May 25, 1988
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U. S. Nuc.... Regulatory Commission
Attention: Document Control Desk
Washington, DC   20555

South Texas Project Electric Generating Station
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Revised Response to NRC Generic Letter 83-28,
"Required Actions Based on Generic Implications
of Salem ATWS Events"

Reference: A.   Response to NRC Generic Letter 83-28, "Required Actions Based
on Generic Implications of Salem ATWS Events," J. H. Goldberg,
HL&P; Letter to Hugh L. Thompson, NRC; June 28, 1985;
ST-HL-AE-1274.

B.   Response to Request for Additional Information Regarding NRC
Generic Letter 83-28, M. R. Wisenburg, HL&P; Letter to
Hugh L. Thompson, NRC; May 30, 1986; ST-HL-AE-1671.

Houston Lighting & Power Company has prepared the attached report to
revise inf ...aacion previously submitted in References A and B for the South
Texas Project Electric Generating Station regarding the generic implications
of the Salem ATWS event. Hardware limitations within the Emergency Response
Facilities Data Acquisition and Display System (ERFDADS) have necessitated
some deviations in format of the Post-Trip Review Information (Section 1.2).
Revisions are indicated by change bars.

The primary change noted is that analog data for Reactor Coolant System
(RCS) pressure and containment pressure are processed every 3 to 4 seconds by
the ERFDADS and cannot be stored in the 1/2 second resolution transient file.
However, these parameters are presently available on strip chart recorders in
the Control Room with the charts becoming a permanent part of the
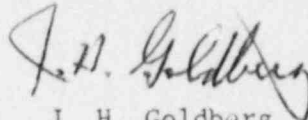Pre-trip/Post-trip data.

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A055
'||

If you should have any questions on this matter, please contact Mr.
Mark A. McBurnett at 512-972-8530.

J. H. Goldberg
Group Vice President, Nuclear

THC/hg

Attachment: Revised Response to Generic Letter 83-28
               Section 1.2 "Post-Trip Review-Data and
               Information Capability"

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter   )
)
Houston Lighting & Power   )   Docket Nos. 50-498
  Company, et al.,   )   50-499
)
South Texas Project   )
Units 1   )

AFFIDAVIT

J.H. Goldberg, being duly sworn, hereby deposes and says that he is Group
Vice President, Nuclear of Houston Lighting & Power Company; that he is duly
authorized to sign and file with the Nuclear Regulatory Commission the attached
response to NRC Generic Letter 83-28; is familiar with the content thereof; and that
the matters set forth therein are true and correct to the best of his knowledge and
belief.

J. H. Goldberg
J. H. Goldberg
Group Vice President, Nuclear

STATE OF TEXAS   )
County of Matagorda)
)

Subscribed and sworn to before me, a Notary Public in and for the State of
Texas this 25ᵗʰ day of May   , 1988.

Mazie D. Hill
Notary Public in and for the
State of Texas

MAZIE D. HILL
Notary Public, State of Texas
My Commission Expires 2-2-89

My comm.   pires:

- -2-2-09

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Houston Lighting & Power Company

cc:

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Revised Response to Generic Letter 83-28
Section 1.2 "Post-Trip Review-Data and Information Capability"

1.2 Post-Trip Review - Data and Information Capability

Equipment supplied to the South Texas Project has the capability to
record, recall. and display data and information to permit diagnoses of
the causes of unscheduled reactor shutdowns prior to restart and for
ascertaining the proper functioning of safety-related equipment. This
capability is provided by the following systems:

1. Proteus Computer System

2. Emergency Response Facilities Data Acquisition and Display System
   (ERFDADS)

The Proteus Computer System is designed to provide supervision of the
Reactor Control and Protection Systems, the NSSS process systems, and the
plant secondary systems, with online data acquisition, alarming, logging,
and data reduction.

The ERFDADS provides continuous monitoring of NSSS process systems and
safet   lated support systems and provides the data acquisition and
disp.   required by NUREG-0696. The system performs online data
acquisition, alarming, logging, data reduction, and archival data
storage.

1.2.1 Capability for Assessing Sequence of Events (on-off indications)

1.2.1.1 Equipment

The Proteus Computer System provides Sequence of
Events (SOE) recording capabilities to monitor the
detailed status of selected key parameters. The
Proteus Computer System is a Westinghouse multi-CPU
P-2500 system with capability provided for monitoring
350 SOE inputs. All SOE points are digital contact
inputs which initiate a computer system interrupt on
the occurrence of a change of state. The multi-CPU
configuration assures a high system reliability via
auto-switchover techniques to backup failed
components. The system is provided with a dedicated
SOE typer within the control room for output of the
SOE information. Additional typers in the control
room may be used for output should the dedicated
typer be unavailable.

1.2.1.2   Parameters Monitored

The parameters which require SOE monitoring are
established by the following selection criteria:

1.   All equipment which directly supports plant
operation   i whose tripping would have a high
probability of causing either a reactor trip,
turbine trip, or generator trip

2.   Parameters which will cause or nay lead to the
tripping of equipment defined by Criterion 1

3.   Parameters which will initiate actuation of the
Reactor Protection System

4.   Parameters which will initiate turbine or
generator trips

5.   All manual actuations of RPS, turbine trip, and
reactor trip

6.   All auxiliary bus distribution breakers which
feed equipment defined by Criterion 1.

1.2.1.3   Time Discrimination Between Events

The system has a time discrimination between events
of 4 milliseconds. Events which occur within less
than 4 milliseconds are detected and recorded, but
time tag resolution is to the nearest 4 milliseconds
following time of initial event.

1.2.1.4   Display Format

The Proteus system collects the SOE interrupts in
groups of 40. Upon initiation of the first event,
the system logs the next 40 events and/or monitors
the SOE points for 60 seconds. After 40 events are
logged or 60 seconds has passed, the system prints an
SOE log on the control room typer. The system resets
after 40 events or 60 seconds until triggered again
by a new SOE interrupt.

The SOE log printout is a complete history of the SOE
interrupt. It contains the time and data of the
initial sequence, the time of each subsequent event,
the point identification of each SOE detected, the
status of the point and the description of the point.
The log is printed in chronological order starting
with the initial interrupt.

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1.2.1.5   Data and Information Retention

The SOE log buffer is cleared and reset after printout. SOE data is maintained only for the period required for collection and printout. The hardcopy printouts of the SOE logs are retained as required by the post-trip review procedure.

1.2.1.6   Power Source

The Proteus Computer System has a non-Class 1E uninterruptible power supply that provides power for 10 minutes following loss of offsite power.

1.2.2   Capability for Assessing the Time History of Analog Variables

The capability for determining the cause of an unscheduled shutdown and the proper functioning of safety-related equipment is provided by a combination of the Proteus Computer System and the ERFDADS.

1.2.2.1   Equipment

Both the Proteus and ERFDADS computer systems are configured using multiple interconnected processing units which provide highly reliable monitoring and logging capabilities. The Proteus system is a Westinghouse multi-CPU P-2500 system with various time history logging capabilities. The ERFDADS is a multiple Modcomp Classic II/75-based system with long term data storage and logging capabilities. Both systems have the ability to scan and process plant analog input signals at rates commensurate with the time resolution of the inputs.

A Pre-trip/Post-trip Log capability is provided in both the Proteus and ERFDADS. In addition, a Transient Log is provided within the ERFDADS which enhances the plant trip and safety system performance assessment capabilities.

The Pre-trip/Post-trip Logs monitor the values of key analog inputs. Individual ten second values of each input selected are stored by the systems in a ten minute pre-trip circular buffer. The newest ten second values are continuously added to the buffer with the oldest values being pushed out (older than 10 minutes). Upon detection of a triggering event, the contents of the buffer are frozen and a new Post-trip buffer is created. The Post-trip buffer will contain the ten second values for each input for the 10 minute period after a triggering event.

The triggering events are Reactor Trip, Turbine Trip, and Generator Trip for Proteus and Reactor Trip and Turbine Trip for ERFDADS.

The Transient Log in ERFDADS provides a combination analog history and sequence of events data log for additional key plant parameters not included in the logs described above. The Transient Log monitors selected analog and digital inputs on a half-second scan frequency. The value of each analog point is recorded twice a second for the 10 minute period after a triggering event. Digital input status is recorded at each change of state. The status change is time tagged to within a half second of actual occurrence.

The Proteus Pre-trip and Post-trip Logs are printed out on the control room typer automatically or on demand. The Pre-trip log information can be printed at any time without affecting the Pre-trip storage buffers. After initiation of the Post-trip data collection, the total contents of the Pre-trip and Post-trip Logs are automatically printed out after the 10 minute collection period. After printout, the logs reset and begin a new log collection period.

The ERFDADS Pre-trip/Post-trip and Transient Logs are printed on the line printer in the Technical Support Center when requested by an operator. The information can be printed at any time without affecting the storage buffers. The buffers must be manually reset following an event so that data an be collected from a subsequent event.

1.2.2.2   Parameters Monitored

The parameters monitored by the Pre-trip/Post-trip and Transient Logs are established by the following selection criteria:

A.   Plant Trip Log

1.   Primary operating parameters of each system that directly supports plant operation (Pressure, flow, temperature, level)

2.   Primary operating parameters of each ESF system

3. Each parameter which issued as an input to the Reactor Protection System (RPS). Only one loop of redundant parameters need be logged. For example, RPS has multiple narrow range level loops from each steam generator but only one would need to be in the log

4. Each parameter which is used as an input to the generator protection system

Trip Log Trigger

1. Proteus will trigger the Trip log on the occurrence of any of the following conditions:

    a. Reactor trip

    b. Turbine trip

    c. Generator trip

2. ERFDADS will trigger the Trip log on the occurrence of any of the following conditions:

    a. Reactor trip

    b. Turbine trip

B. Transient History Log

    1. Parameters subject to rapid transients for systems which directly support plant operation or mitigate the consequences of an accident.

    2. The operating status of equipment required to support plant operation which is not included as part of the SOE monitoring function.

    3. The operating status of equipment required to function to mitigate a transient which is not included as part of the SOE monitoring function.

    4. The operating status of all ESF-actuated equipment.

5.   The initiation of each ESF actuation signal shall be recorded by the transient log.

Clarification

The signals monitored on Items 2, 3, and 4 are contact closures which represent the status of equipment that does not require the fast resolution of SOE monitoring.

Transient History Triggers

The following conditions will trigger the transient history log:

1.   Reactor trip

2.   Turbine trip

The sampling rate for the Trip Logs is 10 seconds.

The sampling rate for the Transient Log is 1/2 second.

1.2.2.3   Duration of Time History

The Pre-trip/Post-trip Logs record the time history of the selected plant parameters for the 10 minute period before and after a triggering event.

The Transient Log records the time history of the selected parameters for the 10 minute period after a triggering event.

1.2.2.4   Format for Displaying Data

The Pre-trip/Post-trip Logs provide a complete listing of all the recorded data values collected both before and after the triggering event.   A printout of all pre-trigger data values may be obtained at any time prior to post-trip collection initiation by operator command.

The Pre-trip/Post-trip Log contains an indication of the triggering event, time of triggering event, and the time tagged value of each point assigned to the log.   The log contains a total of 60 pre-trip and 60 post-trip values for each point.   Each set of values

is identified by the point identification number and the engineering units of the value. Values from a given collection period are printed in a format to allow for cross comparisons between points and trend analysis. The description of each point identification is also provided.

The Transient Log is formatted similar to the Trip logs.

The Pre-trip/Post-trip logging capabilities of Proteus and ERFDADS are supplemented by continuous strip chart recording located in the Control Room for those parameters subject to rapid changes during a transient. Resolution of the Pre-trip/Post-trip Logs is not adequate for such parameters as Reactor Coolant System Pressure and containment pressure and these parameters cannot be inputs to the Transient Log due to hardware limitations of the ERFDADS. Strip chart recording provides the time resolution necessary to adequately monitor these parameters during a transient.

A list of the major parameters monitored is provided in Table 1.

Note that control rod position is not included as a parameter. Required sequence information on rod insertion is derived from the reactor trip breaker position inputs. Additional rod position information can be obtained from the long-term data storage files provided by the Proteus computer system.

1.2.2.5 Capability for Retention of Data, Information, and Physical Evidence

The Proteus Pre-trip and Post-trip Log buffers are cleared and reset after printout. The trip data is maintained only for the period required for collection and printout. Manual printout of the pre-trip portion of the log does not clear and reset the buffers.

The ERFDADS buffers must be manually reset following an event. This allows verification of the log printing and transfer of data to magnetic tape if desired.

The hardcopy printouts of the logs and designated
strip charts are retained as required by the
Post-Trip Review procedure.

1.2.2.6   Power Source

The Proteus Computer System is powered by a non-Class
1E uninterruptible power supply as discussed in
section 1.2.1.6.

The ERFDADS computer is powered by a non-Class 1E
uninterruptible power supply that provides power for
2 hours following loss of offsite power.

1.2.3   Other Data and Information Provided

In addition to the dedicated SOE and Trip Logs, both the
Proteus and ERFDADS computer systems provide long term
data storage and retrieval capabilities. The systems
store the periodic instantaneous values of all analog
points and the status of digital points. This information
is available either directly or through magnetic tape
storage to supplement event analysis and diagnosis.

1.2.4   Schedule for Planned Changes

No changes are planned in the STPEGS design described
above.

TABLE 1

POST-TRIP REVIEW PARAMETERS

PARAMETER	PROTEUS SOE LOG	PROTEUS PRE/POST TRIP LOG	ERFDADS PRE/POST TRIP LOG	ERFDADS TRANSIENT LOG
1. Reactor Trip	X	X	X	X
ESF Initiations	X			
Manual Initiations	X			
2. Safety Injection Actuation				X
ESF Initiations	X			
Manual Initiations	X			
3. Containment Isolation				X
Containment Vent. Isol.				X
4. Turbine Trip	X	X	X	X
ESF Initiations	X			
Manual Initiations	X			
5. Generator Trip	X	X		
6. Neutron Flux				
Source Range	X	X		
Intermediate Range	X	X		
Power Range	X	X		
7. Containment Pressure	X		X	
8. Containment Radiation				
RCB ATM Noble Gas			X	
RCB ATM Particulate			X	
9. Containment Sump Level			X	
10. Primary System Pressure				
PZR. Press	X		X	
RCS Press			X	
11. Primary System temperature				
OPDT (per Loop)	X			
OTΓT (per Loop)	X			
Compensated T-cold (per Loop)	X			
Delta-T (per Loop)			X	
T-Average (per Loop)			X	
Wide Range T-Hot (per Loop)			X	
Wide Range T-Cold (per Loop)			X	

TABLE 1

POST-TRIP REVIEW PARAMETERS

PARAMETER	PROTEUS SOE LOG	PROTEUS PRE/POST TRIP LOG	ERFDADS PRE/POST TRIP LOG	ERFDADS TRANSIENT LOG
12. Pressurizer Level	X		X	
13. Reactor Coolant Pump Status	X			
14. Primary System Flow Per Loop	X		X	
15. Safety Injection System				
HHSI Pump Flow			X	
HHSI & LHSI Pump Status				X
HHSI Pump Discharge Pressure			X	
16. MSIV Position	X			
17. Steam Generators				
Pressure (per SG)	X		X	
Level (W/R & N/R) (per SG)	X		X	
18. Feedwater System				
Flow (per TRN)			X	
Pump Status (per TRN)	X			X
Booster Pump Status (per TRN)	X			
19. Steam Flow			X	
20. Auxiliary Feedwater System				
Flow (per TRN)			X	
Pump Discharge (per TRN)			X	
Pump Status (per TRN)				X
21. Electrical Systems				
13.8 KV Status	X			
13.8 KV Bus Voltages		X		
ESF Load Sequencers				X
ESF Diesel Generators	X		X	
125 VDC Bus Voltage				X
22. PORV Position				
SG PORV				X
PZR PORV				X