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5211-84-2023

Office of Nuclear Reactor Regulation  
ATTN: D. G. Eisenhut, Director  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Eisenhut:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
Operating License No. DPR-50  
Docket No. 50-289  
Safety Parameter Display System  
NUREG-0737 (Item I.D.2)

This letter provides information about the TMI-1 SPDS based on our August 4, 1983 (updated November 28, 1983) submittal to the Commission entitled "Licensee Comments on Commissioner Gilinsky's Tentative Conclusion" Appendix A. In the document we stated our intentions to provide the NRC with "...identification of any additional instruments and schedule for implementation ..."

Attachment 1 provides the current list\* of instrumentation we have identified for an operational 'basic' and 'upgraded' SPDS. Our 'basic' SPDS will satisfy the major requirements for four of the five identified critical safety functions. The 'basic' SPDS will include parameters presently in the plant process computer data base. Upgrades to the basic SPDS will incorporate parameters from existing and new instrumentation not currently in the process computer data base.

At this time, our target to complete upgrades to the 'basic' SPDS is the first available outage of sufficient duration following June 1985. However, we have initiated planning and scheduling in an attempt to integrate this new instrumentation at the same time we declare the 'basic' SPDS operational. This accelerated goal is a function of procurement lead time and plant availability.

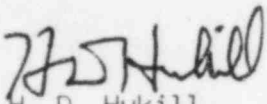
\*Although we consider the list complete at this time, as further analysis and detailed development of the SPDS continues, we will update the list and notify your staff as appropriate.

Attachment 2 describes our schedule for implementation to fulfill the various commitments made in our response to Generic Letter 82-33 and updates the information supplied in our April 15, 1983 letter by incorporating changes to the description of the system.

Finally, we wish to clarify our intentions for the SPDS as stated by the Staff's memorandum of the December 16, 1983 meeting. Our intent is to have operational 'basic' SPDS by the end of 1984. We will attempt to upgrade this 'basic' SPDS with the new instrumentation at the same time. But, as expressed above, our target to complete upgrades will be during the first appropriate outage after June 1985.

We trust this information and attachments will clarify and apprise the Staff of our progress in the implementation of the TMI-1 SPDS.

Sincerely,

A handwritten signature in dark ink, appearing to read "H. D. Hukill". The signature is stylized with a large, looped "H" and a cursive "Hukill".

H. D. Hukill  
Vice President - TMI-1

cc: J. Van Vliet  
R. Conte

# ATTACHMENT 1

## SAFETY PARAMETER DISPLAY SYSTEM

<u>PARAMETERS</u>	<u>Critical Safety Functions</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
REACTOR TRIP SIGNAL	3	X		X	
EFFECTIVE FULL POWER DAYS (EFPD)	3	X			
POWER RANGE POWER	3			X	
POWER RANGE IMBALANCE	3			X	
SOURCE RANGE START UP RATE	3	X			
INTERMEDIATE RANGE START UP RATE	3	X			
RCS WIDE RANGE PRESSURE	3			X	
STEAM GENERATOR PRESSURE	3			X	
REACTOR BUILDING PRESSURE	3				X
CONDENSER VACUUM	3	X			
RCS WIDE RANGE COLD LEG TEMPERATURE	3			X	
RCS WIDE RANGE HOT LEG TEMPERATURE	3			X	
INCORE THERMOCOUPLE TEMPERATURE	3	X		X	
REACTOR BUILDING TEMPERATURE	1	X			X
HEATUP/COOLDOWN RATE	3	X		X	
REACTOR BUILDING SUMP LEVEL	3	X			
REACTOR BUILDING FLOOD LEVEL	3				X
REACTOR VESSEL WATER LEVEL	2	X		X	
HOT LEG WATER LEVEL	2	X			
PRESSURIZER LEVEL	3	X			
RCS TOTAL FLOW	3			X	
RCS LETDOWN FLOW	3	X			
RCS MAKEUP FLOW	3	X			
HIGH PRESSURE INJECTION FLOW	1	X			
MAIN FEEDWATER FLOW	3			X	
REACTOR COOLANT PUMP STATUS	3	X		X	
CIRCULATING WATER PUMP STATUS	3	X			
ROD INDEX	3	X			
REACTOR BUILDING HYDROGEN MONITOR	3				X
RM-L1 Lo (Letdown)	1			X	
RM-L2 (A Loop Decay Heat Closed)	1	X			
RM-L3 (B Loop Decay Heat Closed)	1	X			
RM-L9 (Intermediate Closed)	1	X			
RM-A2 GAS/PARTICULATE/IODINE (RB Atmosphere)	1	X			X
RM-A4 GAS/PARTICULATE/IODINE (FHB Atmosphere)	1			X	
RM-A5 (Condenser Exhaust)	1	X			
RM-A6 GAS/PARTICULATE/IODINE (Aux Bldg Atm)	1			X	
RM-A8 GAS/PARTICULATE/IODINE (Plant Stack)	1			X	
RM-A9 GAS/PARTICULATE/IODINE (RB Stack)	1			X	
PM-G8 (Reactor Building Dome)	1	X			X
RM-G26 (A Loop Steam Relief)	1	X			
RM-G27 (B Loop Steam Relief)	1	X			
BORON CONCENTRATION (Grab Sample)	3	X			

ATTACHMENT 1 (Cont'd)

CRITICAL SAFETY FUNCTIONS

1. Reactivity Control
2. Reactor Coolant System Inventory Control
3. Primary Side Heat Removal
4. Radiation Control
5. Reactor Building Environment

NOTES

1. Parameters presently available in the control room but not available on the plant process computer.
2. Parameters which are not presently installed at TMI-1.
3. Parameters presently in the plant process computer data base.

## ATTACHMENT 2

### TMI-1 SCHEDULE FOR SPDS IMPLEMENTATION

#### A. THE TMI-1 SPDS

In our April 15, 1983 letter, we described our designs and status for the SPDS as a subset of the Plant Computer System. The following provides an update and elaboration of that description: The TMI-1 SPDS will be available in a 'basic' form by January 1, 1985. The 'final' form is scheduled to be completed by June 1985 or the first outage after this date, of sufficient length to allow the new instrumentation to be connected to the Plant Process Computer System. However, planning and scheduling have been initiated in an attempt to implement the 'final' form concurrent with the 'basic' SPDS.

The SPDS has evolved as a result of work done to define the objectives of the SPDS and the parameters required to meet these objectives. Attachment 1 is a complete list of the SPDS critical safety functions and the parameters associated with each function. This list is expected to go through minor changes as the safety analysis, user guideline, and CRT display development work continues. Even after the SPDS has been implemented, operational experience with the system may cause changes in the parameter set.

#### B. BASIC SPDS

The 'basic' SPDS is that portion of the final SPDS which is a subset of the 2500 points currently available in the computer data base. These parameters are identified by Note 3 in Attachment 1. The 'basic' SPDS will satisfy the major requirements of four of the five critical safety functions.

A subset of the 'basic' SPDS has already been implemented at TMI-1 in the form of a post trip pressure-temperature plot. This plot is used to evaluate core cooling and heat removal from the reactor coolant system. This display supports the use of symptom-oriented emergency procedures developed from the ATOG program. Operators and Shift Technical Advisors are taught how to interpret this display by a computer aided instruction course.

#### C. FINAL SPDS

The 'final' SPDS will include the 'basic' SPDS plus additional parameters which are available in the control room but not on the Plant Process Computer System. These additional parameters are identified by Note 1 in Attachment 1. The 'final' SPDS will also include new parameters which are presently being installed at TMI-1. These parameters are identified by Note 2 in Attachment 1.

## SCHEDULE

The implementation schedule for the SPDS is shown on Figure 2-1 and the important milestones are discussed below.

### o SPDS SAFETY ANALYSIS

An SPDS safety analysis is currently being performed, and Critical Safety Functions (CSF) which would describe the safety status of the plant have been identified. Parameters for each CSF to satisfy the objectives for that CSF have also been identified and include additional instrumentation/parameters which require incorporation into the existing plant computer data base. The SPDS parameters will alert the user through warnings or alarms of abnormal conditions and will be tested (analytically) against a range of transients/accidents to determine if each event in a transient can be monitored and evaluated adequately. A safety analysis report will be submitted to the NRC by April 30, 1984.

### o USER GUIDELINES

User guidelines will be developed to aid the user in evaluating and dealing with normal and abnormal conditions. These guidelines will also serve as the basis for developing CSF displays and for training the SPDS users.

### o IMPLEMENTATION PLAN

In our April 15 and July 12, 1983 letters, we provided a major milestone schedule for implementation of the SPDS. Further refinement to this plan together with the verification/validation program will be submitted to the NRC by June 30, 1984.

### o DISPLAYS DEVELOPED

CRT displays will be developed to provide concise and unambiguous information to the user. These displays will be accessible by using the CRT presently available in the control room. The SPDS warnings and alarms will be incorporated into the existing alarm processor. The displays and alarms will have a human factors review performed on them prior to implementation.

### o DISPLAYS IMPLEMENTED

In this phase, computer programs will be written which allow the displays to be implemented in real time in the control room. The programs will have a verification and validation process performed on them prior to implementation.

### o USERS TRAINED

The users will receive proper training on the SPDS philosophy, design and use. This training will in part be developed from the user guidelines. This training will also include the observation of how the SPDS responds to a few transient/accident scenarios developed for this purpose.

## PROCESS COMPUTER UPGRADE

Independently of SPDS implementation, longer range plans for the process computer include replacement with a new computer system providing two fully compatible and redundant computer systems which will be powered from an uninterruptible power supply.

These improvements which are beyond the requirements of NUREG-0737, will enhance the SPDS in the areas of redundancy and reliability.

FIGURE 2-1

SPDS IMPLEMENTATION SCHEDULE

			<u>1984</u>							<u>1985</u>
APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCT	NOV	DEC	JANUARY	
SPDS Safety Analysis		User Guide- lines	Refinements to Imple- mentation plan to NRC	Displays Developed			Displays Imple- mented	Users trained	Basic SPDS available	
			Description of verification and validation plan							
							<u>JUNE 1985</u>			
							Final SPDS Available*			

\* May be delayed until the first outage of sufficient length to allow new instrumentation to be connected to the Plant Process Computer System. However, planning and scheduling have been initiated to attempt to have implemented upgrades to Basic SPDS by January 1985 if the plant is available for installation for new signals.