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GL 89-06

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
GENERIC LETTER (GL) 89-06 TASK ACTION PLANT ITEM I.D. 2-
SAFETY PARAMETER DISPLAY SYSTEM (SPDS) RESPONSE

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Attn: T. E. Murley

August 1, 1989

Dear Dr. Murley:

This letter responds to Generic Letter (GL) 89-06 dated April 12, 1989, received on May 8, 1989, concerning NUREG-0737 Task Action Plant Item I.D. 2 - SPDS. The following discussion is provided in accordance with paragraph three of the letter.

DISCUSSION

As pointed out in GL 89-06, NUREG-0737 Supplement 1 "...extracted the fundamental requirements for emergency response capability from the wide range of regulatory documents issued on the subject. It was written at the conceptual level to allow for a high degree of flexibility in scheduling and design." As we indicated in our response to GL 82-33 (AEP:NRC:0773 dated April 15, 1983), we also used the wide range of regulatory documents, specifically NUREGs -0585, -0660, -0696, and -0737, published respectively in October 1979, May 1980, February 1981, and November 1980, as conceptual guidance in procuring our SPDS from Westinghouse in May of 1980. Further, we believe the Westinghouse designed SPDS met the intent of the wide range of regulatory documents then available.

We also relied heavily on the ability of our vendor, Westinghouse, to obtain a favorable Nuclear Regulatory Commission Safety Evaluation Report (SER). The NRC did issue an SER on February 2, 1984 on the Westinghouse generic SPDS. Our SPDS Analysis Report was submitted in letter AEP:NRC:0531A dated June 19, 1981 and clarified by letters AEP:NRC:0531E, H, and I dated September 29,

A003
1/1

1982, April 3, 1985 and May 31, 1985, respectively. The Westinghouse design methodology, verification and validation program, and parameter selection were used for the Cook Nuclear Plant SPDS and as such were approved by the generic SER dated February 2, 1984.

CURRENT STATUS

In response to the above submittals, we received an SER dated August 12, 1985 that stated in part:
"We have reviewed the SPDS Safety Analysis Report for Donald C. Cook and conclude it is acceptable for IMEC to continue implementing its SPDS Program, but this is conditional to a satisfactory resolution of our concerns. Our review of the process variables selected for display on the SPDS identified the following concerns:

1. It is not clear that reactor coolant subcooling is displayed as a discrete variable. If a discrete subcooling monitor is provided for D. C. Cook in compliance with NUREG-0737, Item II.F.2, it should be considered for display in the SPDS.

2. It is not clear that a 'containment isolation' assessment is provided in the display system. Although valve position is provided for many 'major valves,' it is not clear that these constitute the set comprising 'containment isolation,' and it is not apparent that containment isolation is displayed as a discrete variable.

3. Apparently IMEC does not have instrumentation to monitor steam generator (steamline) radiation for an isolated steam generator. The control room operator will not be able to make a rapid assessment of radioactivity control when the steam generators and/or its steamlines are isolated.

Additional details on these concerns are provided in the enclosed Safety Evaluation. We recommend that either the above defined variables be added to the SPDS to provide unique data to the operator in evaluating critical safety function or that IMEC provide us with additional justification that they not be included."

We believe that we satisfactorily responded to these concerns in letters AEP:NRC:0531K, dated September 26, 1985, AEP:NRC:0678Z

dated September 8, 1986, and AEP:NRC:0773Y dated May 18, 1987. The reactor coolant subcooling is displayed on the SPDS top level/ICONIC display as a discrete variable. (It should be noted that the terms top level display and ICONIC are synonymous.) We have also proceeded to upgrade the containment isolation indications and plan to have containment isolation status available on a terminal that is adjacent to the SPDS ICONIC display terminals by the end of the 1990 refueling outages for both units.

We do not have instrumentation on the steam generator (steamline) to monitor radiation. We believe that the steam generator PORV radiation monitoring system is adequate to assess radioactivity when the steam generators and/or its steamlines are isolated. The concern for steam generator (steamline) radiation monitoring remains an open issue under consideration by the NRC and is discussed in submittals AEP:NRC:0678Z and 0773Y. The primary method for determining effluent releases is the Eberline RMS terminal which is adjacent to the SPDS terminal. NUREG-1342 describes this arrangement as satisfactory.

We have completed the GL 89-06 checklist to the best of our understanding of the specific questions and included it as an Attachment to this letter to show any additional Cook Nuclear Plant SPDS variations from the NRC requirements outlined in NUREG-1342.

We declared our SPDS operational, and have maintained operational status, since March 31, 1986, for Unit 1 and July 11, 1986 for Unit 2. Our SPDS was reviewed by the NRC during the February 1987 Detailed Control Room Design Review (DCRDR) audit. We responded to the auditor's comments, and have documented the status of our SPDS as requested in letters AEP:NRC:0678Z and AEP:NRC:0773Y.

CONCLUSION

Based on the vintage of our SPDS, we cannot certify to meeting all the requirements of NUREG-0737, Supplement 1, considering the information provided in NUREG-1342. We do believe that the state-of-the-art SPDS that we purchased in May 1980 met the intent of the directives published at the time. Furthermore, based on operator experience, we believe that by referring to sub-level displays and the separate RMS monitor, we adequately compensate for indications that are not available on the SPDS top level/ICONIC display.

While the Cook SPDS does not meet all of the requirements of NUREG-0737, we believe that we have demonstrated, during each NRC

review/inspection, an SPDS adequate to the post accident needs of the operator.

This letter is submitted pursuant to 10 CFR 50.54(f) and, as such, an oath of affirmation is enclosed.

Sincerely,

M. P. Alexich
Vice President

MPA/eh

Attachment

cc: D. H. Williams, Jr.
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Charnoff
NFEM Section Chief
A. B. Davis - Region III
NRC Resident Inspector - Bridgman

STATE OF OHIO)
COUNTY OF FRANKLIN)

Milton P. Alexich, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the forgoing Response to Generic Letter (GL) 89-06 Task Action Plant Item I.D. 2-Safety Parameter Display System (SPDS) Response and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

M P Alexich

Subscribed and sworn to before me this 1st

day of August, 1989.

Lisa D. Hice
NOTARY PUBLIC

Commission expires 6-28-94

ATTACHMENT TO 0773AE

GENERIC LETTER 89-06: TASK ACTION PLANT ITEM I.D. 2-

SAFETY PARAMETER DISPLAY SYSTEM (SPDS) RESPONSE

SPDS CHECKLIST

This checklist is intended to aid licensees in determining the status of their SPDS. Bracketed, [ ], information refers to the section in NUREG-1342 where discussions on the specific question(s) may be found.

1.0 GENERAL DESCRIPTION

1.1 Plant Name: Donald C. Cook Nuclear Plant

1.2 Who/What organization developed the original version of the SPDS software implemented at your site?

___ Utility (in-house)

___ Utility Owner's Group; which? _____

_X_ Contractor; which? Westinghouse

___ Other; who? _____

1.3 If the SPDS software has undergone significant modification (i.e., more than 25 percent of software replaced or modified) since original implementation, list the organization performing the modification:

___ Utility (in-house)

___ Utility Owner's Group _____

___ Contractor _____

___ Other _____

1.4 What is the hardware host on which the current SPDS software is implemented?

___ Westinghouse P250

_x_ Westinghouse P2500

___ Gould/SEL, Model Number _____

___ Digital (DEC), Model Number _____

___ IBM, Model Number _____

___ MODCOMP, Model Number _____

___ Babcock & Wilcox (Recall)

___ Honeywell, Model Number _____

___ Burroughs, Model Number _____

___ Other: Manufacturer, Model _____

_____

1.5 How many total CPUs are accessible by SPDS software on the computer system described in the previous question? four (4)

1.6 What is the approximate MIPS rating of all the CPUs counted above?

0.5 MIPS/CPU NOTE: Use a decimal fraction if less than 1.0

If SPDS does not run on a single computer system, provide the following information for the minority parameter set provided by a second computer system. For example, a frequent occurrence of this case is where a separate but adjacent computer terminal provides radiological parameters.

1.7 Manufacturer Eberline/Hewlett Packard (Note 1)

1.8 Model Number CRT-5 /HP - 9000 Model 310

1.9 List parameters provided: (on the second system)

Radioactivity Control Parameters
Effluent Monitors
*Plant Unit Vent, Airborne
*Steam Jet Air Ejector Noble Gas
*Gland Seal Condensor Exhaust Noble Gas
Main Steam Relief for Atmosphere
(SG PORV Monitor) Gross Gamma
Steamline Radiation Monitored by
Effluents (see above)

Containment Radiation
Containment Area Radiation
**Containment Airborne

* - includes effluent flow rate
** - isolates on Phase B containment isolation

Note 1. Currently the radiation monitoring function is on the SPDS narrow and wide range ICONIC displays and the Eberline RMS display terminals. It will be removed from the SPDS ICONIC display and only presented on the Eberline RMS displays that are adjacent to the SPDS display terminals.

1.10 Are significant changes in hardware or software planned in the next two years? ___YES _x_ NO.*

*The following changes are planned in the next two years but we do not expect them to have a significant effect on software or hardware.

If YES, briefly describe planned changes and list a schedule of major milestones.

1. Install limit switch inputs for containment isolation displays: 1990 refueling outages
2. software for Containment Isolation Status: 1990 refueling outages
3. software changes resulting from Human Factors Review: 1992 refueling outages
4. We intend to remove the Radiation Monitoring Status Displays from ICONICS. The primary Radiation Control Parameters Listed in Section 1.9 are displayed on a Eberline RMS terminal situated adjacent to SPDS ICONIC terminal.

2.0 PARAMETER SELECTION

This section is divided into two parts: the safety functions, and the parameters used to depict each safety function.

2.1 Plant-Specific Safety Functions [III.F.]

List the title of the plant-specific safety function(s) displayed on your SPDS that is (are) equivalent to the safety function in Supplement 1 to NUREG-0737.

Supplement 1 To NUREG-0737 Safety Functions	Plant-Specific Safety Functions
2.1.1. Reactivity Control	Startup Rate — Wide Range Iconic Power Mismatch — Narrow Range Iconic

Supplement 1 To NUREG-0737 Safety Functions		Plant-Specific Safety Functions	
2.1.2	Core Cooling and Heat Removal	RCS Pressure	Wide Range Iconic
		Core Exit Temperature	Wide Range Iconic
		SG Level	Wide Range Iconic
		RV Level	Wide Range Iconic
		PRZR Pressure	Narrow Range Iconic
		RCS Tavg	Narrow Range Iconic
		SG Level	Narrow Range Iconic
2.1.3.	RCS Integrity	PRZR Level	Wide Range Iconic
		RV Level	Wide Range Iconic
		CNTMT Pressure	Wide Range Iconic
		SG Level	Wide Range Iconic
		RCS Pressure	Wide Range Iconic
		PRZR Level	Narrow Range Iconic
		Net Charging Flow	Narrow Range Iconic
		CNTMT Monitor	Narrow Range Iconic
		SG Level	Narrow Range Iconic
		Radiation Monitoring	Presently on Wide & Narrow Range Iconic & Eberli
			Proposed on Eberline Only RMS terminal
2.1.4.	Radioactivity Control	Radiation Monitoring	Presently on Wide & Narrow Range Iconic & Eberline
			Proposed on Eberline Only RMS terminal
2.1.5.	Containment Conditions	CNTMT Pressure	Wide Range Iconic
		CNTMT Monitoring	Narrow Range Iconic
		Radiation Monitoring	Presently on Wide & Narrow Range Iconic & Eberline.
			Proposed on Eberline Only RMS terminal

2.2 Parameters Selected to Display Each Safety Function

The purpose of this section is to specify a list of parameters used to depict each of the five safety functions identifed in Supplement 1 to NUREG-0737. Lists of parameters that have been found acceptable to NRC through previous SPDS post-implementation reviews have been provided. One list of parameters applies to pressurized water reactors in general, and the other list applies to boiling water reactors.

NOTE: Check any parameters that have been selected as an SPDS parameter. List any additional parameters under the relevant "Others" category. Include additional safety functions and parameters that are a part of your SPDS.

PRESSURIZED WATER REACTOR SPDS PARAMETER SELECTION CHECKLIST [III.F.1]

Supplement 1 To NUREG-0737 Safety Functions	Parameters
2.2.1 ~~Reactivity Control~~ Wide Range Iconic Startup Rate Narrow Range Iconic Power Mismatch	Neutron Flux _X_ Source Range _X_ Intermediate Range _X_ Power Range _X_ Other: (List) Turbine Impulse Pressure
2.2.2 ~~Reactor Core Cooling and Heat Removal from the Primary System~~ Wide Range Iconic RCS Pressure Core Exit Temperature Steam Generator Level Reactor Vessel Level Narrow Range Iconic Pressurizer Pressure RCS Tavg Steam Generator Level	_X_ RCS Level _X_ Subcooling Margin ___ Hot Leg Temperature ___ Cold Leg Temperature _X_ Core Exit Thermocouples _X_ Steam Generator Level NARROW & WIDE ___ Steam Generator Pressure ___ RHR Flow _X_ Other: (List) PRZR Pressure RCS Tavg RCS Pressure

Supplement 1 To NUREG-0737 Safety Functions	Parameters
2.2.3 ~~RCS Integrity~~	X RCS Pressure
Wide Range Iconic	___ Cold Leg Temperature
Pressurizer Level Reactor Vessel Level RCS Pressure Containment Pressure Steam Generator Level	X Containment Sump Level X Steam Generator (Level) X Other: (List) PRZR Level Wide & Narrow Range Net Charging Flow a. RCP 1 seal return flow b. RCP 2 seal return flow c. RCP 3 seal return flow d. RCP 4 seal return flow e. Letdown flow
Narrow Range Iconic Pressurizer Level Net Charging Flow Containment Monitor Steam Generator Level Radiation Monitoring	Radiation Monitoring (See Answer to Question 1.9) CNTMT Temperature maximum CNTMT Pressure RV Level
2.2.4 ~~Radioactivity Control~~***	X Stack Monitor (s)
Radioactivity Control Parameters	___ Steamline Radiation (s)
Effluent Monitors *Plant Unit Vent, Airborne *Steam Jet Air Ejector Noble Gas *Gland Seal Condenser Exhaust Noble Gas Main Steam Relief for Atmosphere (SG PORV Monitor) Gross Gamma	X Containment Radiation ___ Other: (List) _____ _____
Steamline Radiation Monitored by Effluents (see above)	
Containment Radiation Containment Area Radiation **Containment Airborne	

* - includes effluent flow rate
** - isolates on Phase B containment isolation
*** - On Eberline RMS terminal

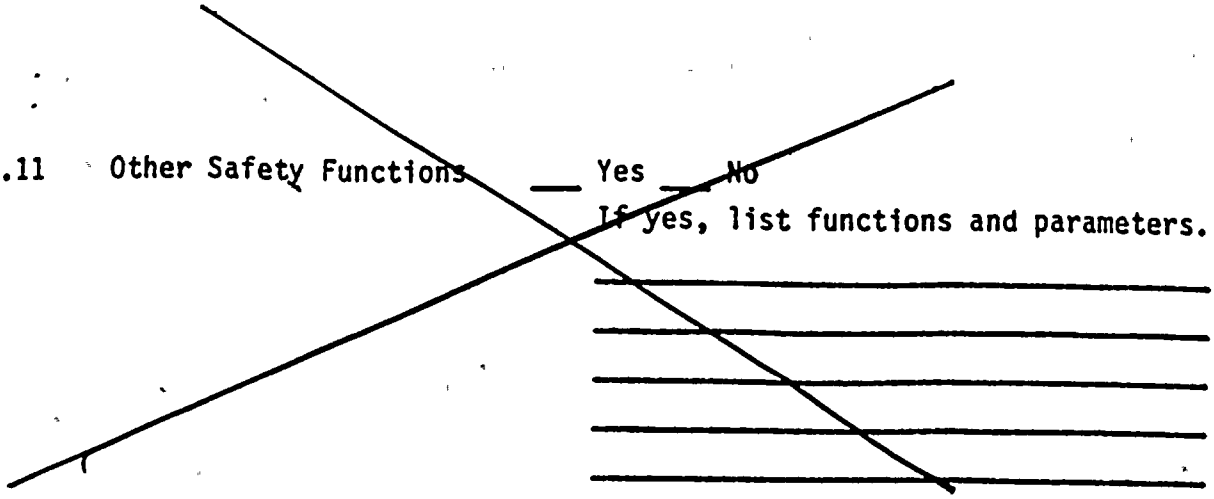
Supplement 1 To NUREG-0737 Safety Functions	Parameters
2.2.5 ~~Containment Conditions~~ Wide Range Iconic Containment Pressure Narrow Range Iconic Containment Monitoring Both Wide & Narrow Range Iconic Radiation Monitoring (Proposed for Removal) *planned to be added by end of 1990 refueling outages **on Eberline terminal, parameters given in 2.2.4 & 1.9	_X_ Containment Pressure _X_ Containment Isolation * ___ Containment Hydrogen Concentration _X_ Other: (List) CNTMT Sump Level inputs CNTMT temperature inputs **Radiation Monitoring inputs
2.2.6 Other Safety Functions	___ Yes _X_ No If yes, list functions and parameters.

BOILING WATER REACTOR SPDS PARAMETER SELECTION CHECKLIST [III.F.2]

Supplement 1 To NUREG-0737 Safety Functions	Parameters
2.2.6 Reactivity Control	___ APRM ___ SRM ___ Other: (List) _____
2.2.7 Reactor Core Cooling and Removal	___ RPV Water Level ___ Drywell Temperature ___ Other: (List) _____
2.2.8 Pressure Vessel Integrity	___ RPV Pressure ___ Other: (List) _____
2.2.9 Radioactivity Control	___ Main Stack or Offgas (Pretreatment) Monitor ___ Containment Radiation Monitor ___ Other: (List) _____
2.2.10 Containment Integrity	___ Drywell Pressure ___ Drywell Temperature ___ Suppression Pool Temperature ___ Suppression Pool Level ___ Containment Isolation Valve Status ___ Drywell Hydrogen Concentration ___ Drywell Oxygen Concentration ___ Other: (List) _____

2.2.11 Other Safety Functions ___ Yes ___ No

If yes, list functions and parameters.



2.3 Detailed Parameter Questions [III.F.1.e and III.F.2.e]

2.3.1 Are containment isolation demand signals input to SPDS (e.g., PWR - Phase A/B Isolation Demand Signal or BWR - Group Isolation Demand Signals)?

___ YES* _x_ NO

*Not provided on ICONIC DISPLAYS. Will be displayed on adjacent TSC computer display terminal.

2.3.2 Does the SPDS use actual containment isolation valve position as an input to monitor successful isolation? ___ YES* _x_ NO

*Actual valve position inputs will be used to display containment isolation on adjacent TSC computer display terminal.

3.0 DISPLAY OF SAFETY FUNCTIONS [III.F.]

3.1 Does the SPDS provide the status of all five safety functions on one display page? _x_ YES* ___ NO

*Containment Condition does not include containment isolation status parameter.

3.2 Are the individual parameters that support the safety functions grouped by safety function? ___ YES _x_ NO

3.3 Is the status of all five safety functions <u>always</u> displayed on the SPDS? [III.B.2] ___ YES _x_ NO

4.0 RELIABLE DISPLAY [III.A.3 except as noted]

4.1 Is the SPDS hosted on the same computer system as the plant process computer? ___ YES _x_ NO

If NO, does the SPDS computer receive some of the computer point inputs from the process computer? ___ YES _x_ NO

4.2 List location of accessible (e.g., keyboards) devices capable of changing SPDS data. [III.A.3.a]

4 CRTs in the control room

4.3 Are SPDS hardware availability data documented? X YES ___ NO

IF YES, what is the documented percent availability of the SPDS hardware over the past 12 months? NOTE: Availability should be based on power operation, startup, hot standby, and hot shutdown only and not include other plant modes. U-1 99.2% 6/1/88 to 5/31/89 % Available
U-2 99.4% 6/1/88 to 5/31/89

4.4 Are the SPDS computer points included in routine instrument loop surveillances? [III.A.3.a] ___ YES X NO.

4.5 What percentage of software verification and validation has been completed?

X 100%
___ Approximately half
___ Planned in the future
___ Other, describe _____

4.6 Have changes to the SPDS host computer and software been maintained under a formal Software/Hardware Change Request (or equivalent) system? Check all that apply below:

X Yes; For how long? 3½ years
___ No
___ Have plans to in the future

4.7 How frequently does the SPDS display invalid or erroneous information? [III.A.3.a]

___ frequent (above 5 percent)
___ infrequent (1-5 percent)
_X_ rare (less than 1 percent of the time)

4.8 How frequently have any of the critical safety functions been in a false alarm condition? [III.A.3.a]

___ frequent (above 5 percent)
___ infrequent (1-5 percent)
_X_ rare (less than 1 percent of the time)*

*Not including Westinghouse Radiation Monitoring inputs. It is proposed they be replaced by the Eberline RMS terminal.

4.9 Does the SPDS display valid parameter information during adverse containment conditions? _X_ YES ___ NO

Re: Eckenrode 6/8/89 - "The SPDS Containment information must be at least as good (reliable) as the primary instrumentation system."

5.0 HUMAN FACTORS [III.E except as noted]

Human factors in the context of SPDS design includes the usefulness of the technical information displayed on the screen to users and their performance during emergency operations. Human factors also includes display design techniques, such as labeling, display layout, and control/display integration.

This section provides a sample of the kinds of questions to be asked to help determine the degree to which the SPDS design incorporates accepted human factors principles.

5.1 Who is the prime user of the SPDS? [III.B.1]

_X_ Shift Supervisor
_X_ Shift Technical Advisor
_X_ Board Operators/Unit Supervisor
_X_ Other (specify) TSC personnel

5.2 Are all SPDS controls located at the SPDS workstation? _x_ YES ___ NO [III.B.1]

If NO, where are the controls located? _____

_____

5.3 Is all SPDS-related information physically displayed such that the information can clearly be read from the SPDS user's typical position? [III.A.1 and III.B.1]

_x_ YES* ___ NO

*Except for Containment Isolation

If NO, what specific information is available at other locations?

_____

_____

5.4 How are SPDS displays accessed? [III.A.2]

_____ Continuous display, no interaction possible.
__x__ Keyboard, one or two keystroke function key.
__x__ Keyboard, greater than 2 keystrokes.
_____ Touchscreen.
__x__ Cursor/menu (mouse, joystick, up/down key).

5.5 Does the SPDS consistently respond to user commands in less than 10 seconds? [III.A.2]

_x_ YES ___ NO

If NO, is feedback provided to the user regarding delays in response?

___ YES ___ NO

5.6 Does the SPDS sampling rate for parameters match the display update rate for those parameters? [III.A.2]

_x_ YES ___ NO* Except for RMS

Proposed Eberline RMS display updates every 10-15 second for each displayed channel. Parameter value updates occur as function of count rate.

If NO, what specific parameters do not match?

Eberline RMS parameters

5.7 Are all parameter units of measure displayed on the SPDS consistent with the units of measure included in the emergency operating procedures?

x YES ___ NO

5.8 Are all parameter labels and abbreviations consistent with the labels and abbreviations included in the emergency operating procedures?

___ YES x NO

5.9 Is any of the displayed information in a form that requires transformation or calculation?

___ YES x NO

IF YES, what types of transformations or calculations are necessary?

5.10 Are the high-and low-level setpoints consistent with hard-wired parameter instrumentation and reactor protection system setpoints?

___ YES x NO

5.11 Does SPDS display high-and low-level setpoints?

___ YES x NO

5.12 Are the SPDS calculated values such as subcooling margin, consistent with calculated values on the plant process computer?

___ YES x NO

5.13 Are all parameter units of measure displayed on SPDS consistent with the hard wired instrumentation?

_x_ YES ___ NO

5.14 Are all parameter labels and abbreviations consistent with hard-wired instrument labels and abbreviations?

_x_ YES ___ NO

5.15 Were the technical basis for software specifications verified with plant-specific data (for example, heat-up and cool-down limits, variable steam generator setpoints and high and low level alarm setpoints)?

___ YES _X_ NO (heat-up and cool-down limits - not applicable to SPDS Iconic)

5.16 List LERs written as a result of SPDS software problems.

None

6.0 TRAINING [III.C.2 all questions]

6.1 Does simulator training include training in the use of the SPDS?

___ YES _x_ NO

6.2 How long is formal classroom training for SPDS users?

___ No formal classroom training

_x_ Less than 2 hours

___ 2-4 hours

___ More than 4 hours

6.3 Is there periodic requalification training for SPDS? ___ YES _x_ NO

If YES, how often? _____

6.4 When are SPDS users given training regarding the relationship of the parameters to the plant safety functions? Check all that apply below:

____	Not trained
X	On the job or required reading
X	During requalification training
X	During an initial SPDS training program

7.0 ELECTRICAL ISOLATION [III.C.1 all questions]

7.1 What isolation devices are currently used?

ANALOG - FOXBORO Model M-66D-CO, M-66G - OW, Scientific Columbus type P;
DIGITAL - GE-HGA, HFA, HEA, NGV, Westinghouse AR & ARD, C. P. Claire type J, Cutler Hammer type M-600, Struthers-Dunn type 214XCX48P
ADDITIONAL ANALOG: VICTOREEN 879-1

7.2 Are these devices the same ones that were originally installed and approved by NRC? X YES* ___ NO

*Victoreen isolator used to supply hi range containment area radiation data from class IE Monitor to both the Eberline System and the TSC.

This isolator installed for 0737/RG 1.97 not original protection system equipment.