ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
GENERIC LETTER 83-28, ITEM 1.2 - POST-TRIP REVIEW
(DATA AND INFORMATION CAPABILITY)
HADDAM NECK PLANT
DOCKET NO.: 50-213

I. INTRODUCTION

On February 25, 1983, both of the scram circuit breakers at Unit 1 of the Salem Nuclear Power Plant failed to open upon an automatic reactor trip signal from the reactor protection system. This incident occurred during the plant start-up and the reactor was tripped manually by the operator about 30 seconds after the initiation of the automatic trip signal. The failure of the circuit breakers has been determined to be related to the sticking of the under voltage trip attachment. Prior to this incident, on February 22, 1983, at Unit 1 of the Salem Nuclear Power Plant, an automatic trip signal was generated based on steam generator low-low level during plant start-up. In this case, the reactor was tripped manually by the operator almost coincidentally with the automatic trip. Following these incidents, on February 28, 1983, the NRC Executive Director for Operations (EDO), directed the staff to investigate and report on the generic implications of these occurrences at Unit 1 of the Salem Nuclear Power Plant. The results of the staff's inquiry into the generic implications of the Salem unit incidents are reported in NUREG-1000, "Generic Implications of the ATWS Events at the Salem Nuclear Power Plant." As a result of this investigation, the Commission (NRC) requested (by Generic Letter 83-28 dated July 8, 1983) all licensees of operating reactors, applicants for an operating license, and holders of

construction permits to respond to certain generic concerns. These concerns are categorized into four areas: (1) Post-Trip Review, (2) Equipment Classification and Vendor Interface, (3) Post-Maintenance Testing, and (4) Reactor Trip System Reliability Improvements.

The first action item, Post-Trip Review, consists of Action Item 1.1, "Program Description and Procedure" and Action Item 1.2, "Data and Information Capability." This safety evaluation report (SER) addresses Action Item 1.2 only.

II. REVIEW GUIDELINES

The following review guidelines were developed after initial evaluation of the various utility responses to Item 1.2 of Generic Letter 83-28 and incorporate the best features of these submittals. As such, these review guidelines in effect represent a "good practices" approach to post-trip review. We have reviewed the licensee's response to Item 1.2 against these guidelines:

A. The equipment that provides the digital sequence of events (SOE) record and the analog time history records of an unscheduled shutdown should provide a reliable source of the necessary information to be used in the post-trip review. Each plant variable which is necessary to determine the cause and progression of the events following a plant trip should be monitored by at least one recorder (such as a sequence-of-events recorder or a plant process computer) for digital parameters; and strip

charts, a plant process computer or analog recorder for analog (time history) variables. Performance characteristics guidelines for SOE and time history recorders are as follows:

- Each sequence of events recorder should be capable of detecting and recording the sequence of events with a sufficient time discrimination capability to ensure that the time responses associated with each monitored safety-related system can be ascertained, and that a determination can be made as to whether the time response is within acceptable limits based on FSAR Chapter 15 Accident Analyses. The recommended guidelines for the SOE time discrimination is approximately 100 milliseconds. If current SOE recorders do not have this time discrimination capability the licensee should show that the current time discrimination capability is sufficient for an adequate reconstruction of the course of the reactor trip and post-trip events. As a minimum this should include the ability to adequately reconstruct the transient and accident scenarios presented in Chapter 15 of the plant FSAR.

- Each analog time history data recorder should have a sample interval small enough so that the incident can be accurately reconstructed following a reactor trip. As a minimum, the licensee should be able to reconstruct the course of the transient and accident sequences evaluated in the accident analysis of

Chapter 15 of the plant FSAR. The recommended guideline for the sample interval is 10 seconds. If the time history equipment does not meet this guideline, the licensee should show that the time history capability is sufficient to accurately reconstruct the transient and accident sequences presented in Chapter 15 of the FSAR. To support the post-trip analysis of the cause of the trip and the proper functioning of involved safety related equipment, each analog time history data recorder should be capable of updating and retaining information from approximately five minutes prior to the trip until at least ten minutes after the trip.

- All equipment used to record sequence of events and time history information should be powered from a reliable and non-interruptible power source. The power source used need not be safety related.

B. The sequence of events and time history recording equipment should monitor sufficient digital and analog parameters, respectively, to assure that the course of the reactor trip and post-trip events can be reconstructed. The parameters monitored should provide sufficient information to determine the root cause of the unscheduled shutdown, the progression of the reactor trip, and the response of the plant parameters and protection and safety systems to the unscheduled shutdowns. Specifically, all input parameters associated with reactor trips, safety injections and other safety-related systems as well as output parameters sufficient to record the proper functioning of these

systems should be recorded for use in the post-trip review. The parameters deemed necessary, as a minimum, to perform a post-trip review that would determine if the plant remained within its safety limit design envelope are presented in Table 1. They were selected on the basis of staff engineering judgment following a complete evaluation of utility submittals. If the licensee's SOE recorders and time history recorders do not monitor all of the parameters suggested in these tables the licensee should show that the existing set of monitored parameters are sufficient to establish that the plant remained within the design envelope for the accident conditions analyzed in Chapter 15 of the plant FSAR.

C. The information gathered by the sequence of events and time history recorders should be stored in a manner that will allow for data retrieval and analysis. The data may be retained in either hardcopy, (e.g., computer printout, strip chart record), or in an accessible memory (e.g., magnetic disc or tape). This information should be presented in a readable and meaningful format, taking into consideration good human factors practices such as those outlined in NUREG-0700, "Guidelines for Room Design Reviews."

D. Retention of data from all unscheduled shutdowns provides a valuable reference source for the determination of the acceptability of the plant vital parameter and equipment response to subsequent unscheduled shutdowns. Information gathered during the post-trip review is to be

retained for the life of the plant for post-trip review comparisons of subsequent events.

III. EVALUATION AND CONCLUSION

By letter dated November 8, 1983, Connecticut Yankee Atomic Power Company provided information regarding its post-trip review program data and information capabilities for Haddam Neck Plant. We have evaluated the licensee's submittal against the review guidelines described in Section II. Licensee deviations from the Guidelines of Section II were reviewed with the licensee by telephone on June 5, 10, and 11, 1985. A brief description of the licensee's responses and the staff's evaluation of the response against each of the review guidelines is provided below:

A. The licensee has described the performance characteristics of the equipment used to record the sequence of events and time history data needed for post-trip review. Based on our review of the licensee's submittal, we find that the sequence of events recorder characteristics conform to the guidelines described in Section II.A, and are acceptable. Based on information obtained during our telephone calls we find that the time history recorder characteristics also conform to the guidelines described in Section II.A, since the licensee stated that a new plant computer system is being implemented that records data for at least five minutes before a trip to at least ten minutes after a trip.

B. The licensee has established and identified the parameters to be monitored and recorded for post-trip review. Based on our review of the licensee's submittal and on information obtained during our telephone reviews, we find that the parameters selected by the licensee include all but one of these identified in Table 1. The licensee stated that while Primary System Flow is not recorded on a time history recorder, there are indicators in the control room which, when combined with special procedures, provide the desired information. The staff finds this alternative acceptable.

The licensee does not record all of the sequence of events and time history parameters in the specific manner recommended in Table 1. However, based upon information provided by the licensee during our telephone reviews, we find that the licensee has alternative data sources for those parameters not recorded on the sequence of events recorders and time history recorders. These include: (1) a new plant process computer, (2) the SPDS with hardcopy capability, and (3) strip chart recorders with non-interruptible power supplies. Consequently, we find that the licensee's selection of parameters meets the intent of the guidelines described in Section II.B and is, therefore, acceptable.

C. The licensee has described the means for storage and retrieval of the information gathered by the sequence of events recorders and for the presentation of this information for post-trip review and analysis. While the licensee's submittal did not describe the format of the output

from the time history recorders and plant process computer, the licensee described these outputs during our telephone reviews. Based on these reviews, we find that this information is being presented in a readable and meaningful format, and that the storage, retrieval and presentation conform to the guidelines of Section II.C.

D. The licensee's submittal indicates that the data and information used during post-trip reviews will be retained in an accessible manner for the life of the plant. Based on our review, we find that the licensee's program for data retention conforms to the guidelines of Section II.D, and is acceptable.

Based on our review, we conclude that the licensee's post-trip review data and information capabilities for Haddam Neck Plant are acceptable.

IV. ACKNOWLEDGMENT

This safety evaluation was prepared by J. Kramer.

Dated: July 3, 1985

TABLE 1 PWR PARAMETER LIST

SOE Recorder	Time History Recorder	Parameter/Signal
(1) x		Reactor Trip
(1) x		Safety Injection
x		Containment Isolation
(1) x		Turbine Trip
x		Control Rod Position
(1) x	x	Neutron Flux, Power
x	x	Containment Pressure
(2)		Containment Radiation
	x	Containment Sump Level
(1) x	x	Primary System Pressure
(1) x	x	Primary System Temperature
(1) x		Pressurizer Level
(1) x		Reactor Coolant Pump Status
(1) x	x	Primary System Flow
(3)		Safety Inj.; Flow, Pump/Valve Status
x		MSIV Position
x	x	Steam Generator Pressure
(1) x	x	Steam Generator Level
(1) x	x	Feedwater Flow
(1) x	x	Steam Flow

SOE Recorder	Time History Recorder	Parameter/Signal
(3)		Auxiliary Feedwater System: Flow, Pump/Valve Status
x		AC and DC System Status (Bus Voltage)
x		Diesel Generator Status (Start/Stop, On/Off)
x		PORV Position

(1) Trip parameters

(2) Parameter may be monitored by either an SOE or time history recorder.

(3) Acceptable recorder options are; (a) system flow recorded on an SOE recorder, (b) system flow recorded on a time history recorder, or (c) equipment status recorded on an SOE recorder.