UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 20 1986

Docket No. 50-458

MEMORANDUM FOR: Walter R. Butler, Director
BWR Project Directorate No. 4
Division of BWR Licensing

FROM: Stephen M. Stern, Project Manager
BWR Project Directorate No. 4
Division of BWR Licensing

SUBJECT: RIVER BEND SITE VISIT AND FOLLOW-UP

Introduction

Members of the staffs of the Offices of Nuclear Reactor Regulation (NRR), Inspection and Enforcement (IE) and Region IV conducted a site visit at the River Bend Station, Unit No. 1 (RBS) on January 28-30, 1986.

The purpose of the site visit was to review the circumstances surrounding events reportable to NRC under 10 CFR 50.72 as well as examine the implications of these events on future operability of River Bend and other BWR-6/Mark III plants. Of particular concern to the staff were reportable events involving loss of offsite power, the feedwater system as well as the number of events in the limited time since initial criticality (10/31/84). Attachment 1 is the staff letter to the licensee defining the agenda for the site visit.

Summary of Findings

During the site visit, the staff held extensive discussions with the licensee concerning the circumstances surrounding the reportable events and the licensee's remedial actions. The staff observed a turnover between operating shifts, observed the licensee's conduct of surveillance test procedures and toured the feedwater system, diesel generators, control room and an electrical substation.

The licensee and staff discussed the licensee's management program to resolve operating problems; the licensee's assessments of reportable events and scrams; the licensee's assessment and corrective actions with regard to; a loss of off-site power event, other power systems events, feedwater system problems, reactor water cleanup and standby-gas treatment systems (see Attachments 4-14).

The staff concluded the following:

(1) The licensee is implementing a project management system to address problem areas as they develop. The project management system apparently allows marshalling and focusing of licensee resources on priority projects as well as providing accountability for results. Senior management (vice presidential level) appears to be directly involved in prioritization and review of tasks.

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(2) The licensee has had a series of events associated with mishaps in use of electrical jumpers to isolate certain circuits during surveillance testing. Although the licensee met the guidance of IE information notice 84-37, additional and stronger controls have been implemented. These include a tight jumper control program, involving controlled access to electrical panels and control of individual jumpers through tagging and log book entries.

(3) The licensee has taken prompt action in response to a loss of offsite power event caused by radio frequency interference (RFI) in an electro-optical circuit at a power substation. In addition to implementing procedural controls and improved training, the licensee is shielding the vulnerable areas of the substation. The licensee has also instrumented the substation to enable prompt diagnosis of any future RFI event.

(4) The staff expressed concern over the operation of the feedwater system at River Bend. Control valves apparently are not functioning smoothly, and the control room lacks direct indication of feedwater control valve position. The licensee informed the staff that feedwater system improvements are a high priority task. Furthermore, since the site visit, the licensee has informed Region IV that they do not plan to operate above 35% power (except for one test of a short duration at approximately 41% power) until the feedwater system is functioning smoothly. Region IV will continue to follow up on this item.

(5) The staff has generic concerns with problems occurring at RBS on the Riley temperature switches in the Reactor Water Clean Up system (RWCU). Similar problems have occurred in other recently licensed BWRs. IE is following up on the generic implications. Since the site visit, General Electric has agreed with IE to issue a SIL on these Riley switches.

(6) The staff has generic concerns with installation/maintenance of a large motor operated valve in the feedwater system. On January 6, 1986, the licensee found that the valve operator (Limitorque SMB-4) had backed off the valve and was lying on the floor. The licensee asserts the cause was conflicting and possibly inadequate torquing instructions from the vendor and manufacturer. Region IV conducted a follow-up visit and IE will issue an information notice on this matter.

(7) The staff raised concerns over transfer of lessons learned from other plant startup experience to RBS. In particular, the staff believed the licensee should have been aware of problems at the plant with Riley temperature switches and jumper problems associated with the use of alligator clip jumpers. We will suggest that the NRR project management staff should advise all BWR license applicants, in particular BWR-6 applicants, to learn lessons from RBS and other recent plant startups. These lessons learned should involve information exchange among instrumentation and control technicians as well as plant management.

(8) The staff suggested that the licensee pursue elimination of their temporary alteration system as well as examine the operation of their annunciators in the control room.

(9) The staff was impressed with the formal and informal communications among operators and supervisors during shift turnover and with the participation of plant management in shift turnover.

(10) The staff suggested that the licensee identify operational problems with the RBS Technical Specifications and offered to work with the licensee to fine tune the Technical Specifications with an objective of enhancing safety. As an example, the staff raised the issue of the necessity of monthly RWCU surveillances (as required by the Technical Specifications).

(11) The licensee commented on the design of the start-up test program. The licensee asserts that the current start up program requires extensive operation at low power levels. Furthermore, the licensee states that at these low power levels, the reactor is operating in a range it was not designed to operate in, and systems are receiving excessive wear and tear. The staff referred to the accelerated start-up program at Hope Creek and advised the licensee to work with the NSSS vendor, other BWR applicants and/or BWR owners group to develop a proposal on a modified start up program which would then be assessed by the staff.

In summary, the staff complimented the licensee on a good management program to identify and correct problems as they develop. The licensee appeared to act promptly to correct the offsite power loss incident. The staff expressed concern with the operation of the feedwater system. The staff advised the licensee to maintain the open reporting of events that has characterized the start-up program. The staff and licensee will meet again in about a month at Region IV to review progress particularly on feedwater system operation.

Stephen M. Stern, Project Manager
BWR Project Directorate No. 4
Division of BWR Licensing

Attachment: As stated

cc: See next page

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ATTACHMENTS

The attachments to this trip report provide:

1. NRC letter to licensee on site visit with agenda (Attachment 1).
2. Staff (IE, NRR) comparative assessment of events reportable under 10 CFR 52 and LERs (Attachment 2).
3. Licensee's task prioritization criteria (Attachment 3).
4. Licensee's functional description of a task program manager (Attachment 4).
5. Licensee's LER trending assessment and case-by-case assessment of scrams (Attachment 5).
6. Licensee's investigation, analysis and corrective action for River Bend Station January 1, 1986 loss of offsite power (Attachment 6).
7. Licensee's assessment of hardware related events (Attachment 7).
8. Licensee's description and remedial actions for:
   - Vibrating condensate piping (Attachment 8).
   - Feedwater pump problems (Attachment 9).
   - Feedwater mini-flow recirc. lines (Attachment 10).
   - Feedwater long cycle recirculation (Attachment 11).
   - Feedwater valve problems (Attachment 12).
9. Licensee's corrective actions on reactor water clean up (RWCU) and standby gas treatment systems (Attachment 13).
10. Licensee's comparative assessment of LERs and scrams (Attachment 14).
11. List of attendees at NRC, licensee meeting of 1/29/86 (Attachment 15).

Attachments 3-14 were presented to the staff by the licensee at a 1/12/86 meeting during the site visit. Attachment 2 was given to the licensee on January 28, 1986.

ATTACHMENT 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 15 1986

Docket No.: 50-458

Mr. James C. Deddens
Vice President
River Bend Nuclear Power Station
Post Office Box 220
St. Francisville, LA 70775

Dear Mr. Deddens:

SUBJECT: SITE VISIT

In a recent telephone conversation, Mr. R. Bernero, NRC's Director of BWR Licensing, discussed with Mr. Cahill of Gulf States Utilities the staff concern over the number of events at the River Bend Station reportable to NRC under 10 CFR 50.72.

The staff's concern is that these events could represent precursors to more significant problems for operations at not only the River Bend Station but also in a generic way for other plants of the same BWR-6/Mark III class.

Accordingly, we plan to have a few members of the headquarters and Region IV staff visit the River Bend Station for two or three days beginning on January 29, 1986.

The objective of this visit is to examine the various circumstances surrounding these events. Enclosures 1 and 2 are the proposed agenda and time table for this site visit. We intend to review the circumstances associated with these events during meetings with your staff and review any reports that might have been prepared on these events. In addition, we expect to visit the immediate vicinity of the areas where the events occurred and discuss the circumstances of the events with your operating staff. Enclosure 3 is the list of headquarters and Region IV staff who will be participating in this site visit.

Please contact the NRC Project Manager, Stephen Stern, for any clarification or further discussion on this topic.

Walter R. Butler

Walter R. Butler, Director
BWR Project Directorate No. 4
Division of BWR Licensing

Enclosures:
As stated

cc w/enclosures: See next page

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Enclosure 1

AGENDA

MEETING WITH GULF STATES UTILITIES
REVIEW OF EVENTS RELATED TO THE STARTUP OF RIVER BEND STATION

JANUARY 29 AND 30, 1986

1. Review causes of plant scrams since issuance of low power license

2. Review causes of plant loss of offsite power incidents since issuance of low power license

3. Review of licensee selected reportable events in accordance with 10 CFR 50.72

4. Human Factors Related Events

   - Licensee evaluation of human factor related events - particularly those involving: wire jumpers, reactor water cleanup system (RWCU) and events with causes unknown

   - Licensee corrective actions - short term and long term

   - Instrumentation and control-qualifications, training and management control

5. Procedure Related Events

   - Licensee evaluation of procedure inadequacies, particularly those related to RWCU

   - Procedure for jumper controls

   - Licensee corrective actions - short term and long term

   - Formulation, indepth safety review and management control of procedures

6. Hardware Related Events

   - Licensee evaluation of hardware/system problems in the following areas:

     a) Power systems including switchyards

     b) Feedwater systems

     c) RWCU

     d) Standby gas treatment

   - Licensee corrective actions for each system, both short term and long term

   - Licensee process for identifying, correcting and maintaining management control over specific hardware system problem areas

Enclosure 2

REVIEW OF REPORTABLE EVENTS DURING STARTUP TEST PROGRAM

RIVER BEND STATION

JANUARY 29 AND 30, 1986

January 29th

8:00 - 9:00	NRC Meeting - Resident's Office
9:00 - 1:00	Licensee Presentation (See Enclosure), discussion
2:00 - 4:00	Plant Tour
4:00 - 5:00	NRC Meeting - Resident's Office

January 30th

8:00 - 8:30	NRC Meeting - Resident's Office
8:30 - 12:00	Plant Tour (continued)
12:00 - 2:00	NRC Working Lunch
2:00 - 3:00	Exit Meeting with Licensee

Enclosure 3

NRC SITE VISIT TEAM

NAME	NRC OFFICE
Stephen M. Stern	NRR
Scott Newberry	NRR
Richard Becker	NRR
Edward Chow	NRR
Richard Bennett	Region IV
Johns Jaudon	Region IV
Dwight Chamberlain	Region IV
Eric Weiss	IE

Mr. William J. Cahill, Jr.
Gulf States Utilities Company

River Bend Nuclear Plant

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Evaluation of River Bend Startup Experience

The staff has raised concerns over the frequency of reportable events during startup at River Bend Station. River Bend Station, a BWR-6 with a Mark III containment, received a low power license on August 29, 1985 and a full power license on November 20, 1985.

In order to place the operating experience in perspective, River Bend's operating experience was contrasted with that of Grand Gulf and Limerick at similar stages of their startup programs. Grand Gulf is the only other operating BWR-6; Limerick is a BWR-4.

A quick evaluation of readily available data* indicates the following (see Figures Ia & Ib):

- River Bend experienced a similar number of events during the low power authorization-to-initial criticality phase of their startup program as Limerick and Grand Gulf. The duration of this phase of the startup program at the three plants was similar--about two months.
- River Bend experienced a significantly smaller number of events during the initial criticality-to-full power authorization phase of startup than Limerick and Grand Gulf. However, the duration of this phase of startup at River Bend was less than a month, contrasted to about seven and one-half months at Limerick and twenty-five months at Grand Gulf.
- River Bend is experiencing a somewhat greater number of events since full power authorization than the comparable phase of startup at Limerick and Grand Gulf. The duration of this phase from full power authorization-to-20% rated power was similar at all three plants--about one month.
- Evaluated on a month-by-month basis, River Bend is experiencing a larger number of events during the time period near full power authorization (Figures II & III). The number of scrams is similar to those of Grand Gulf, but greater than Limerick's during this period (Figure IV).

Both the licensee, Gulf States Utilities, and the staff are exercising increased vigilance on the River Bend startup program. A joint NRR, IE and Region IV team will visit the site beginning on January 28, 1986 with an emphasis on increasing our understanding of the startup program and determine any insights which can be applied to the other BWR-6 plants still in the licensing process.

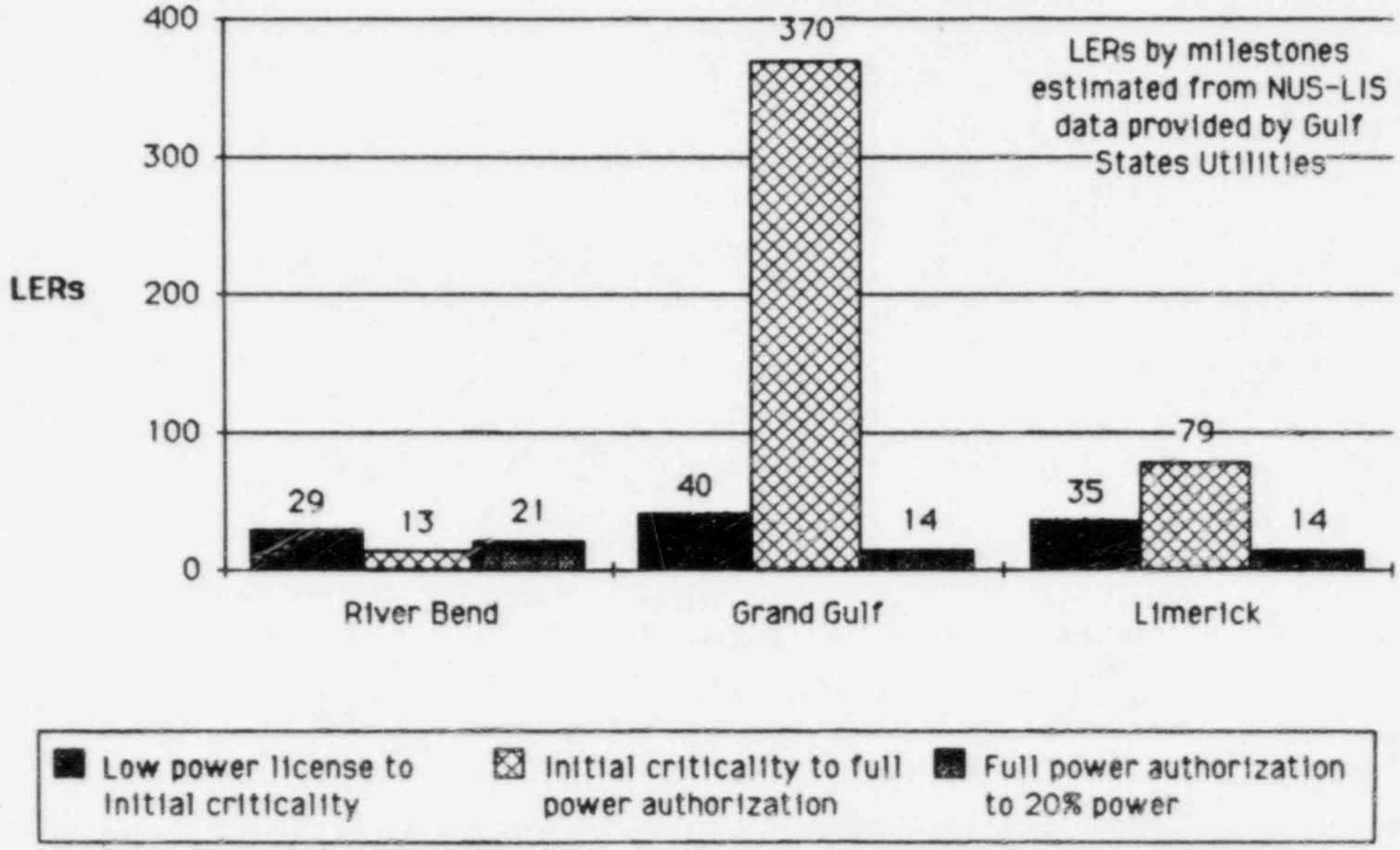
Stephen M. Stern
River Bend Project Manager
NRR/DBL/PD#4
January 24, 1986

*Data was used from a variety of sources-see Analysis Notes

Figure 1A

Comparison of LERs

Tabulation by Milestone.

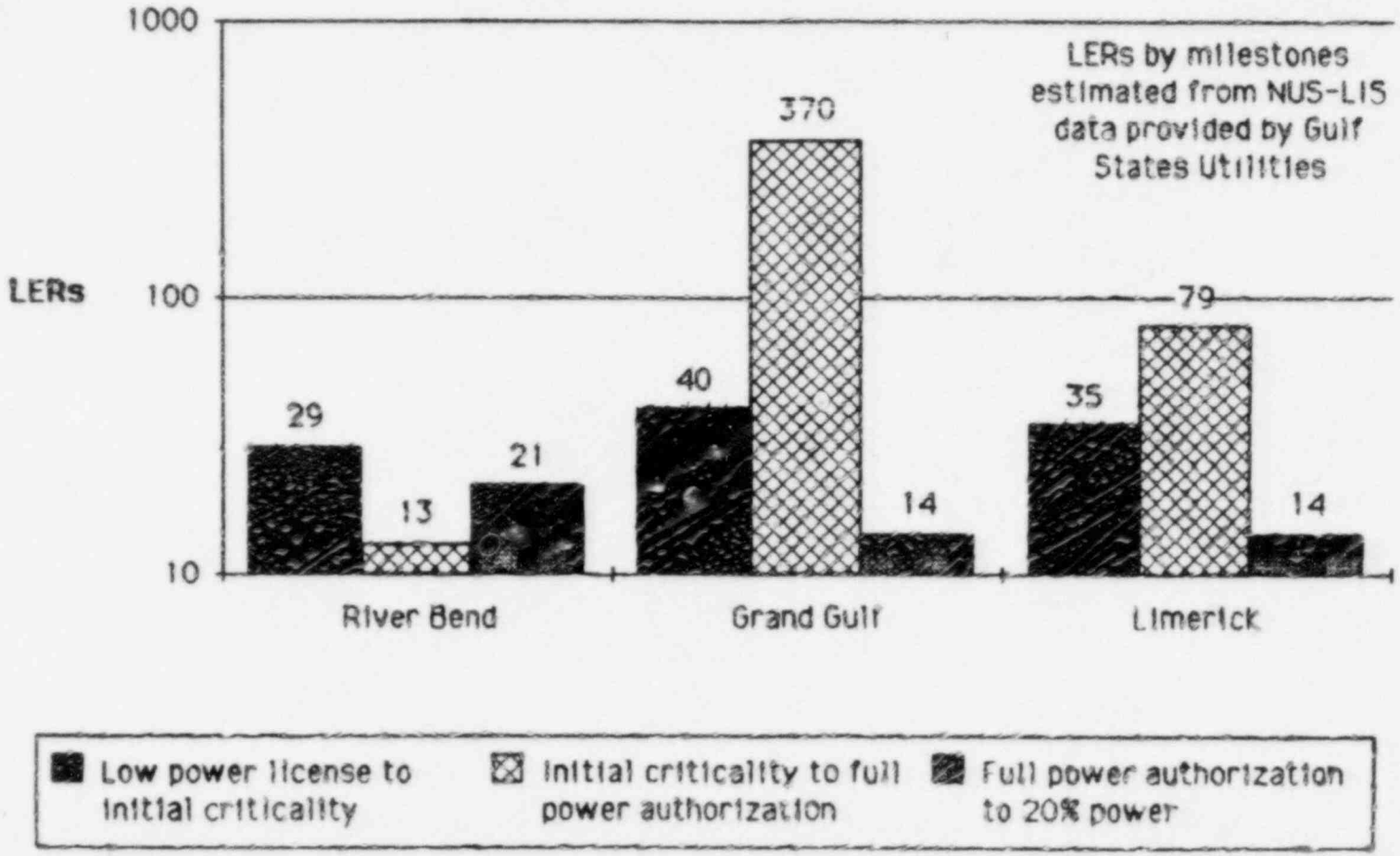


Stephen M. Stern; River Bend Project Manager, NRR/DBL

Figure 1B

Comparison of LERs

Tabulation by Milestone

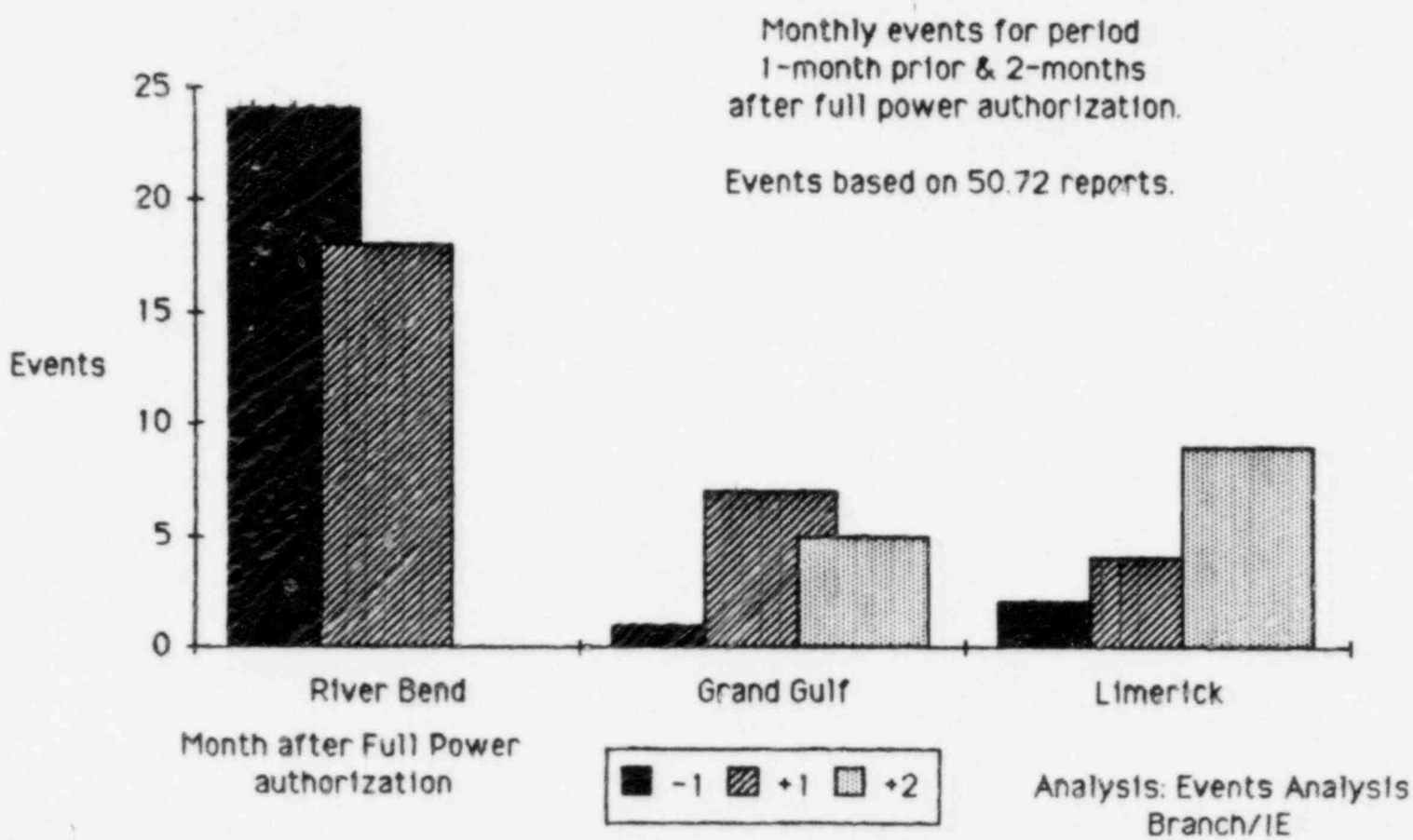


Stephen M. Stern; River Bend Project Manager, NRR/DBL

Figure 11

Comparison of Reportable Events

Tabulation by Month



Stephen M. Stern; River Bend Project Manager, NRR/DBL

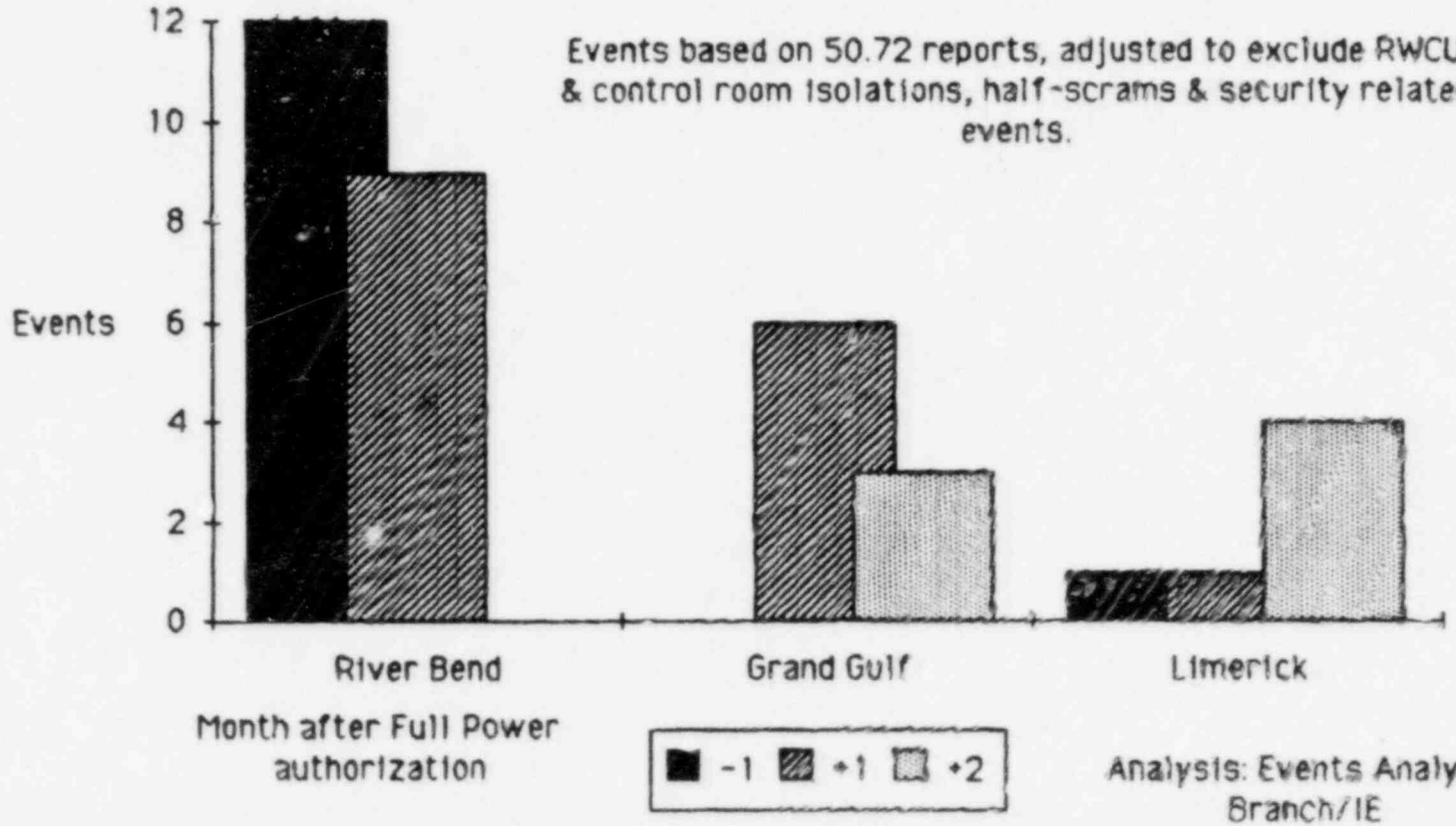
Comparison of Reportable Events

Figure III

Tabulation by Month

Monthly events for period 1-month prior & 2-months after full power authorization.

Events based on 50.72 reports, adjusted to exclude RWCU & control room isolations, half-scrams & security related events.



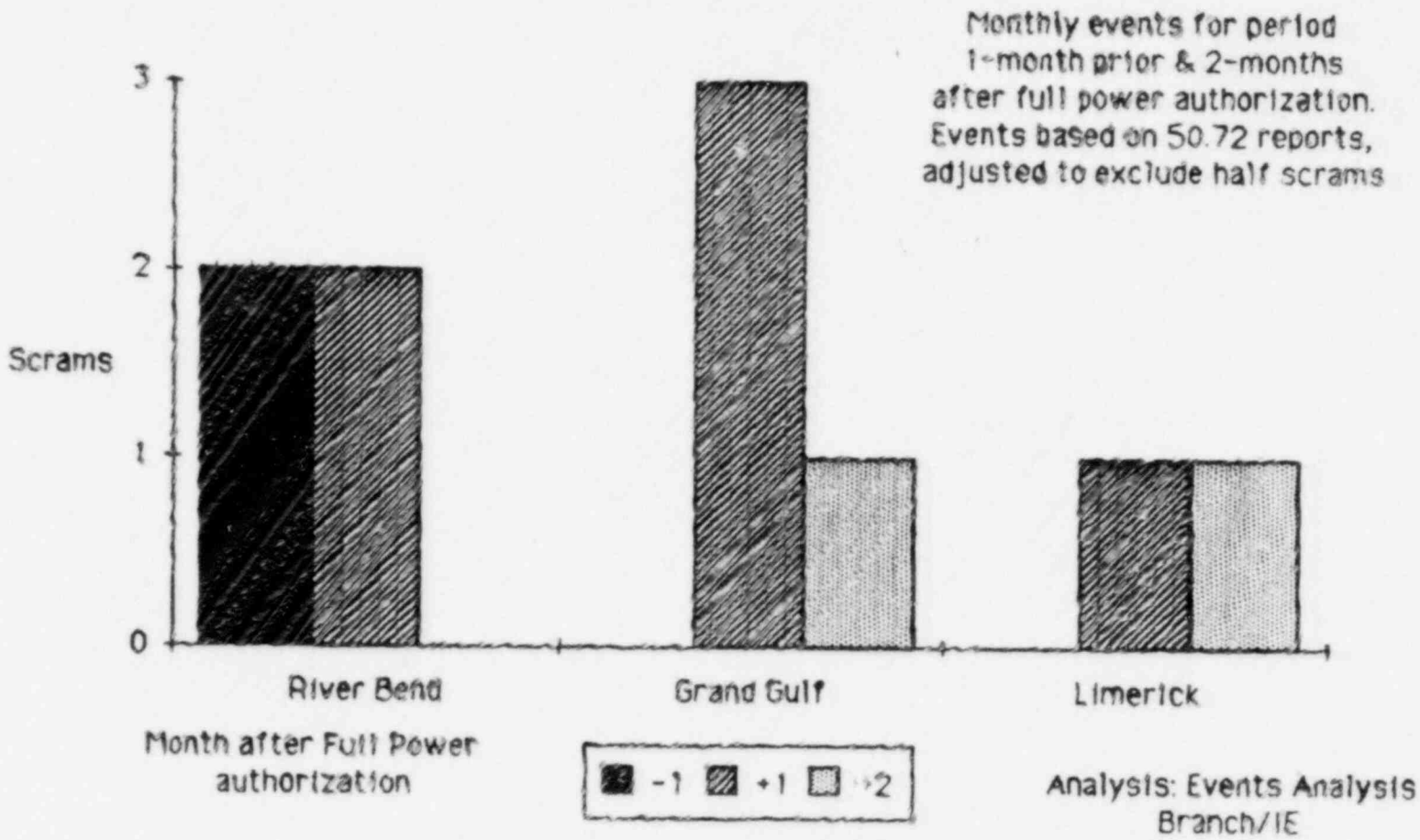
Analysis: Events Analysis Branch/IE

Stephen M. Stern; River Bend Project Manager, NRR/DBL

Comparison of Scrams

Figure IV

Tabulation by Month



Stephen M. Stern; River Bend Project Manager, NRR/DBL

Analysis Notes

Two approaches were selected for this comparative assessment of operating experience:

- By similar milestone intervals during startup
- By comparable monthly statistics during startup

The objective was to gain a quick understanding of events at River Bend, not to perform a definitive analysis. Therefore, emphasis was placed on a *quick* evaluation of *available* data.

The IE Events Analysis Branch responded with an evaluation of monthly statistics of startup at the three plants on the basis of events reported to NRC according to 10 CFR 50.72 (Attachment). These 50.72 reports are current, but sketchy--the more definitive LERs are not available until about one month after an event. Given the need for a real time assessment on ongoing development at River Bend, the 50.72 reports were the obvious candidate. The IE analysis included filtering event data for RWCU & control room isolations, half scrams and security related events as well as a rough assessment of the cause of the events (see Figure V and the attachment).

The Licensee, Gulf States Utilities, provided a monthly count of LERs at the three plants using the NUS License Information System. This data was provided to this author by phone on January 23, 1986.

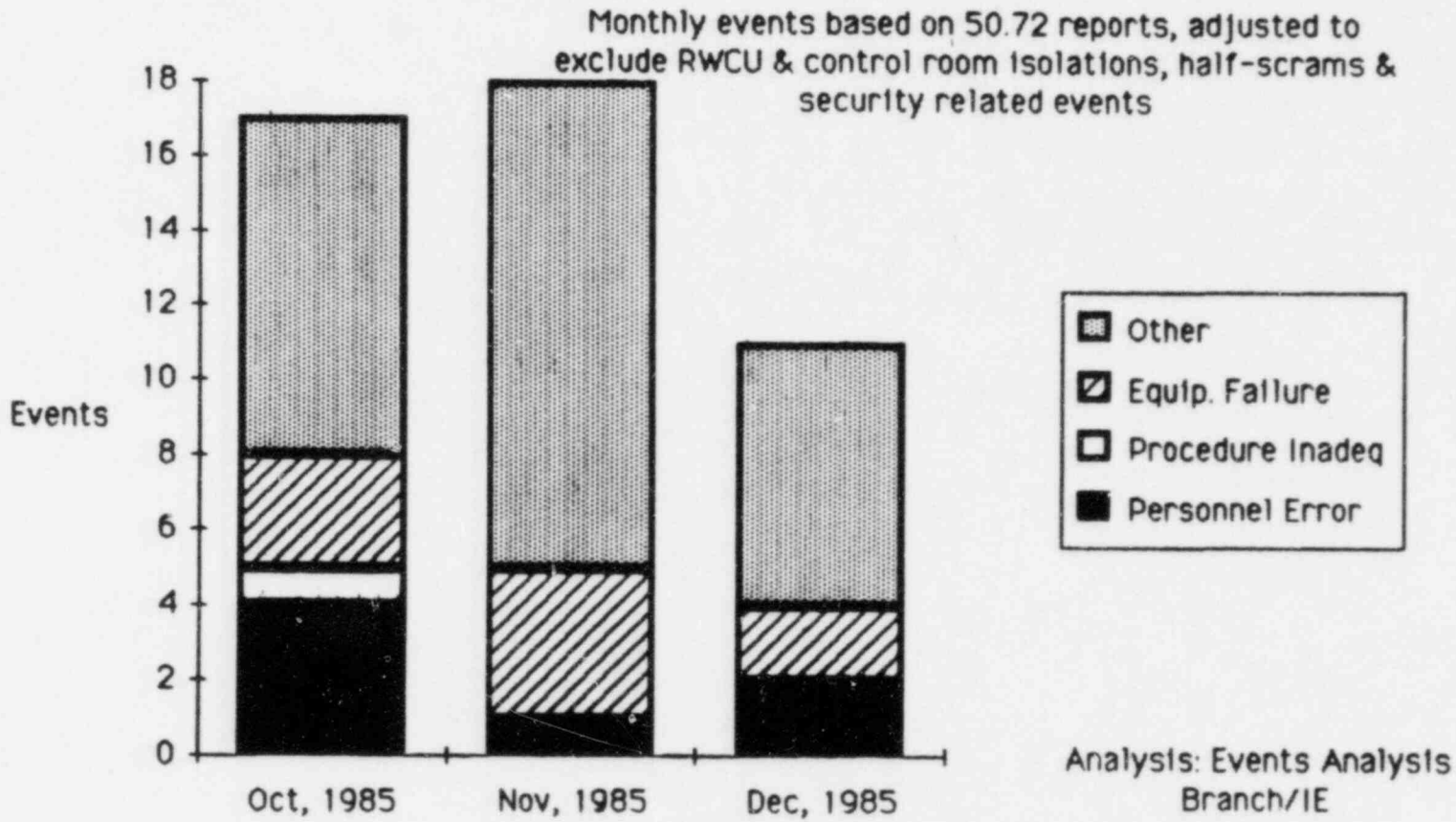
The applicable dates used for the tabulation by milestone for Figures Ia & Ib are:

Plant	Low Power License	Initial Criticality	Full Power Authoriz'n	20% power (first time)
River Bend	8/29/85	10/31/85	11/20/85	12/30/85
Limerick	10/26/84	12/22/84	8/8/85	~9/11/85
Grand Gulf	6/16/82	8/8/82	8/31/84*	11/17/84

*Grand Gulf full power authorization was 8/84 --the full power license was issued 11/84

Figure V

River Bend - Reportable Events



Analysis: Events Analysis Branch/IE

Stephen M. Stern; River Bend Project Manager, NRR/DBL

ATTACHMENT 3

Priority I: Issues that are complex and/or large and presently have or will have a negative effect within 30 days in one or more of the following areas:

a) Regulatory Compliance - Technical specification violations, commitment violations, etc.
b) Operations - Forced outage, large scale abnormal operation or abnormal recovery from a scram or transient.
c) Resource Expenditures - dollars or man-hours

Priority II: Issues fitting Priority I criteria except effects will occur after 30 days.

Priority III: Other issues of scope and complexity to cut across deportment interfaces and sufficient exposure to require management overview.

FUNCTION OF TASK PROGRAM MANAGER

MISSION: Manage closure of specified operational issues on schedule.

SPECIFIC RESPONSIBILITY:

1. Assure issues are defined, their scope established and the consequences understood.

2. Establish mutually agreed upon priority.

3. Develop mutually agreed upon action plan and deliverable products/services to close issues.

4. Develop work performance schedules with commitments by managers providing resources.

5. Monitor progress of work against schedule. Establish work around programs for problems as they develop.

6. Obtain agreement that deliverable products/services have been completed and issued resolved.

A computerized Licensee Event Report (LER) trending system has been developed for use at River Bend Station. This system provides trend information regarding "root-cause" of the incident i.e., hardware deficiencies, procedure problems, personnel error, external or other. These major classifications are further divided as follows:

A. Hardware Deficiencies

1. Failure
2. Design
3. Construction
4. Installation
5. Other

B. Procedure Problem

1. Inadequate
2. Other

C. Personnel Error

1. Error in performing procedure
2. Miscommunication
3. Inadvertent error
4. Other

D. External

1. Fire
2. Tornado
3. Hurricane
4. Other

E. Other

As of JAN 24, 1986 a total of 74 Licensee Event Reports have been identified.

These LER's resulted from:

1. ESF actuations 57 (Note: 24 of the 57 ESF actuations involved RWCU isolations.

2. Miscellaneous 17.

ROOT CAUSE TRENDING

Of the 74 Licensee Event Reports.

a. 38 involved hardware deficiencies

1. Failures 11
2. Design 23
3. Construction 4
4. Installation 0
5. Other 0

b. 13 involved procedure problems

1. Inadequate 13
2. Other 0

c. 22 involved personnel error

1. Error in performing procedure 2
2. Miscommunication 0
3. Inadvertent Error 20
4. Other

d. External Causes 0

1. Fire 0
2. Tornado 0
3. Hurricane 0

e. Other causes (Indeterminate) 1

SCRAM	DATE		CAUSE
85-01	11/14/85	Manual "Training" Scram	- LCO for missing structural supports.
85-02	11/21/85	RFP Lube oil temperature control RFP Discharge MOV torque settings	- RFP tripping and inability to open the discharge valve on two RFP's resulting in low level.
85-03	11/28/85	Condenser vacuum broken due to Turbine vibration (initial roll)	- IRM scram on increased reactivity from feedwater injection.
85-04	12/06/85	Scheduled Loss of Offsite Power Test	
85-05	12/24/85	RFP lube oil temperature control RFP discharge MOV torque settings	- Low level due to inability to line up a feedwater pump to inject.
85-06	12/31/85	Lightning strike/Failed pressure sensor	- Main generator power load unbalance.
86-01	01/01/86	Spurious FW heater high level and low MOV overload setting	- Loss of Condensate pump flow to RFP's resulting in low level.
86-02	01/07/86	Inadvertent deluge activation	- Shorted 480V transformer causing loss of pressure control and IRM scram.
86-03	01/15/86	Unindicated failed open level control valve	- Feedwater regulating valve stuck open with indicated demand full closed. High level scram.

SCRAM #85-01

At 1200 on November 13, 1985 with unit in operational condition 2 (startup) and at approximately 2% power, a discovery was made by plant personnel that installation and erection of supplemental steel support in piping tunnels G and H was not complete. This missing Category I structure affected the safety-related piping of the Standby Service Water system.

Immediate corrective action was taken. Trains A and B of SSW were declared inoperable, a plant shutdown was commenced per Technical Specification 3.0.3 and maintenance personnel began to install (MR 85-0924) the missing structural steel supports. At 0000 hours on November 14, 1985 repairs had not been completed and the reactor was manually scrammed to comply with Technical Specifications. By 2100 on November 14, 1985 the necessary work was complete and Standby Service Water system trains A and B were declared operable.

As discussed in LER 85-033, all open items on safety-related building punch lists were reviewed in detail to ensure that all items which impacted the design basis of the unit were identified and appropriate action taken. This event was identified as a result of that review.

SCRAM #85-02

On November 21, 1985 at 0025 with the unit in operational condition 2 (startup), Reactor Feedwater Pump (RFP) B tripped for unknown causes. The operator restarted the pump and restored reactor water level to normal. In order to investigate the cause, RFP C was started with its discharge Motor Operated Valve (MOV 26C) left shut in the event RFP B tripped again. At 0117 RFP B tripped when its auxiliary oil pump was secured. The operator mistakenly believed that a normal oil supply was available. An attempt to open the discharge MOV for RFP C failed with the valve motor torqueing out. RFP B and its auxiliary oil pump was restarted, but an attempt to open its discharge valve also failed. At 0123 the reactor scrammed when level decreased to the low level scram setpoint. Reactor Core Isolation Cooling (RCIC) was manually started to restore reactor level. At 0127 the RFP B discharge valve was opened and RCIC secured.

The cause of the initial RFP B trip is believed to have resulted from a main oil pump trip on overload due to low oil temperature. Low oil temperature results from the lack of automatic temperature control and fluctuates due to changing service water temperature.

Investigation into the inability to open RFP B and C discharge valves determined that the cause was due to high differential pressure across the discharge valves. This would result when the feedwater to condenser recirculation valve (FV104) is open as it was in this case to aid in reactor level control.

As of December 25, 1985 the cause of the discharge valve breaker tripping has been determined to be incorrect torque switch settings in conjunction with the high differential pressure. These switch settings have been adjusted.

NOTE: The RFP B trip would probably have recurred due to low oil temperature even if it had not been tripped by operator action.

SCRAM #85-03

On November 28, 1985 at 1845 with the unit in operational condition 2 (startup), the reactor scrammed on Intermediate Range Monitor (IRM) upscale trip. During a turbine roll the number 3 bearing was showing signs of high vibration forcing the turbine to be manually tripped at 1821 hours on November 28, 1985. At this time the number 1 turbine bypass valve was 30 percent open. In anticipation of breaking condenser vacuum reactor power was reduced. At 1833 condenser vacuum was broken to accelerate braking of the turbine. At 1840 the turbine bypass valves were tripped closed on low vacuum and reactor pressure began to increase slowly. As Main Steam Line drains were opened to reduce reactor pressure the level swell caused the feedwater level control valves to shut. Additionally, the increased voids caused power to decrease and the IRMs were down ranged to keep flux levels onscale.

As the pressure reduction slowed and level decreased the feedwater level control valve began to open. With reactor pressure nearly stable and with cold feedwater entering the vessel, reactor power began to rapidly increase. The reactor operator, having previously down ranged the IRMs, was unable to range up the IRMs in time to prevent a reactor trip.

SCRAM #85-04

On December 6, 1985 at 2234 a scheduled automatic scram was initiated per ST-31 (Loss of Of'site Power).

SCRAM #85-05

On December 24, 1985 at approximately 2120 with the unit in operational condition 2 (1% power) Reactor Feedwater Pump (RFP) C was manually tripped after approximately 30 minutes of operation due to oil spraying from the gear reducer seals. RFP B was started and the discharge valve failed to open. RFP A was then started, with its discharge valve opening, as the low level scram setpoint was reached (2123).

The cause of RFP C gear reducer seal failure is attributed to inadequate lube oil cooling water flow. This flow is manually adjusted to control oil temperature. Procedural steps were not adequate to ensure close monitoring of oil temperature and subsequent adjusting of cooling water flow after the pump is started.

Investigation into the inability of RFP B discharge valve to open determined the cause to be high differential pressure and incorrect torque switch settings.

As a result of this event and investigation, all three Reactor Feedwater Pump Discharge valves torque switch settings have been adjusted. Procedural changes have been made to require close monitoring of oil temperatures on Reactor Feed Pump starts and routine periodic checks by equipment operators. Additionally, design changes to the lube oil cooling system and temperature monitoring system have been initiated.

SCRAM #85-06

On December 31, 1985 at 1015 with the unit in operational condition 1 (20% power), a Reactor Scram occurred due to activation of the Main Generator Power to Load Unbalance circuity. Prior to the event the Turbine Load Sensor (a steam pressure sensor) had failed and a Maintenance Work Request was written. Following the incident the pressure sensor for turbine load was found to be failed high.

At the time of the trip, a GSU electrical system transient was generated by a lightning strike on a 500 KV line south of Willow Glen Station resulting in downing a line carrying 195 MWe. At the time RBS was generating 190 MWe. This transient caused the generator rate of-Current Change Sensor to trip in the Power to Load Unbalance Circuitry. Combined with the high input from the Turbine Load Sensor, a Turbine Control Valve fast closure signal was generated. The fast closure caused a hydraulic system pressure fluctuation resulting in a low EHC pressure Turbine Trip. The ensuing reactor pressure spike caused a Reactor Scram.

SCRAM #86-01

On January 1, 1986 at 0354 with the unit in operational condition 1 (19% power), a Reactor Scram on low level occurred due to loss of all FW flow. Apparently a spurious high - high level in 5th PT heater A was received causing heater string A to isolate. Heater string B had previously isolated and went undetected. It is believed to have been caused by a similar spurious signal which may have caused the A heater string to isolate. The low pressure heater string bypass valve failed to auto open on either A or B heater string isolation. Its breaker was found tripped. This resulted in complete isolation of condensate flow to the feed pumps and a loss of feed water flow to the vessel.

After throughly investigting all the associated instrumentation and logics and finding no apparent problems, it was determined the probable cause to be flashing in the pots causing high level spikes. Failure of MOV-136, low pressure heater string bypass valve to open was investigated. It is speculated that during system heatup the bypass valve may have bound and caused the motor overload. Its motor overload was reset to its upper current limit having been found at its lower limit.

These level transmitters have been instrumented with strip recorders to monitor for similar occurrences. MOV-136 heater string bypass is left opened until 15% power to ensure system heatup does not cause valve binding, which may have lead to its breaker tripping. Human factors design changes to highlight heater level alarms and trip indicators for MOV-136 have been initiated.

SCRAM #86-02

On January 7, 1986 at 0856 while operating at approximately 3% power a contruction employee was attempting to open a fire detection supervisory panel door to rework a penetration seal. Believing the door had been unlocked, he attempted to open it by turning an unmarked switch just above the door handle. This unmarked switch initiated a water curtain (deluge) spray system which inundated NJS-LDC1A causing a fault and tripping NPS-BKR16. This breaker also fed two other non-safety related switchgears. The hydraulic pump which supplied the turbine bypass valves tripped and caused the bypass valves to fail closed.

As the main steam line drains were opened to reduce the increasing reactor pressure (peaked at 1015 psig) and rods were being inserted, the IRMs were down ranged to maintain onscale readings. Subsequent level changes and sudden cold feedwater injection caused a rapid increase in IRM readings to the scram setpoint.

All local fire detection supervisory panels with deluge system switches will be modified. A hinged plexiglass cover will be fabricated for these switches and installed at these local panels. Additionally, labeling for the switches is being verified.

The NJS-LDC1A fault was caused by water dripping through un-sealed cabinet penetrations on elevation 141'. The water cascaded through these penetrations onto the top of this load center which is located one floor below. As a result, water entered the transformer and caused a fault condition. Corrective action for this situation is to seal the penetractions.

This work should be completed by April, 1986.

SCRAM #86-03

On January 15, 1986 at 0329 with the unit in operational condition 1 (17% power) a Reactor Scram and Turbine Trip occurred due to high Reactor Vessel water level. The Reactor Feed Water System was in a normal lineup with RFP B maintaining level using the startup feed water regulating valve in automatic. All main Feed Water Regulating valves (A,B,C) were in manual and indicating closed on their controllers in the Control Room (the indication is of demand to the AOV and not position). Feed Water Regulating valve inlet isolation valves (1FWS-MOV27A, B, C) were also closed.

While preparing to line up one of the main Feed Water Regulating valves, the operator placed the control switch for B inlet isolation (1FWS-MOV27B) to the open position per the applicable Station Operating Procedure. When 1FWS-MOV27B started to come open, reactor vessel level increased rapidly to the reactor scram and turbine trip setpoint (approximately 6 seconds). The Reactor Feed Pump tripped and the reactor scrammed on high level.

Upon investigation, it was found that B Feed Water Regulating Valve was actually stuck 70% open and not closed, as indicated in the Control Room. A prompt MWR was written to begin investigation of the valve malfunction and the valve is currently under repair.