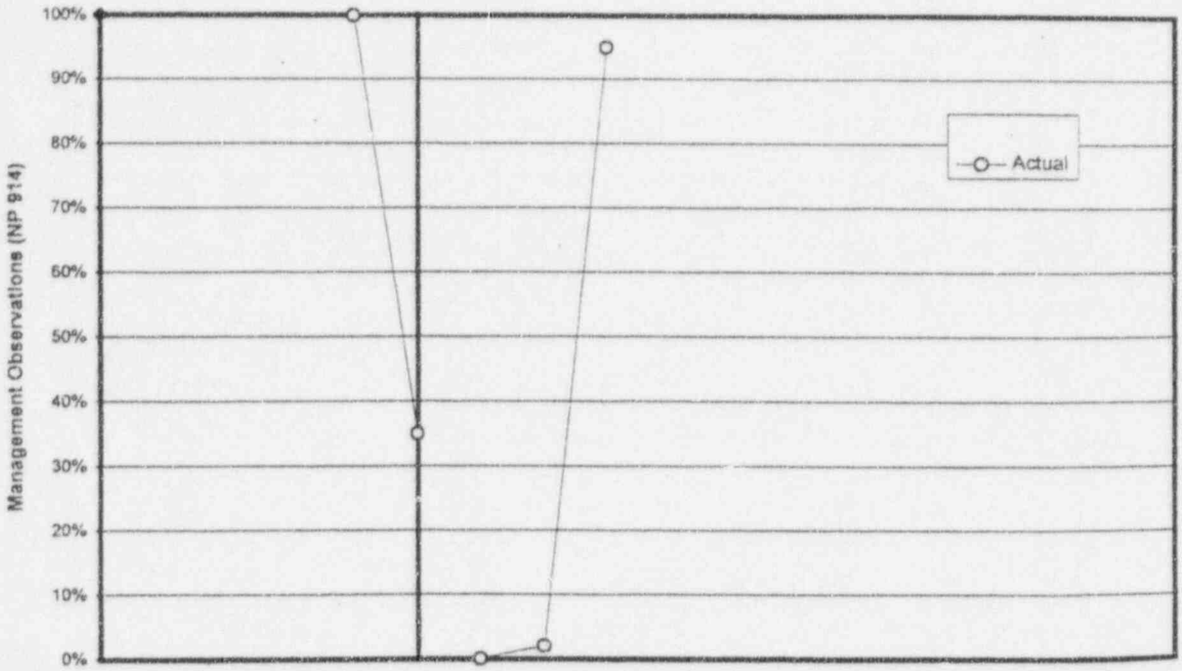
ST. LUCIE PLANT
BUDGET PERFORMANCE INDICATOR





SLIMM RC-PSL 4/18/96

PSL TRAINING OBSERVATIONS



	1991	1992	1993	1994	1995	1/96	2/96	3/96	4/96	5/96	6/96	7/96	8/96	9/96	10/96	11/96	12/96
Actual				100%	35%	0%	2%	95%									

Data Source: P. Fincher

MATERIALS

IMPROVEMENTS/ACTIONS

MATERIALS

Major Improvement Areas

Outage Material Availability:

- Delivery of material has been expedited for 90 PWOs
- No PWOs have been cancelled for lack of parts

Reduce the Cost of Carried Inventory:

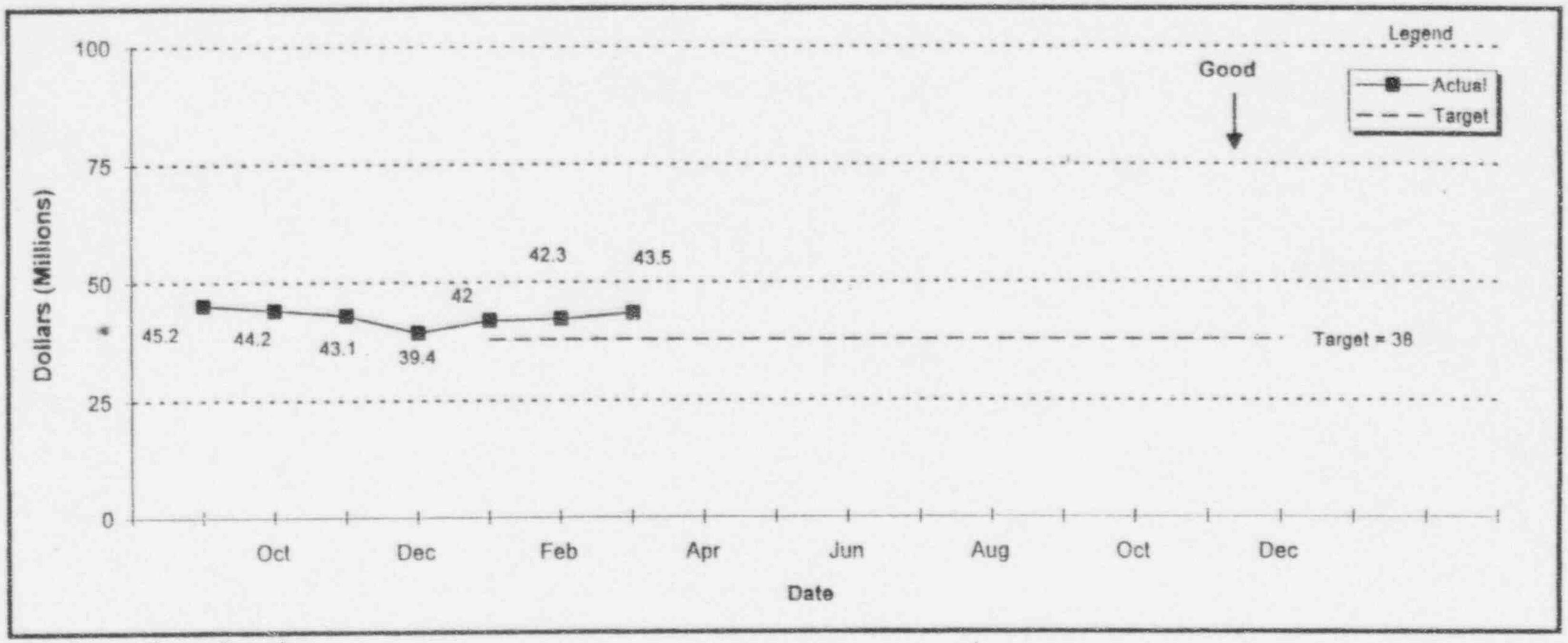
• Reduce value of inventory to $38 million	12/31/96
• Reduce the value of overmax inventory to $2 million	12/31/96

Increase Spare Part Availability:

• Reduce the number of restocks to 500	Complete
• Reduce the number and age of non-outage work order AWP's to 70	7/1/96
• Reduce the number of purchase requisitions older than 30 days to 20	7/1/96

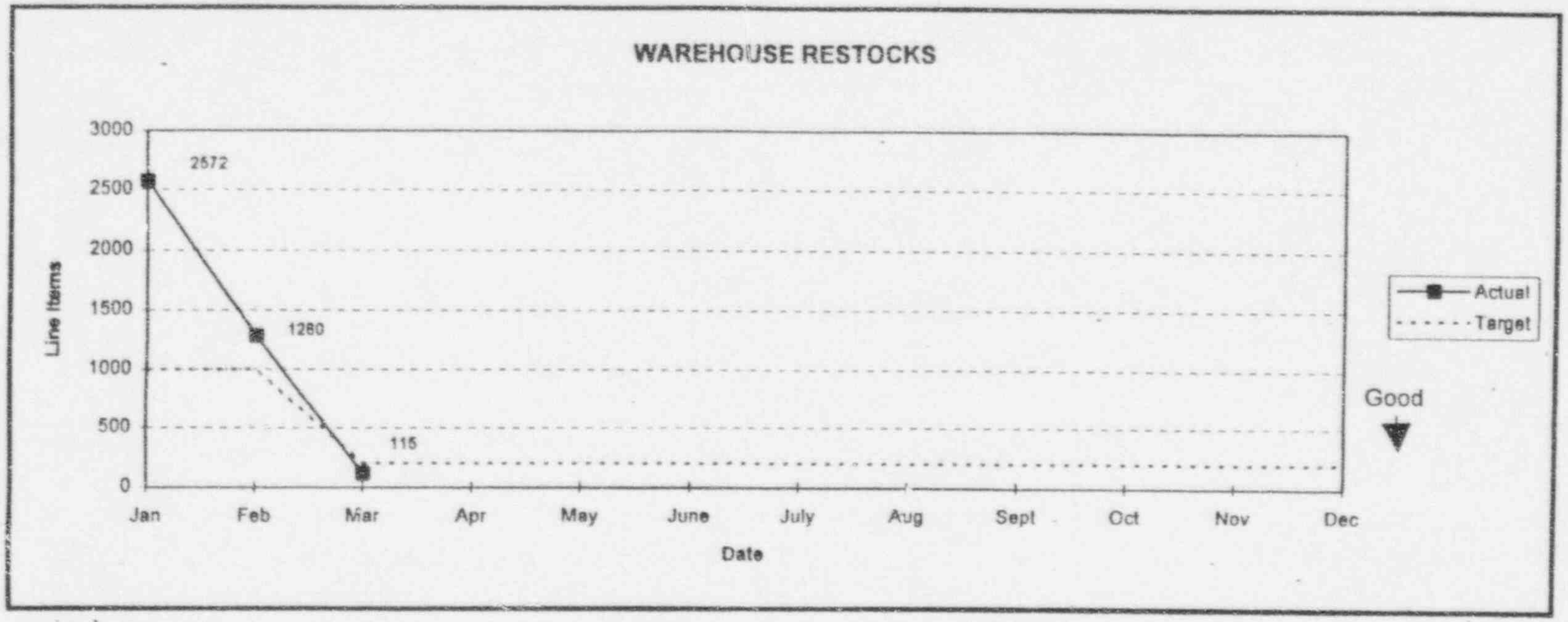
INVENTORY VALUE

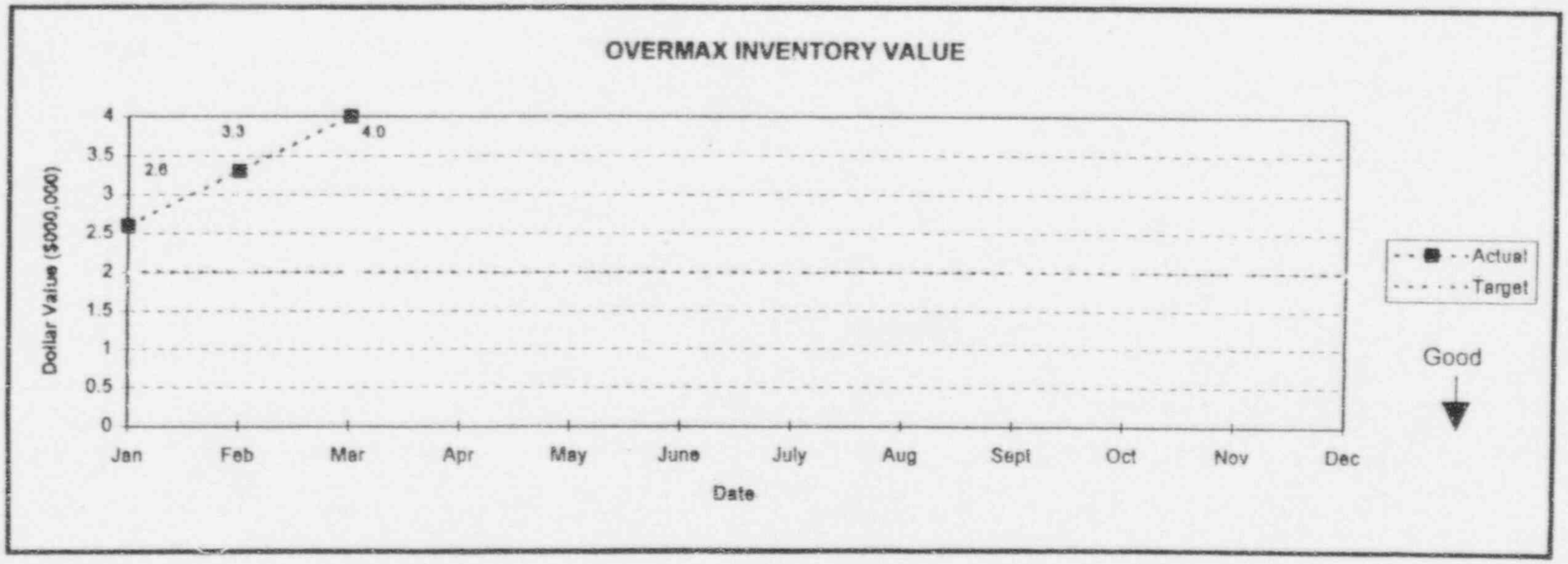
Dan Quilty - Nuclear Materials Management

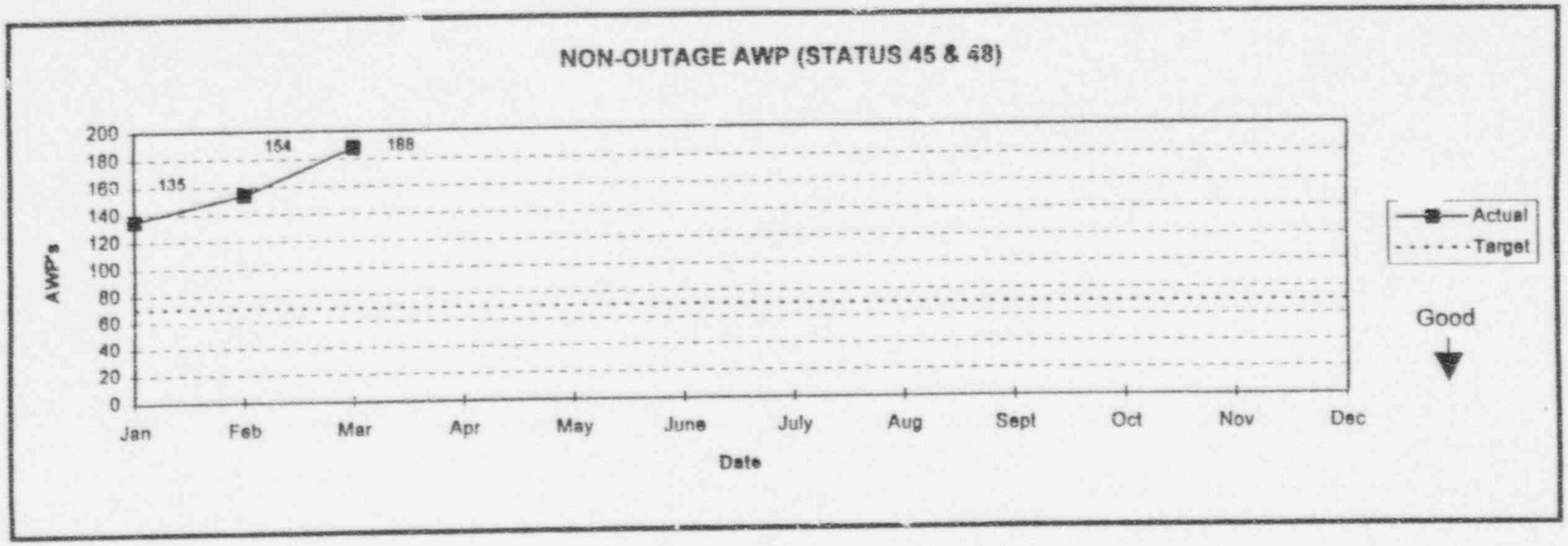


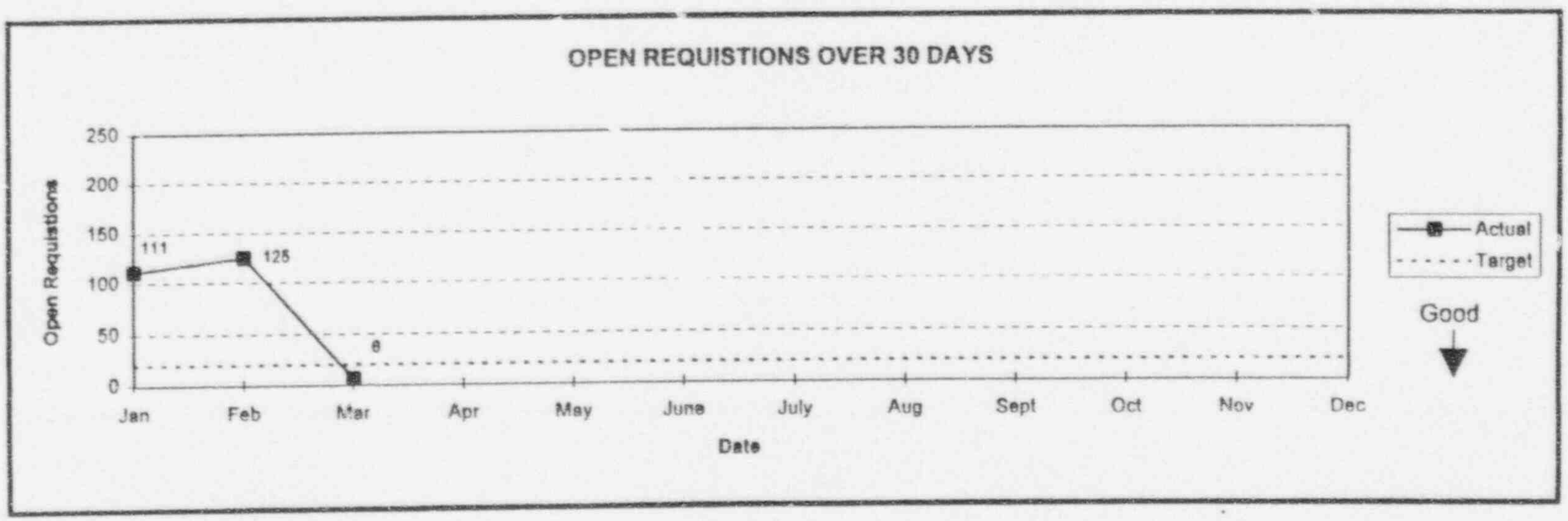
Data Source: Norman Quesada

100


WAREHOUSE RESTOCKS
3000
2500
2000
1500
1000
500
0
Line Items
2572
1280
115
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
Date
Actual
Target
Good


OVERMAX INVENTORY VALUE
4
3.5
3
2.5
2
1.5
1
0.5
0
Dollar Value ($000,000)
2.6
3.3
4.0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
Date
Actual
Target
Good


NON-OUTAGE AWP (STATUS 45 & 48)
AWP's
200
180
160
140
120
100
80
60
40
20
0
135
154
188
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
Date
Actual
Target
Good

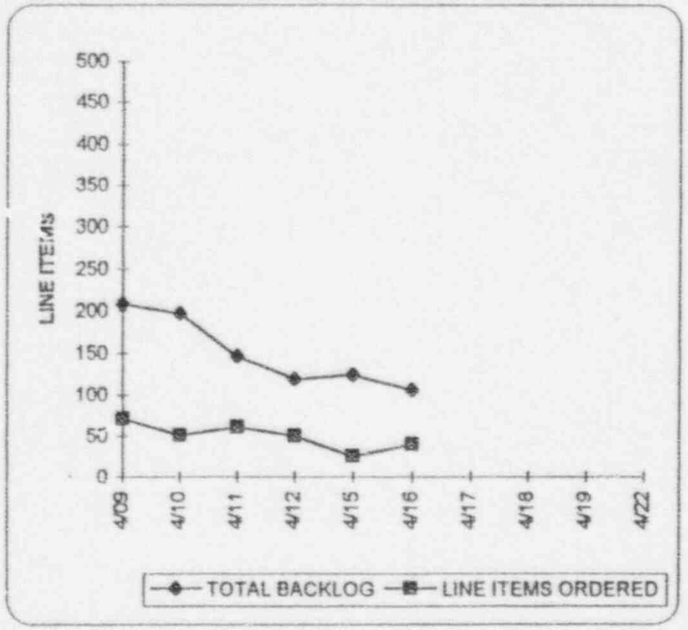

OPEN REQUISTIONS OVER 30 DAYS
Open Requistions
250
200
150
100
50
0
111
125
8
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
Date
Actual
Target
Good

NUCLEAR MATERIALS MANAGEMENT 10 OLDEST AWP'S
WEEK ENDING
APRIL 12, 1996

UN	ORIGINATION DATE	COMPONENT/ASSOCIATE/NAME	TITLE	WORK ORDER	SCHEDULE	STOCK CODE	P.O./P.R.	ACTION	COMMENTS
1	1/14/93	V14143 CHECK VALVE FOR COMPONENT COOLING WATER PUMP 1A DISCHARGE	IMPLEMENT PCM #335-190M	9300144401	SL1-14	177522-1	PO15383	PUR	DELIVERY DATE 5/6/96
1	3/18/93	SR-07-1B/SAFETY RELIEF VALVE FOR LPSI 1B & HPSI 1B PP SUCTION	PERFORM IST INSPECTION & RPR FLNG LK.	9300864501	SL1-14	37251-3 57194-1	P0 14283 PO 13496	PUR	DELIVERY DATE 4/5/96 DELIVERY DATE 5/10/96
1	8/4/93	J5-1 GRAPHITE ANODE FOR INTAKE STRUCTURE	REPLACE TRAVELLING SCREEN ANODES	9302132001	SL1-14	21776 4	PO14417	PUR	DELIVERY DATE 4/26/96
1	9/26/94	FCV-24-107/VALVE/CONTROL VALVE FOR ES DRAIN TO CNDSR 1A FROM HP EXH	DISASSEMBLE AND INSPECT REPAIR AS NEEDED	9402439601	SL1-14	59478-4 59567-4 59533-4	PO 14506 PO 14417 PO 14417	PUR	DELIVERY DATE 4/26/96
1	9/26/94	FCV-24-108/VALVE/CONTROL VALVE FOR ES DRAIN TO CNDSR 1A FROM HP EXH	DISASSEMBLE AND INSPECT REPAIR AS NEEDED	9402439701	SL1-14	59478-4 59567-4 59533-4 178731-4	PO 14506 PO 14417 PO 14417 PO 13477	PUR	DELIVERY DATE 4/26/96
1	9/26/94	FCV-09-1A2 FLOE CONTROL VALVE FOR FEEDWATER PUMP 1A	DISASSEMBLE AND INSPECT REPAIR AS NEEDED	9402439801	SL1-14	28004-1 56289-4 56297-4 56314-1	PO 14489 PO 13539	PUR	DELIVERY DATE 4/26/96
1	9/26/94	CONTAINMENT SPRAY PUMP 1A	BORIC ACID BUILD UP ON SUCTION FLANGE	9402441501	SL1-14O	27837-1 27972-1 27977-1 29493-1	PO 14609 PO 14489 PO 14489 PO 14306	PUR	DELIVERY DATE 4/24/96
1	9/26/94	FCV-09-1B2/VALVE/FLOW CONTROL VALVE FOR FEEDWATER PP 1B DISCHARGE	DISASSEMBLE AND INSPECT REPAIR AS NEEDED	9402443101	SL1-14	30300-1 56315-4 56289-4 56334-4	PO 15018 PO 13539 PO 13539 PO 13539	PUR	DELIVERY DATE 5/3/96
1	9/26/94	FCV-24-100/VALVE/CONTROL VALVE FOR ES DRAIN TO CNDSR 1A FROM HP EXH	DISASSEMBLE AND INSPECT REPAIR AS NEEDED	9402443801	SL1-14	59478-4 59567-4 178731-4 178734-4	PO 14506 PO 14417 PO 13477 PO 13892	PUR	DELIVERY DATE 4/22/96
1	9/26/94	FCV-24-101/VALVE/CONTROL VALVE FOR ES DRAIN TO CNDSR 1A FROM HP EXH	DISASSEMBLE AND INSPECT REPAIR AS NEEDED	9402443901	SL1-14	59478-4 59567-4 178731-4 178734-4	PO 14506 PO 14417 PO 13477 PO 13892	PUR	DELIVERY DATE 4/25/96

UPDATED AND SUBMITTED BY: MATERIALS MANAGEMENT - N. QUESADA

SL1-14 PURCHASING BACKLOG



SL1-14 PWO'S WITH A DELIVERY DATE PAST 4/29	267
REVIEWED BY MAINTENANCE	240
ACCEPTABLE DELIVERY	148
NUMBER TO EXPEDITE	92
OP's REVIEW "MUSTS" TO WORK	82
PWO'S CANCELLED	

FOR FULL EXCEPTION LISTING REFERENCE
FILE F:\COMMON\NMMPSL\EXCEP48.XLS

	4/09	4/10	4/11	4/12	4/15	4/16	4/17	4/18	4/19	4/22
Previous Day's Backlog	235	208	196	146	119	124				
Incoming P.R.'s	44	43	13	24	30	22				
Line Items Ordered	71	51	61	50	25	40				
Line Items To P.E.		4	2	1						
Total Backlog	208	196	146	119	124	106				

104