

1-28-86

INVESTIGATION, ANALYSIS AND CORRECTIVE ACTION
FOR
RIVER BEND STATION
JANUARY 1, 1986 LOSS OF OFFSITE POWER

PURPOSE

The purpose of this report is to describe the investigations, analysis and corrective actions that have been taken by Gulf States Utilities prior and subsequent to return to power for the January 1, 1986 loss of offsite power. The loss of offsite power is documented in Condition Report 86-0003 of January 1, 1986 (Attachment 1, pages 1 through 10). In addition, this report documents the "Subsequent Actions After Return to Power" to assure that within reasonable certainty the conditions will not recur. This report serves as that action and as input to Item 9 of the Condition Report with the completion of the outstanding work described herein.

SUMMARY

A loss of offsite power (LOP) was experienced at the River Bend Station (RBS) on January 1, 1986. This is documented via Condition Report No. 86-0003 and via the Notification of Unusual Event (NOUE), GSU to NRC letter RBG-22,911 of January 2, 1986 (Attachment 2). It will also be addressed in Licensing Event Report 86-002.

Gulf States Utilities has investigated and carefully reviewed the event and has concluded with "high probability" that it was caused by radio frequency interference with the tone equipment backup relaying between the plant and Fancy Point substation.

Corrective actions for the root cause have been taken and additional actions are in progress as described below. There is no unreviewed safety question.

DISCUSSION AND ACTIONS

The following is intended to describe in a chronological order, as nearly as practical, the actions taken subsequent to the loss and restoration of offsite power to the plant on January 1, 1986 and additional actions underway to assure, with a high degree of confidence, that a loss of offsite power (LOP) will not recur in the future. In the discussion, the justifications and rationale are presented.

GSU Vice President, Jim Deddens, conducted a briefing meeting the first thing on January 2, 1986, subsequent to the LOP on January 1. Don Reynerson, Director NuPE, was directed to form a task force to investigate the LOP as directed by Mr. Deddens' January 2, 1986

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memorandum (Attachment 3). The directions were to diagnose, recommend corrective actions for return to power and recommend changes and improvements to prevent future occurrences.

The task force met several times and conducted tests on both January 2 and 3, 1986. There were no protective relaying initiating targets which would indicate that an actual fault had occurred. Through further investigation of the pilot wire relaying and circuits, no misoperations were found. Both the tone and pilot wire systems functioned as designed during followup testing.

Since the initial testing of the pilot wire and tone transfer trip circuits verified that the equipment was operating properly, tests were conducted, using the four and five watt radio transmitters as used by Operations and Security personnel and a 100 watt mobile radio, to determine the equipment susceptibility to radio frequency interference (RFI). Although keying of the 100 watt mobile unit outside the Fancy Point substation control building had no effect on the equipment, keying of the four and five watt transmitters inside the control building repeatedly produced trip signals.

The task force has been unable to show conclusively that anyone was inside the Fancy Point control building at the time of the first trip (09:41). Operations personnel were in the area during the second trip (10:44). However, due to the now proven susceptibility of the tone transfer trip equipment to RFI, the task force has concluded with "high probability" that the trip was initiated by RFI causing the backup tone relaying equipment to be erroneously keyed and causing the LOP. This report is contained in pages 11 through 15 of Attachment 1.

The balance of this report addresses the corrective actions of the task force stated on pages 13 and 14 of Attachment 1, by Action Item number. It also identifies additional actions determined in pursuing those.

- I.A. Tony Fredieu, Assistant Operating Supervisor, confirmed on January 6, 1986 that all operating shifts had been notified via shift briefings not to take or use portable radios inside the Fancy Point substation building. The same effect was accomplished by Security on January 3 and 4, 1986 (see pages 16 and 17 of Attachment 1).
- I.B. Signs were posted on January 3, 1986 on all doors to the substation building and at the substation entrance gate restricting radio use beyond this point. On January 6, 1986 the sign at the gate was revised to indicate no radio use within the substation building to allow usage in the yard.
- I.C. An operator aid (page 15 of Attachment 1) was posted at both 1CES Panel 1F in the Turbine Building and 2CES Panel 1G in the Auxiliary Control Room on January 3, 1986 to provide instructions on how to reset the relay equipment.

I.D. The tone system was returned to service the evening of January 3, 1986.

The above were completed, or ongoing in the case of item I.A., prior to return to power.

Follow-up and implementation action was delegated to Greg Henry, Supervisor NuPF-EE. The follow-up task force consisted of:

- A. Bysfield (GSU/Tech Staff)
- G. Canfield (GSU/T&D Relaying)
- O. Cassidy (GSU/NuPE)
- R. Cole (GSU/Projects)
- L. Dopson (GSU/Beaumont Engr.)
- J. Ducote (GSU/T&D Communications)
- J. Hargrove (GSU/Beaumont Engr.)
- D. Powell (GSU/Beaumont Engr.)
- J. Reeves (GSU/Baton Rouge T&D)
- T. Shea (SWEC/SEG)

Still referencing pages 13 and 14 of Attachment 1 for item numbers, the following subsequent actions have or are being implemented with the schedule noted for outstanding items.

II.A. The training department added Fancy Point protective relaying as a two hour addition to License Requalification, the Hot License Operator Training and the Nuclear Equipment Operator Training (see Attachment 4). This training commenced the week of January 13, 1986 and will be completed on or before March 28, 1986.

II.B. The manufacturer of the tone equipment, G.E., claimed that they had heard of loss of guard, but not keying due to RF interference. Studies were performed and recommendations made to eliminate RFI interference (see pages 1 and 2 of Attachment 5). A purchase order was issued (Attachment 6) for the material to construct RF shielding around the tone equipment in the substation. No additional shielding is being added in the plant since the tone equipment is in a concrete walled room with metal doors.

INSTALL SHIELD STRUCTURE: R. Cole by January 31, 1986
INSTALL RF SHIELD: J. Ducote by February 12, 1986

II.C. A study was performed in April, 1984 in response to FSAR question 430.14 (8.2.1). The tone/fibre optic system was installed as a "diverse" method to provide plant to substation protective relaying control functions. This commitment was added to the FSAR via Amendment 13. This study was revisited considering the tone equipment as well as other backup relaying options (pages 3 through 6 of Attachment 5) with the recommendation that two tone

trip signals, instead of only one as was being used, be present for a transfer trip to be initiated. This provides the type 40 tone equipment added security against RF interference nuisance trips (LOP without actual fault). This work was accomplished by a Temporary Alteration. Modification Request MR-86-0081 (Attachment 7) was issued to document and make the fix permanent.

MR INTERDEPT. CHECKLISTS: R. Cole by January 28, 1986
REMOVE TEMP ALT: A. Bysfield by January 29, 1986

- II.D. Initial review of the d-c feeds to the tone equipment revealed that in some cases the power and keying had different battery sources for the same tone channel (see Attachment 8). The voltages could vary causing transients in the control circuits - especially if a battery charger was lost - possibly causing inadvertent signals. A Temporary Alteration was made to rectify this. In addition, a Modification Request MR-86-0026 (Attachment 9) was issued to document and make the fix permanent.

INTERDEPT. CHECKLISTS: R. Cole by January 28, 1986
REMOVE TEMP ALT: A. Bysfield by January 29, 1986

- II.E. The lock-up features of the tone relaying equipment was carefully reviewed by engineering and reported on Attachment 5, Item E, page 6 and Figure 2. By resetting 86-RxBB and/or 86RXPB first, the other 86 relays may be reset (Note: x is either 1 or 2, as appropriate). Thus, the Operator Aids described in Item I.C. above were revised and replaced with those shown on Attachment 10.

- II.F. Sequence of events recorders have been purchased for installation at both the plant and substation to monitor both pilot wire and tone equipment. The recorders are being installed to monitor status and trip signals not indicated by target relays (see Attachment 11). A purchase order has been issued for the equipment. Modification Request MR-86-0027 (Attachment 12) was issued to complete the plant raceway and cable work. An additional Modification Request MR 86-0098 (Attachment 16) was generated to perform the termination work. Installation cable termination will be completed in accordance with the following schedule:

MR INTERDEPT. CHECKLISTS: R. Cole by January 28, 1986
INSTALL CABLES & RACEWAYS: A. Bysfield by January 29, 1986
INSTALL PLANT EQUIP: A. Bysfield by January 30, 1986
MAKE TERMINATIONS AT SUBSTATION AND PLANT DURING
OUTAGE AFTER 35% POWER: G. Canfield by February 5, 1986

- II.G. The GSU operating T&D personnel have been instructed not to take & radios into the Fancy Point Substation building and to keep the doors locked (see Attachment 13). In addition, the gate locks have been changed using non-duplicatable keys and controlled distribution of the keys.

In addition to the above there are several other actions that were identified as an ongoing review by the task force, by GSU management, and NRC reviews. These are identified below, including their scheduled action:

1. Operations was instructed and signs were posted at the two doors to the room containing the CES panels, where the tone equipment is located in the plant, to not use RF equipment in the room and to keep the doors locked.
2. It was noted during the course of equipment checkouts that the shield wires for the three pilot wire circuit schemes are grounded through a common grounding reactor. During fault conditions, circulating currents could possibly be induced from one circuit set of shields to another. Therefore it was decided to install three additional reactors on the plant side to provide individual grounding for each circuit's shields. Modification Request MR-86-0093 (Attachment 14) has been issued for this work.

MR INTERDEPT. CHECKLISTS: R. Cole by January 28, 1986
 INSTALL REACTORS: A. Bysfield by January 29, 1986

3. It was discussed with the NRC and concluded by the task force that alarms (one each for Fancy Point and plant) should be added to the control room for tone equipment trouble. Thus, the plant would not have to rely solely on the SCADA system alarm via microwave to the Baton Rouge dispatcher's office and call back to the plant. Modification Request MR-86-0094 (Attachment 15) was issued for this work. Additionally, printed circuit cards have been ordered as replacements in the tone equipment racks for each channel. These cards will allow not only loss of channel alarms, but also loss of guard and trip signals. On receipt, they will be installed to give additional alarm and events recorder indication without any additional cable installation or terminations required. The schedule for the work is as follows:

COMPLETE MR DESIGN: SWEC/GE by January 28, 1986
 NUPE MR REVIEW: J. Cassidy by January 29, 1986
 MR INTERDEPT. CHECKLISTS: R. Cole by January 30, 1986
 SUBSTATION INSTALLATION: G. Canfield by February 3, 1986
 PLANT INSTALLATION: A. Bysfield by February 5, 1986
 CARD REPLACEMENT: Ducote/Canfield by April 18, 1986

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4. Develop or incorporate into existing procedures the instructions necessary for maintaining the events recorders (i.e., paper supply and routine maintenance).

COMPLETE PROCEDURES: A. Bysfield by January 29, 1986

5. Preventative Maintenance Procedure EMP-1210 has been issued for testing the tone systems on a monthly basis instead of the semi-annual cycle that was being used.

CONCLUSION

Although not known with 100% certainty that the tone equipment, via radio frequency interference, caused the LOP on January 1, 1986, the investigative and follow-up task force believes it to be the case with a "high probability" from all indications.

Numerous measures have been taken to eliminate this possibility in the future and to make the tone system much more secure. These include providing RF shielding, double trip signals, posting signs, locking doors, prohibited RF equipment in the area, training, additional monitoring equipment, control room alarms, more frequent testing, and other design improvements.

The task force believes that with these design improvements and modifications the tone relaying equipment will continue to provide highly reliable relay protection with significantly improved security against erroneous tripping which could possibly cause a LOP. This course of action was also reviewed with and approved by the Facility Review Committee on January 14, 1986.

A summary schedule for completion of the outstanding work to close out the Condition Report is shown on Attachment 17.

C. K. Henry 1/28/86
C. K. Henry

GKH/rq

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Attachments: 1 - 17 pages Condition Report No. 86-0003
2 - 4 pages RBG-22,911 dated January 2, 1986
3 - 1 page JCD-001-86 dated January 2, 1986
4 - 3 pages NT-0245 dated January 10, 1986
5 - 10 pages Memo to D. Reynerson dated January 9, 1986
6 - 1 page Purchase Requisition AXX-24960
7 - 1 page Modification Request 86-0081
8 - 1 page DC Feeds
9 - 1 page Modification Request 86-0026
10 - 2 pages Recommended Operator Aid for
Resetting 86 Lockouts
11 - 3 pages Sequence of Events Recorders
12 - 1 page Modification Request 86-0027
13 - 1 page Memo to All T&D Operating Employees dated
January 6, 1986
14 - 1 page Modification Request 86-0093
15 - 1 page Modification Request 86-0094
16 - 1 page Modification Request 86-0098
17 - 1 page Summary Schedule of Outstanding Work to
Close Out Condition Report



APPROVALS

Signatures/Dates

- OPS. *[Signature]* / 1-28-86
- MAINT. *[Signature]* / 1-28-86
- TECH STAFF *[Signature]* / 1-28-86
- PROJECTS *[Signature]* / 1-28-86
- NUPE *[Signature]* / 1-28-86
- T&D RELAY *[Signature]* / 1-28-86
- T&D COMM. *[Signature]* / 1-28-86
- SWEET *[Signature]* / 1-28-86
- GMT ENGR. *[Signature]* / 1-28-86
- TYM *[Signature]* / 1-28-86

Hardware Related Events
Power Systems Including Switchyards

In a review of all License Event Reports (LER's) we have found nine LER's that dealt with problems with electrical power/control concerns.

LER 85-002	CR 85-0287
85-006	85-0334
85-009	85-0372
85-017	85-0460
85-028	85-0475
85-055	85-0624
85-057	85-0648
Turbine Trip of 12/31/85	85-0703
LOP of 1/1/86	86-0003

Of these nine LER's three were determined to be personnel errors:

85-002, 85-017, and 85-028,

four were determined to be equipment failures/malfunctions:

85-006, 85-009, Turbine Trip, and LOP,

one was determined to be a design/procedural error:

85-055,

and one is still considered indeterminate:

85-057.

Attachment 1 provides a brief synopsis of each of these LER's.*

An "Electrical Distribution Problems Task Force" has just recently been organized to research problems such as spurious trips or continual equipment malfunctions in more detail. This group is in the process of reviewing Condition Reports and LER's to determine trends and to establish solutions to complex distribution problems. Attachment 2 provides an overall scope of the problems that the task force is presently addressing.

* The LOP LER is not addressed here because of the earlier presentation.

Attachment 1

LER 85-002

CR 85-0287

09-04-85

Reactor Protection System Isolation

Three Actuations:

- 1) Manually tripped RPS Channel "A" to perform maintenance calibration. Construction simultaneously generated a noise spike from handling main steam line radiation monitors, which caused Channel "B" trip.
- 2) High scram discharge volume filled with water due to first actuation.
- 3) Repeat of what happened in the first actuation.

Correction Actions Taken:

- 1) Ceased inspection of radiation monitors.
- 2) Radiation monitors jumpered out of the RPS logic until they are fully operational and are required.

LER 85-006

CR 85-0334

09-16-85

Reactor Protection System Actuation

Spurious trip occurred on Electrical Protection Assembly (EPA) C71*S003E in RPS Channel "A" alternate power feed due to malfunction of undervoltage timer section in EPA logic card.

Corrective Action:

Replaced the printed circuit board, functionally tested and returned to service.

Attachment 1

LER 85-009

CR 85-0372

09-26-85

Reactor Water Cleanup Containment Isolation

Spurious actuations caused by obtaining temperature readings on a leak detection differential temperature. Cause is a generic design problem in U.S. Riley type temperature switches.

Corrective Action:

MR 85-0589 adds a 5.9 Kohm resistor on affected U.S. Riley temperature switches.

LER 85-017

CR 85-0460

10-25-85

ESF Isolation of E12*MOVFO08 (Shutdown Cooling Suction to RHR Pump A)

Technician inadvertently grounded a recorder lead in an attempt to attach the lead to a relay terminal. Fuse B21H-F76A blew.

Corrective Action:

STP-204-0602 was revised to attach all signal point test leads to a terminal block.

LER 85-028

CR 85-0475

10-30-85

RHR "A" Isolation and RPS "B" Loss of Power

Electrical technician inadvertently tripped 1NPS-SWG1B, ACB-25. This is the main supply breaker for the 1NPS-SWG1B bus.

Correction Action:

Since the incident was caused by personnel error and the employee has been instructed concerning his error no further corrective action is deemed necessary.

Attachment 1

LER 85-055

CR 85-0624

Loss of RPS Bus "D" Power with Loss of Annulus Pressure Control, PWCU Isolation and RHR Isolation

Drawing error caused an error in the procedure. Troubleshooting to determine the error resulted in personnel error when a technician shorted across two terminals.

Corrective Action:

MR 85-1138 was initiated to correct drawing error. TCN 85-4892 to STP-508-4802 was initiated to correct the procedure.

LER 85-057

CR 85-0648

12-16-85

Voltage Transient on Div. I Power Buses Causes ESF Actuations

Breaker 1NNS-ACB-06, which is the supply breaker for 1NNS-SWG1A from 1STX-XNS1C, was closed in on a hot 1NNS-SWG1A bus causing a backfeed through the 1STX-XNS1C transformer to the 22Kv isophase bus. ACB-06 immediately tripped but the resulting transients caused automatic initiations of Div. I Standby Gas Treatment, Div. I and II Annulus Mixing, and Div. II Control Room HVAC.

Conclusions:

Investigation into specific ESF actuations is inconclusive. Momentary loss of power (severe voltage drop) to Div. I power buses would allow Annulus Pressure Control System (APCS) pressure control damper to close. Standby Gas and Annulus Mixing would start on low flow. Loss of Div. I power would also cause loss of Div. I control building HVAC to trip and Div. II control building HVAC to start. Further investigation required.

Attachment 1

LER *

CR 85-0703

12-31-85

Turbine Trip and Reactor Scram

The Turbine Trip was caused by a combination pressure transducer failed high and a rate of current change transient caused by a fault on a 500Kv line south of Willow Glen,

Corrective Action:

Pressure transducer reworked. Modification Request submitted for sequence turbine intercept valves back open after a fast closure to prevent pressure transients in the EHC system.

* LER to be submitted by January 31, 1986.

Attachment 2

ELECTRICAL DISTRIBUTION PROBLEMS

TPM: R. E. Cole

PLANNER: M. O'Brian

Description of Problem

Electrical distribution problems, generally related to transients, are causing unit trips or operating problems. Page 2 contains a brief synopsis provided by the Plant Manager. These problems cause abnormal effects in one or more plant systems and lessen confidence that the plant will respond in a predictable manner. Review of the 10 Condition Reports showed that although abnormal conditions were reported in each case, 5 of the problems were caused by specific minor equipment problems. Correction of these problems should permanently resolve the condition. One of the CR's addresses "ghost lights" which is being handles separately. However, three of the CR's deal with problems which have not had adequate solutions. The lack of solutions is generally due to "one-shot" non-repetitive problems. The last CR deals with the degree of lightning protection for the switchyard.

Consequences

If unexplained electrical problems persist, unit reliability will be adversely affected.

Present status

Lightning protection switchyard; NuPE (Henry), Maintenance (Roark) to discuss with Beaumont. After answering the CR, there does not appear to have been further action on the unexplained problems.

Plan

1. Charter a standing task force to track electrical distribution problems and handle resolution of those that cannot be adequately explained.
2. This task force to develop plan to be implemented when this type of problem arises. This plan will address data to be taken, personnel to call, etc. This will maximize the amount of knowledge gained from each occurrence.
3. The task force will analyze each problem occurrence, data taken, and recommend a course of action. Then expedite the actions as a task force.

Attachment 2

ELECTRICAL PROBLEMS

- 1) Voltage transient caused flow control runback in the Reactor Recirc System (CR-85-0547).
- 2) A normal closure of NNS-ACB-06 onto a 4160V BUS resulted in a voltage spike causing the loss of "C" preferred transformer (CR-85-0671).
- 3) Voltage transients on the system have caused the plant to experience a load unbalance causing a turbine trip and reactor scram (CR-85-0671). *CR-85*
- 4) During electrical storms or voltage transients on system transmission lines, the plant has experienced electrical spikes causing fuses throughout the plant to blow. These fuses included safety related control fuses in ECCS and ESF systems including a 200 amp RPS alternate fuse. Additionally, many annunciator cards have failed, HVAC chillers trip and SGTS to auto starts (CR-85-465, 85-460, 85-431, 85-519).
- 5) During electrical storms we have experienced ~~lighting strikes~~ *lightning strikes* in the switchyard which have lead to breakers tripping and fires in the 500 KV yard (CR-85-0414).
- 6) Ghost light indications on various breakers (CR-85-605, 85-0425).

VIBRATING
CONDENSATE
PIPING

CONDENSATE BYPASS VIBRATIONS

PROBLEM - SHORT CYCLE RECIRCULATION BYPASS TO CONDENSER HAD PROBLEMS WITH VIBRATION INDUCED FAILURES OF SMALL BORE PIPING (DRAIN LINE) AND SUPPORTS

CAUSE - FLOW CHARACTERISTICS INDUCED HIGH FREQUENCY VIBRATIONS WHICH LOOSEMED HANGER BOLTING, AND CAUSED FAILURE OF SUPPORTS

CORRECTIVE ACTION - REROUTE PIPING TO PROVIDE FLOW PATH WITH LESS TURBULENCE AND PRESSURE DROP. ALSO MINIMIZE USE OF THIS BYPASS. MODIFICATION TO BE STAGED TO BE DONE IN SHORT OUTAGES

LONG TERM ACTION - FINAL MODIFICATION WILL INCLUDE PIPE REROUTING, POSSIBLE CHANGE IN CONTROL VALVE TYPE AND LOCATION AND SUPPORT RE-DESIGN

FEEDWATER

PUMP

PROBLEMS

FEEDWATER PUMP LUBE OIL COOLING

PROBLEM - LOW TURBINE PLANT COMPONENT COOLING WATER
TEMPERATURE IS CAUSING FEEDWATER PUMP LUBE OIL
TEMPERATURES TO BE TOO LOW TO START THE PUMPS

CAUSE - TURBINE PLANT COMPONENT COOLING SYSTEM IS OVERSIZED
AND CURRENT LOW POWER LEVELS OF OPERATION HAVE NOT
PUT ENOUGH HEAT LOADS ON THE SYSTEM TO ACHIEVE
OPTIMUM OPERATING TEMPERATURE

CORRECTIVE ACTION - PROVIDE AN AUTOMATIC TEMPERATURE MONITORING
AND BYPASS OF THE LUBE OIL AROUND THE LUBE
OIL COOLERS

FEEDWATER
MINI-FLOW
RECIRC. LINES

FEEDWATER MINI-FLOW PROBLEMS

PROBLEM - EROSION OF PIPING DOWNSTREAM OF THE FEEDWATER
RECIRCULATION VALVE (MINI-FLOW TO CONDENSER)

CAUSE - OPERATION OF SYSTEM IN TEMP AND PRESSURE RANGE
OUTSIDE OF IDEAL DESIGN RANGE

CORRECTIVE ACTION - A) INTERIM MODIFICATION TO CHANGE OUT
PIPING MATERIAL TO EROSION RESISTANT
STAINLESS STEEL IN AREA OF EROSION
B) FINAL MODIFICATION UNDER ENGINEERING
ANALYSIS TO BE IMPLEMENTED AT FIRST
REFUELING OUTAGE

FEEDWATER
LONG CYCLE
RECIRCULATION

FEEDWATER LONG CYCLE RECIRC.

PROBLEM - EXTENDED USE OF LONG CYCLE RECIRC VALVE FOR
PUMP PROTECTION IS CAUSING ADDED OPERATION
CONCERNS FOR REACTOR LEVEL CONTROL

CAUSE - THE VIBRATION PROBLEM WITH THE SHORT CYCLE RECIRC
HAS CAUSED EXTENDED USE OF THE LONG CYCLE RECIRC

CORRECTIVE ACTION - CHANGED LOGIC FOR LONG CYCLE RECIRC
VALVE TO AUTOMATICALLY CLOSE UPON
LEVEL 4 (MR 86-0127)

FEEDWATER

VALVE

PROBLEMS

MOV FAILURE

PROBLEM - OPERATOR BROKEN OFF VALVE

CAUSE - SHORT AND LOOSE BOLTS APPEARED TO HAVE LED TO THE
FAILURE

CORRECTIVE ACTION - REPLACE OPERATOR, REPLACE BOLTS AND
CHECK ALL OTHER OPERATORS OF THE SAME
TYPE AND SIZE

FOLLOW UP ACTION - ESTABLISH PLAN FOR CHECKING ALL LIMITORQUE
OPERATORS FOR BOLTING TORQUE AND THREAD
ENGAGEMENT, AND PERFORMING ANY NECESSARY
REWORK

STATUS - INSPECTION PLAN IS BEING FOLLOWED WITH ALL REWORK TO
BE COMPLETED PRIOR TO STARTUP AFTER 35% OUTAGE

REACTOR WATER CLEANUP SYSTEM (RWCU)

- . RWCU Operability Task Force established by RBS management to review problem areas and to initiate corrective actions required to improve system operability/reliability.

Corrective Actions (Short Term)

- . Differential Flow Instrumentations -- MR 85-1039
 - Recalibrated differential flow instrumentation for cold conditions.
 - Field work completed 12/23/85
 - Modification improved the operability of RWCU
- . Cavitation/flashing across flow element in the blowdown line -- MR 85-1037
 - Resized the restricting orifice in blowdown line to the condenser.
 - Field work completed 1/5/86
 - Modification improved the operability of RWCU
- . Riley Temperature Switches -- MR 85-0589
 - Design change made to eliminate "noise" - induced spurious isolation signals when going to "test" mode.
 - Modification completed on 28 of 32 switches.
 - Have had no additional trips.
- . RWCU isolation bypass switches -- MR 85-0585
 - Eliminate requirement to jumper out contacts during monthly surveillance testing.
 - Field work scheduled for next outage
- . No isolations due to differential flow instrumentation or Riley temperature switches have occurred since December, 1985.

REACTOR WATER CLEANUP SYSTEM (RWCU)

Corrective Actions (Long Term)

- . Continue RWCU Operability Task Force activities
 - Review for new or additional problem areas and develop action plan to address.
 - Complete evaluation of corrective actions completed to date (gather operational data).
 - Continue evaluation of additional modifications proposed for possible incorporation into plant design:
 - a) MR 85-1038 "Revise differential flow instrument trip setpoint".
 - b) MR 85-1055 "Change design to use temperature - compensated differential flow instrumentation".
 - c) MR 86-0011,0012 "Wiring revision in Division A Panel, Division B Panel.
 - d) "Provide separate test panel for surveillance testing."

STANDBY GAS TREATMENT SYSTEM (SGTS)

Review of Operational Events

- . Condition Report (CR85-0648)

Operating Annulus Pressure Control Subsystem (APCS) fan tripped, standby fan failed to start, causing SGTS and Annulus Mixing subsystem to initiate.

- . Condition Report (CR85-0671)/Licensee Event Report (LER85-057)

Voltage transient on Division 1 power buses led to SGTS initiation.

Corrective Actions

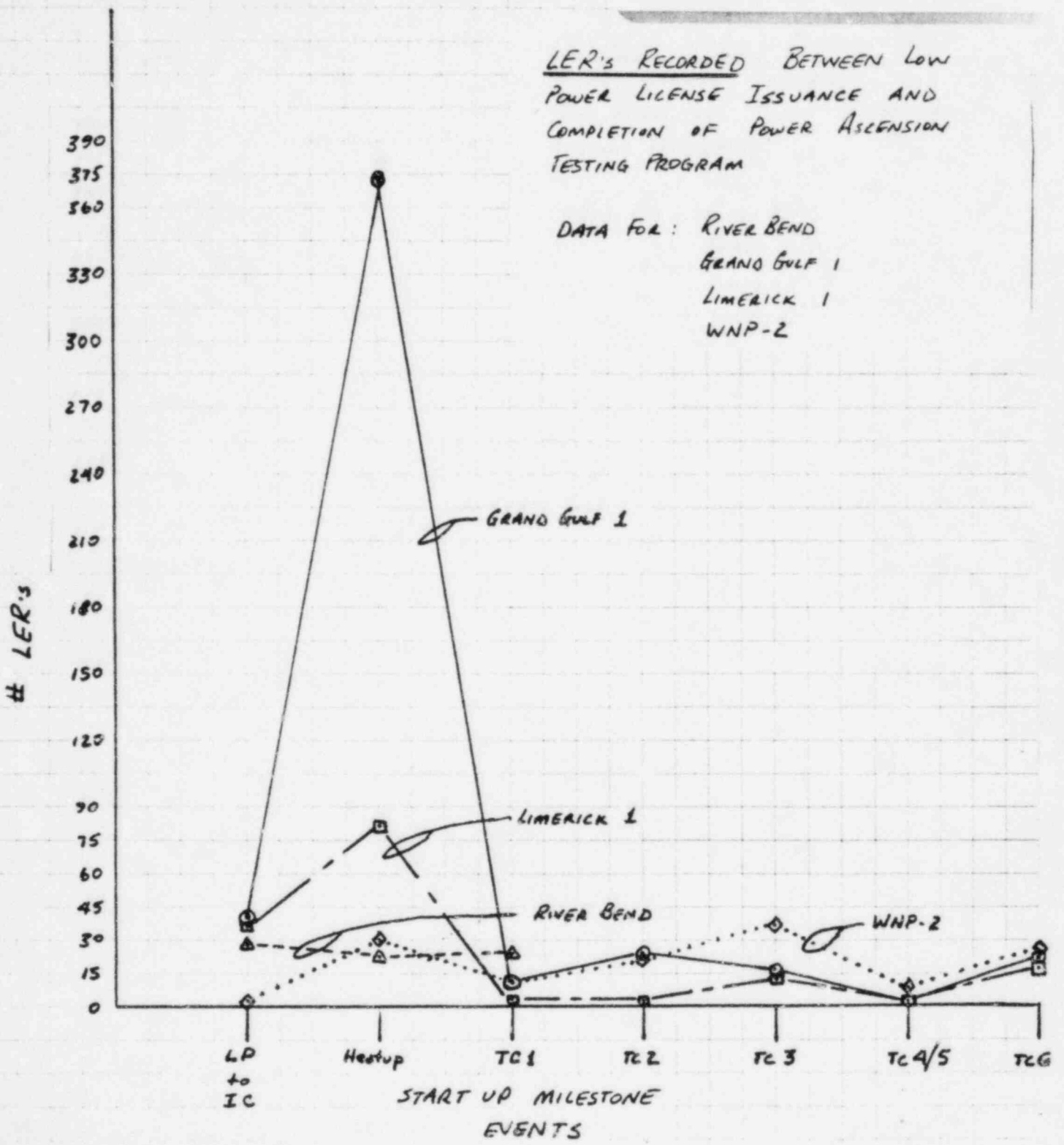
- . Will troubleshoot the system (MWR-12,366) to determine possible causes of condition (CR 85-0648).
- . Have reviewed breaker closing operation and control circuit design. Have reviewed ongoing surveillance testing activities. No evidence found to link these events with the initiation and no hardware problems identified (CR 85-0671/LER 85-057).
- . Will continue to monitor system performance through surveillance testing program.

REACTOR WATER CLEANUP SYSTEM OPERABILITY TASK FORCE

- . Established December 13, 1986 to address operation problems with RWCU System

- . Task Force membership

Plant Operations
Plant Chemistry
Plant Tech Staff
Plant Maintenance
Projects
Planning
Nuclear Plant Engineering
General Electric Company
Stone & Webster Engineering Corporation



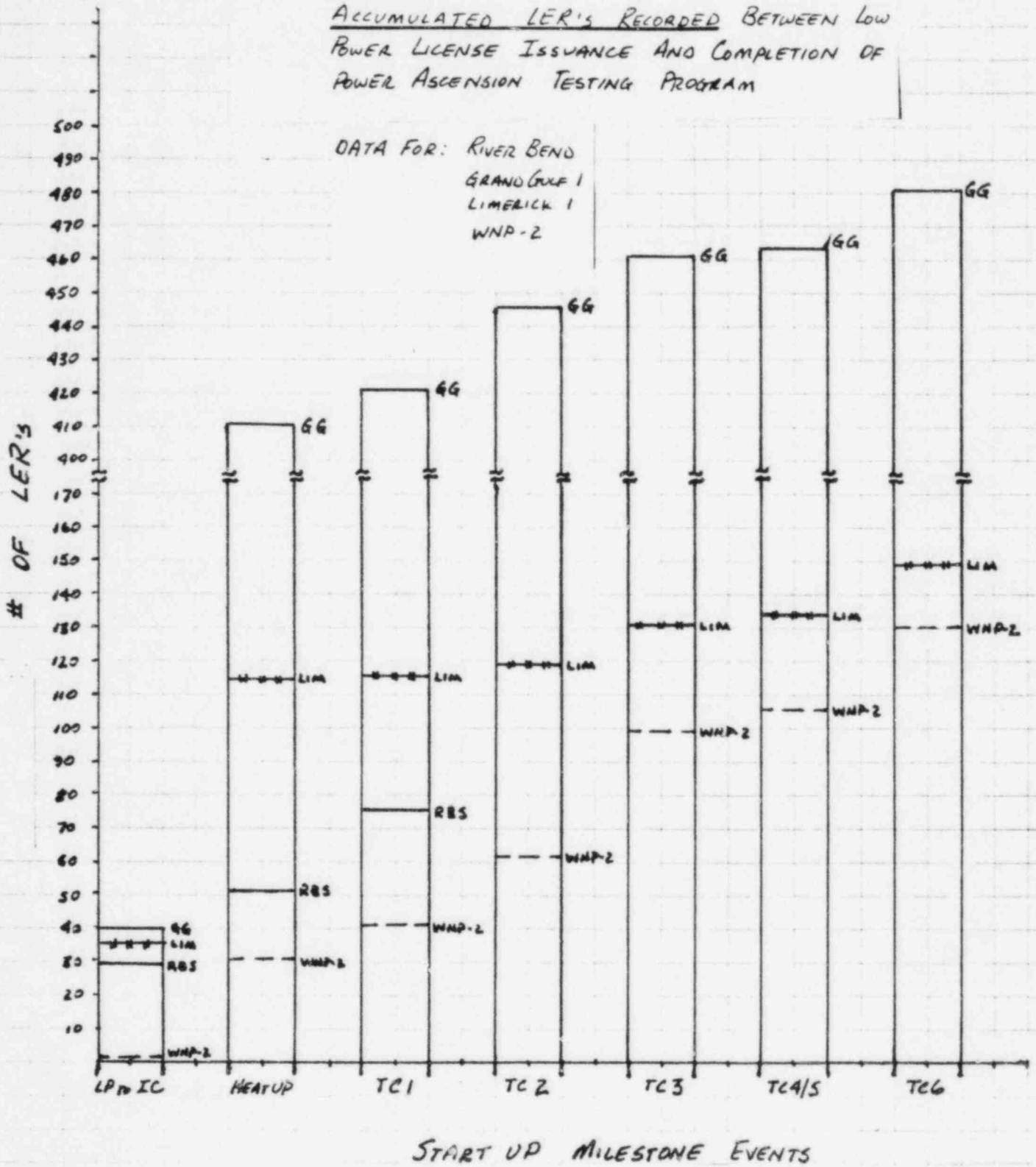
GSU System Engineering Description

Drawn By _____ Sheet No. _____

Date _____ Job No. _____

ACCUMULATED LER'S RECORDED BETWEEN LOW POWER LICENSE ISSUANCE AND COMPLETION OF POWER ASCENSION TESTING PROGRAM

DATA FOR: RIVER BEND
GRAND GULF 1
LIMERICK 1
WNP-2



GSU System Engineering

Description

Drawn By _____

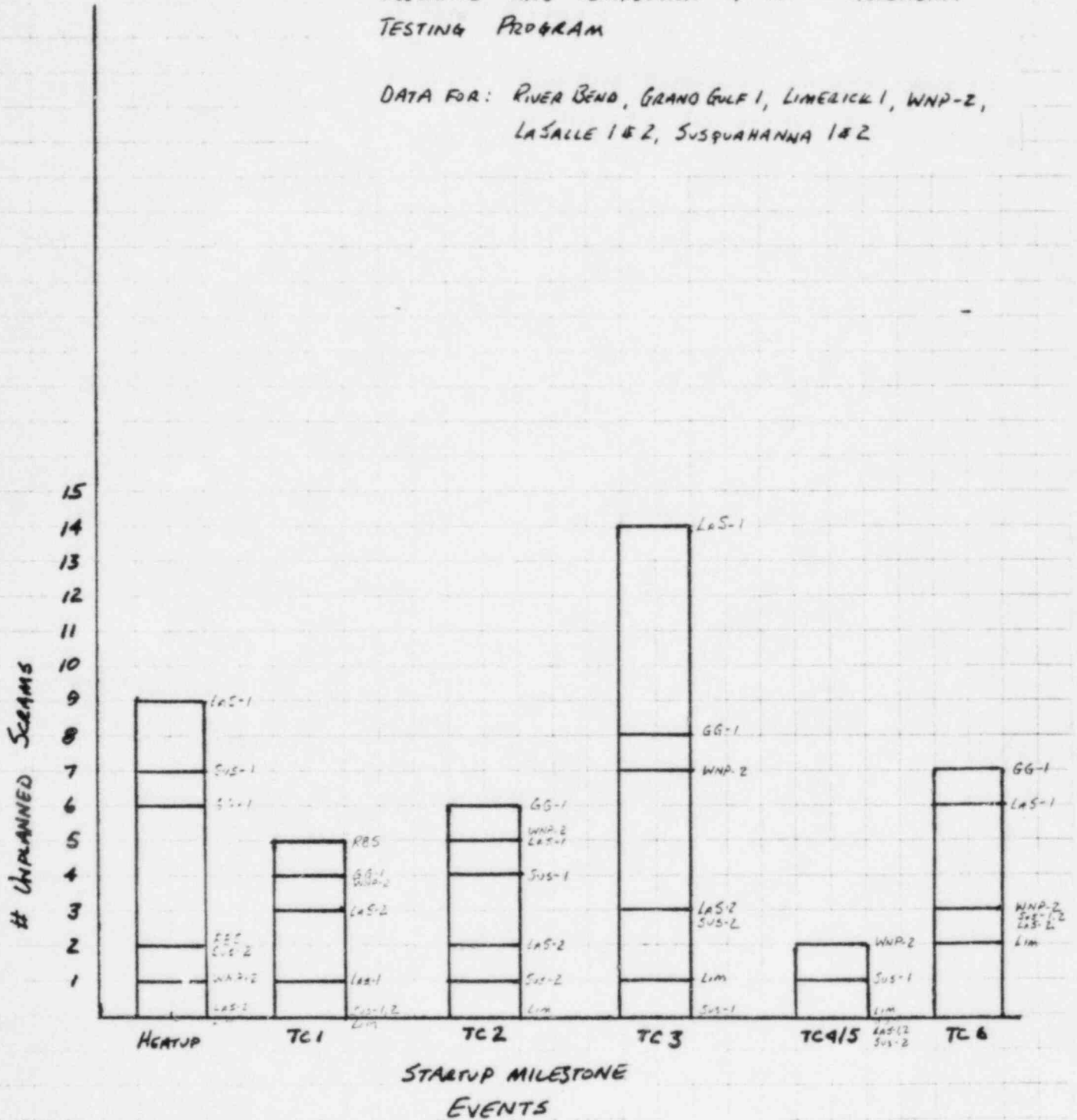
Sheet No. _____

Date _____

Job No. _____

UNPLANNED SCRAMS BETWEEN LOW POWER LICENSE
ISSUANCE AND COMPLETION OF POWER ASCENSION
TESTING PROGRAM

DATA FOR: RIVER BEND, GRAND GULF 1, LIMECLICK 1, WNP-2,
LA SALLE 1 & 2, SUSQUAHANNA 1 & 2



GSU System Engineering

Drawn By _____

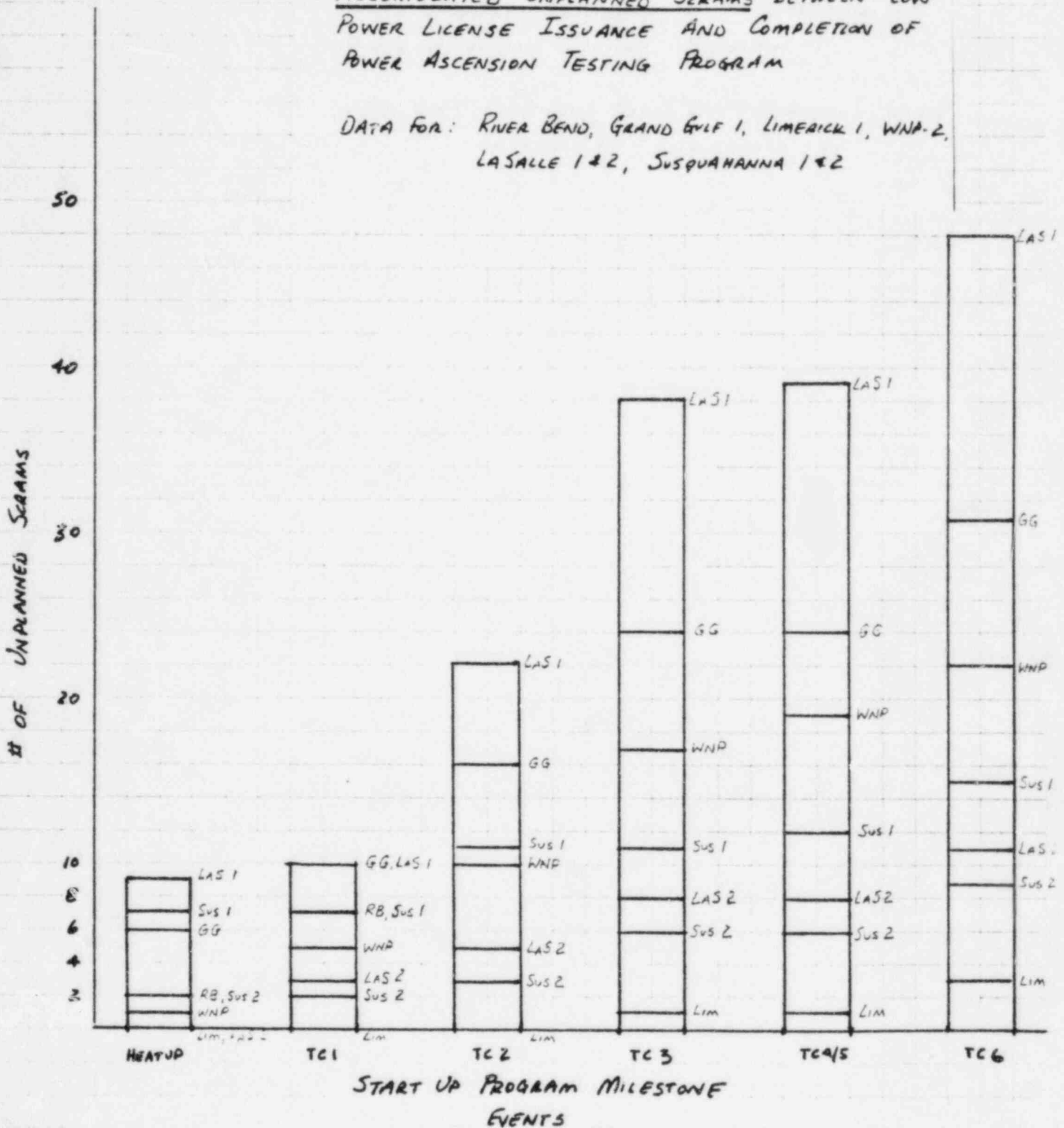
Date _____

Sheet No. _____

Job No. _____

ACCUMULATED UNPLANNED SCRAMS BETWEEN LOW POWER LICENSE ISSUANCE AND COMPLETION OF POWER ASCENSION TESTING PROGRAM

DATA FOR: RIVER BEND, GRAND GULF 1, LIMERICK 1, WNA-2, LASALLE 1&2, SUSQUAHANNA 1&2



GSU System Engineering

Description

Drawn By _____

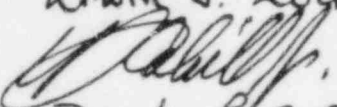
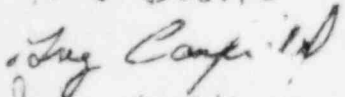
Sheet No. _____

Date _____

Job No. _____

JAN 29, 1985

ATTACHMENT 15

<u>Name</u>	<u>TITLE & ORG</u>
J.P. JAUDON	CH. PROJ SEC. A, NRC, RIV
S. STERN	PM, RB, NRR, NRC
D. D. CHAMBERLAIN	SRI NRC
W.R. Bennett	RB Project Engr., NRC, RIV
ERIC W. WEISS	Office of Inspection & Enforcement, DPEP, EAS, NRC
Richard Becker	DIV OF Lic. BWR/Facility Operations Branch
ED CHOW	DIV. OF BWR LIC / FOB
Scott Newberry	NRR - OPERATING REACTOR ASSESSMENT STAFF
Greg Henry	Supv Elect Engr / NUPE RBS
Doug Fennell	EMT - SUPV. RELAY DESIGN
JOHN HARGREAVE	EMT - SUPV. COMMUNICATIONS ENGINEERING
Erwin J. Zoch	Supv. Supv. - Nuclear Engr. / Nuc. Plant Engr. / GSU
	SR. V.P. IS&E
Douglas R. GIPSON	ASST PLANT MGR OPS, CHEMISTRY, & RADWASTE
JIM DEDDEN	V.P. - RBWA GSU
JIM BOOKER	MANAGER - ENGR, FUELS & LICENSING - GSU
Tom Blunkatt	Plant Manager GSU
DAN WILLIAMSON	OPS SUPV GSU
DAVID RICHMOND	DIR NUCLEAR PLANT ENGINEERING
RW HERRICK	DIRECTOR - PROJECTS
AD Kowalczuk	Asst Plt Mgr - Maint - M&I's
CE DeWeese	Chem Engr - Nuclear Plant Eng.
Alan Gystroff	Dr. Systems Engr - Tech. Staff
R.J. Dueste	GSU Communications Supervisor
	GSU Relay Foreman
John A. Hernandez	GSU QA ENGRG
Ronald E. Cole	GSU Projects - Elec. Engr.

(continued next page)

(Attendance Sheet Continued)

<u>Name</u>	<u>Title & Org.</u>
B. E. Hey	Engineer / Licency
R G West	IDL Supervisor / Maint
B. K. Thibodaux	Acting Test Plant Manager / Tech. Services
P F Gillespie	Sr Compliance Analyst / Plant Services
W. H. Odell	Manager Administration - GSU
K. E. Surrick	MANAGER PROCESS, PLANNING - COORDINATION
J. W. LEAVINGS	Supv. - Independent Safety Eng. Group - GSU
W J Reed, Jr	Dir - Nuclear Licensing
E R Grant	Supv - Nuclear Licensing
L A England	Supv - Nuclear Licensing
R. E. PERKINS	Resident ENR - CAJUN ELECT.
J. D. FORE	Op. monitor - CAJUN ELECT.
G. E. ENGLERT	SR. MECH. ENGINEER - GSU / NUPE
M. L. REEVES	MECH ENGINEER - GSU / NUPE
J. A. WRIGHT	SUPV. MECH. ENGR - GSU / NUPE
J. L. Courne	Manager QA