TOLEDO EDISON

RICHARD P. CROUSE
Vice President
Nuclear
(419) 259-5221

Docket No. 50-346

License No. NPF-3

Serial No. 1059

June 28, 1984

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz
Operating Reactor Branch No. 4
Division of Operating Reactors
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Stolz:

On December 17, 1982 the NRC issued Supplement 1 to NUREG-0737 "Requirements for Emergency Response Capability" (Generic Letter No. 82-33) (Log No. 1168). Toledo Edison was requested as part of the letter to submit a report describing how we meet the requirements of Regulatory Guide 1.97 "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." Attached is Toledo Edison Report for Regulatory Guide 1.97 for the Davis-Besse Nuclear Power Station Unit No. 1.

Toledo Edison will submit its proposed schedule for implementation by January 31, 1985 in accordance Commision Order dated February 21, 1984 as revised June 5, 1984 (Log No. 1527).

Very truly yours,

RPCrouse

RPC:GAB:lah

cc: DB-1 NRC Resident Inspector

attachments - 5 copies

A046
1/1

INTRODUCTION

Toledo Edison has reviewed the NRC generic letter 82-33 dated December 17, 1982 transmitted to licensees, Supplement 1 of NUREG-0737 requiring licensees to address RG 1.97 in determining plant specific Accident Monitoring Instrumentation and to justify alternate design or exceptions to the recommendations and guidelines of RG 1.97.

This report describes Davis-Besse's Nuclear Power Station Unit 1 Monitoring Instrumentation and its comparison with RG 1.97 Revision 3 criteria.

This report contains two main sections. Section I provides a summary of RG 1.97 parameters with respect to compliance with type and category requirements along with any justifications of exceptions taken for type A, B, C, D and E variables. The compliance information for each parameter is condensed and provides the following data:

a. For the category specified in RG 1.97, an instrument train is considered complient with the requirements of RG 1.97 if and only if it meets all the criteria specified for the same category as outlined in Section II.

b. References to justification of exceptions or nonconformances are also identified in the table.

c. The description of the exception justification is included on the pages following the table.

Section II consists of Davis-Besse's acceptance criteria and guidelines for compliance with the design and qualification criteria for instrumentation contained in Table 1 of RG 1.97.

The categories are separated into three main groups that provide a graded approach to requirements depending on the importance of the specific variable. The first group, Category 1, provides the most stringent group requirements (Class 1E) and is intended for key variables. The second as Category 2, generally applies to instrumentation for indicating system operating status. Category 2 consists of some Class 1E instrument loops from sensor to display and some Class 1E instrument loops from sensors up to and including channel isolation devices. Category 3 provides high-quality instrumentation for backup and diagnostic purposes. Non-Class 1E instrumentation is considered adequate for monitoring Category 3 parameters.

Section I

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATE-GORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
Neutron Flux	10^{-6} -100% F.P.	1	B	C	N	C	N	1	C	C	2/2/4	N	C	C	C	A
Control Rod Position	Full In or Not	3	B	C	C	C	C	3	C	C	1	C	C	C	C	
RCS Soluble Boron Content	0 to 6000 PPM	3	B	E	E	E	E	3	E	E	1	E	E	E	E	C
RCS Cold Leg Temp.	50° to 700°F	1	B	E	C	E	E	3	E	C	2	C	C	C	C	EE
RCS Hot Leg Temp.	50° to 700°F	1	A,B	E	C	C	C	1	C	C	2	C	C	C	C	B,Z
RCS Pressure	0 to 3000 PSIG	1	A,B	E	C	C	C	1	C	C	2	C	C	C	C	FF
Core Exit Temp.	200° to 2300°F	1	B,C	C	N	C	N	1	N	C	2	C	C	C	C	B
Coolant Inventory	Hot Leg - Top to Bottom	1	B	C	C	C	C	1	C	C	2	C	C	C	C	B
Degrees of Subcooling	200° Subcooled to 35° Superheat	2	B	C	C	C	C	2	C	C	2	C	C	C	C	B
Containment Sump Water Level (N.R.)	Plant Specific	2	B,C	C	C	C	C	2	C	C	2	C	C	C	C	B
Containment Sump Water Level (W.R.)	Plant Specific	1	B,C	C	C	C	C	1	C	C	2	C	C	C	C	B
Containment Isolation	Closed Not Closed	1	B	C	C	C	C	1	C	C	2	C	C	C	C	See USAR Table 6.2-23
Containment Pressure (N.R.)	-5 psig to Design Pressure	1	A,B,C	C	C	C	C	1	C	C	2	C	C	C	C	MM E

N - Non-Compliance C - Complies E - Exception NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION															
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS			
Cont.:inment Pressure (W.R.)	-5 psig to 3 Times Design Pressure	1	A,C	C	C	C	C	1	C	C	2	C	C	C	C	B,E			
Containment H_2 Conc.	0 to 10% Vol.	1	A,C	C	C	C	C	1	C	C	2	C	C	C	C	B			
RCS Radioactivity	1/2 Tech. Spec. to 100 Times Tech. Spec.	1	C	E	E	E	E	3	E	E	E	E	E	E	E	AA			
RHR System Flow	0-110% Design	1	A,D	C	C	C	C	1	C	C	2	C	C	C	C	D			
RHR HX Out Temp.	40° to 350°	2	D	C	E	C	C	3	E	C	1	C	C	C	C	P			
Accumulator Level and Pressure	10% to 90% Vol. 0 to 750 PSIG	2	D	E/E	C/E	C/C	C/C	2/3	C/C	C/C	2/2	C/C	C/C	C/C	C/C	K			
Accumulator Isolation Valve Position	Closed Or Open	2	D	C	C	C	C	2	C	C	1	C	C	C	C				
Boric Acid Charging Flow	0 to 110% Design	2	D	C	E	C	C	3	E	C	1	C	C	C	C	M			
Flow In HPI	0 to 110% Design	1	A,D	C	C	C	C	1	C	C	2	C	C	C	C				
Flow In LPI	0 to 110% Design	1	A,D	C	C	C	C	1	C	C	2	C	C	C	C	Same as Flow In RHR			
Refueling Water Storage Tank	Top to Bottom	1	A,D	C	C	C	C	1	C	C	2	C	C	C	C	F			

N - Non-Compliance C - Complies E - Exception NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
RCP Status	Motor Current	3	D	C	C	C	C	3	C	C	1	C	C	C	C	
PZR Heater Status	Electric Current	2	D	E	C	C	C	2	C	C	1	C	C	C	C	GG
Primary Safety Relief Valve Position	Closed Not Closed	2	D	C	C	C	C	2	C	C	2	C	C	C	C	B
PZR Level	Top to Bottom	1	A,D	E	C	C	C	1	C	C	2	C	C	C	C	HH
Quench Tank Level	Top to Bottom	3	D	E	C	C	C	3	C	C	1	C	C	C	C	KK
Quench Tank Temp.	50° to 750°F	3	D	E	C	C	C	3	C	C	1	C	C	C	C	Q
Quench Tank Press.	0 to Design Press.	3	D	C	C	C	C	3	C	C	1	C	C	C	C	
Steam Generator Level	From Tube Sheet to Seperators	1	D	E	C	C	C	1	C	C	2	C	C	C	C	R
Steam Generator Pressure	0 to 20% Above Lowest Safety Setpoint	1	A,D	E	C	C	C	1	C	C	2	C	C	C	C	S
Safety Relief Valve Position	Closed Not Closed	2	D	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	BB
Main Feedwater Flow	0 to 110% Design	3	D	C	C	C	C	3	C	C	2	C	C	C	C	
Auxiliary Feedwater Flow	0 to 110% Design	1	D	C	C	C	C	1	C	C	2	C	C	C	C	B,U

N - Non-Compliance   C - Complies   E - Exception   NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
Condensate Storage Tank Level	Plant Specific	1	D	E	E	E	E	3	E	C	2	C	C	C	C	I
Containment Spray Flow	0 to 110% Design	2	D	C	E	C	C	3	E	C	1	C	C	C	C	II
Containment Heat Removal	Plant Specific	2	D	C	C	C	C	2	C	C	1	C	C	C	C	JJ
Containment Atmosphere Temp.	40 to 400°	2	D	E	E	C	C	3	E	C	1	C	C	C	C	L
Containment Sump Temp.	50° to 250°	2	D	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	V
Makeup Flow In	0 to 110% Design	2	D	N	C	C	C	3	C	C	1	C	C	C	C	M
Letdown Flow Out	0 to 110% Design	2	D	C	E	C	C	3	E	C	1	C	C	C	C	M
Volume Control Tank Level	Top to Bottom	2	D	E	C	C	C	3	E	C	2	C	C	C	C	M, KK
Component Cooling Temp. to ESF Sys.	40° to 200°F	2	D	C	C	C	C	3	C	C	1	C	C	C	C	W,J
Component Cooling Water Flow to ESF System	0 to 110% Design	2	D	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	G,J
High-Level Radioactive Liquid Tank Level	Top to Bottom	3	D	E	C	C	C	3	C	C	1	E	C	C	C	H, KK

N - Non-Compliance   C - Complies   E - Exception   NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
Radioactive Gas Holdup Tank Pressure	0 to 150% Design	3	D	E	C	C	C	3	C	C	1	C	C	C	C	T
EVS Damper Position	Open - Closed	2	D	C	C	C	C	2	C	C	2	E	C	C	C	NN
Control Room Normal Ventilation Isolation Status	Open - Closed	1	A	C	C	C	C	1	C	C	2	C	C	C	C	
Status of Standby Power	Voltage, Current Pressure	2	D	C	C	C	C	2	C	C	1	C	C	C	C	LL
Containment Area High Range Radiation Monitor	1 to 10^7 R/HR	1	E,C	C	C	C	C	1	C	C	2	C	C	C	C	B
Area Radiation Monitors	10^{-1} to 10^4 R/HR	3	E	E	C	C	C	3	C	C	1	C	C	C	C	N
Containment Purge	10^{-6} to 10^5 µCi/cc	2	C,E													Not Required See Common Plant Vent
Reactor Shield Building Annulus	10^{-6} to 10^4 µCi/cc	2	E													Not Required See Common Plant Vent

N - Non-Compliance C - Complies E - Exception NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
Auxiliary Building Effluent	10^{-6} to 10^{3} µCi/cc	2	C,E													Not Required See Common Plant Vent
Condenser Air Removal Exhaust	10^{-6} to 10^{5} µCi/cc	2	E													Not Required See Common Plant Vent
Common Plant Vent Effluent	10^{-6} to 10^{3} µCi/cc	2	E	C	C	C	C	2	C	C	2	C	C	C	C	B
Common Plant Vent Flow	0 to 110% Design	2	E	C	C	C	C	2	C	C	2	C	C	C	C	
Steam Safety & Atmospheric Vent Flow	Mass Flow Rate	2	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	BB
Steam Safety & Atmospheric Vent Effluent	10^{-1} to 10^{3} µCi/cc	2	E	E	E	C	C	3	C	C	1	C	C	C	C	O,BB
Common Plant Vent Radiohalogen and Particulates	10^{-3} to 10^{2} µCi/cc	3	E	C	C	C	C	3	C	C	2	C	C	C	C	B

N - Non-Compliance C - Complies E - Exception NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
Plant and Environ. (Portable Instruments) Radiation	10^{-3} to 10^{4} R/HR	3	E	C	C	C	C	3	C	C	-	C	C	C	C	
Plant and Environ. (Portable Instruments) Radioactivity	10^{-9} to 10^{-3} µCi/cc	3	E	C	C	C	C	3	C	C	-	C	C	C	C	
Plant and Environ. (Portable Instruments) Radioactivity	Multi-Channel Gamma Spectrometer	3	E	C	C	C	C	3	C	C	-	C	C	C	C	
Wind Direction	0 to 360° ± 5°	3	E	C	C	C	C	3	C	C	1	C	C	C	C	
Wind Speed	0 to 50 MPH ± .5 MPH	3	E	C	C	C	C	3	C	C	1	C	C	C	C	
Estimation of Atmospheric Stability	-9 to 18°	3	E	E	C	C	C	3	C	C	1	C	C	C	C	X
RCS/Sump Grab Samples	(See Below)															
·Gross Activity	1 µCi/cc to 10 Ci/cc	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y
·Gamma Spectrum	Isotope Analysis	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y
·Boron Content	0 to 6000 PPM	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y
·Cloride Content	0 to 20 PPM	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y

N - Non-Compliance   C - Complies   E - Exception   NR - Not Required

DBNPS-1
REGULATORY GUIDE 1.97
INVENTORY & COMPLIANCE TABLE

NRC SPECIFICATIONS				PLANT SPECIFIC INFORMATION												
INSTRUMENT	RANGE	CATEGORY	TYPE	RANGE	E.Q.	POWER	SEISMIC QUALIFICATION	TED CATEGORY	QUALITY ASSURANCE	REDUNDANT	NO. OF CHANNELS	CONTROL ROOM DISPLAY	CONTROL ROOM RECORDER	TSC DISPLAY	EOF DISPLAY	COMMENTS
$\cdot O_2$	0 to 20 PPM	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y
$\cdot H_2$ or Total Gas	0 to 2000 CC/Kg	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y
·pH	0 to 13	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Y
Containment Air Grab Samples	(See Below)															
$\cdot H_2$	0 to 10% Vol.	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	CC
$\cdot O_2$	0 to 30% Vol.	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	DD
·Gamma Spectrum	Isotopic Anal.	3	E	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	CC

N - Non-Compliance C - Complies E - Exception NR - Not Required

PD 4103A

* Based on B&W Owners Group RG 1.97 Task Force Generic Position

(A) This instrument string currently does not meet requirements for a category 1 item. The instrument is currently being incorporated into the integrated living schedule.

(B) This instrument has been or is being added or upgraded as part of regulatory requirements for Post TMI-2 modifications. Specific schedules are provided for each item in Appendix A.

*(C) The primary means of determining RCS soluble boron concentration post accident is by manual sampling and laboratory analysis via the Post Accident Sampling System which is sufficient to meet the requirements of Regulatory Guide 1.97. This is based on the fact that the loss of negative reactivity due to xenon decay is sufficiently slow that the control room operator need not know instantaneously or continuously what is the boron concentration in the RCS. The Post Accident Sampling System was installed per requirements of NUREG 0737, Item II.B.3, and therefore is fully qualified for this function.

(D) The Decay Heat (DH)/Low Pressure Injection (LPI) system in itself is redundant therefore there is only one indication channel per loop.

(E) Containment pressure narrow range indicating instruments are not specified as nuclear safety related. However the instruments are powered from the Safety Features Actuation System (SFAS) which is 1E, are mounted in the SFAS control room panel, and are seismic Class 1. This along with the fact that backup indication is provided in the SFAS cabinets and the containment wide range indication which is fully qualified make this parameter in compliance with Regulatory Guide 1.97. The containment narrow range pressure is specified as a Type A variable do to its resolution and accuracy.

(F) The Borated Water Storage Tank (BWST) indicating instruments located in the control room are not specified as nuclear safety related but are installed as seismic Class 1. The power supply and signal for the level indicators is from SFAS which is 1E and backup indication is provided in these local SFAS cabinets which meet the category 1 requirements. Also, control room indication is provided by computer based display which are not 1E indications but satisfies the Regulatory Guide 1.97 requirements.

(G) Component Cooling Water Flow is indicated on SFAS panel by pump motor status and critical system valve positions. No direct flow indication is provided, however since this system requires no manual throttling and the system and indication are 1E, these indications are considered to meet the requirements of Regulatory Guide 1.97.

(H) For these category 3 instruments, no direct control room indication exists. However, since the Regulatory Guide 1.97 recommendation for category 2 & 3 allows the reading to be processed and displayed on demand, TED interprets this to mean that local instrument readout is sufficient if the information can be made available to the control room operator from a local indicator. A backup trouble alarm is provided in the control room for these instruments.

*(I) For Davis-Besse the nuclear safety related feedwater supply is from the Service Water (SW) system and as such is the assured water supply. The switchover from the Condensate Storage Tank (CST) to SW is automatic and has been reviewed and approved by the NRC (see letter dated February 21, 1984 TED No. 1455 comment GS-4). Since the CST serves no nuclear safety related function other than being the preferred water source, this parameter is therefore most appropriately a category 3.

(J) During the Task Analysis and Task Verification and Validation utilizing the proposed Abnormal Transient Operator Guidelines procedures for the CRDR, it was determined that these indications were not required to mitigate the consequences of a design basis accident.

*(K) Core flood tank pressure and level is provided on the SFAS panel with ranges 0-700 PSIG and 0-14 ft. respectively. These instruments provide the operator information pertaining to tank status during normal operation. However, since the Core Flooding System is totally passive, no monitoring of Core Flood tank pressure is required for any manual actions to mitigate the consequences of an accident and thus has been reclassified as category 3. Core Flood Tank Level is used to initiate closure of the Core Flood Tank isolation valves after the tank has discharged. As a type D variable, Core Flood Tank Level should be classified as category 2, with which we comply.

*(L) Containment atmospheric temperature is provided in the control room by three (3) different temperature indicating instrument strings TT1356, TT1357 and TT1358. This information does not provide any safety related function and no operator actions are based on these readings for accident mitigation. For those actions that are required for accident mitigation, the operator utilizes containment pressure indication. This parameter is a backup indication of containment air cooling. Therefore as a backup to a key category 2 type D variable for Davis-Besse this parameter be reclassified to category 3. The range of these instruments is 0°-300°F. The maximum containment temperature is less than 285°F for any DBA; this is therefore considered adequate to meet the requirements of Regulatory Guide 1.97.

(M) The Makeup and Purification System at Davis-Besse is a non-safety related system that is non-redundant and therefore not required in the mitigation of an accident. There is however, high temperature, 1E interlocks to isolate letdown in the event of a letdown line break. Since makeup is non-essential, the monitoring instruments located in the Makeup and Purification System are not required and therefore Toledo Edison has reclassified these instruments as category 3.

In addition to the Boric Acid Charging Flow indication located in the control room, there is a local mechanical flow indicator located in the Boric Acid Addition Tank room.

The present range for Makeup Flow has been defined to be inappropriate by the Control Room Design Review. The desired range is to be established by the on-going Control Room Design Review.

*(N) Area radiation monitors do not cover the range recommended in Regulatory Guide 1.97, however the range of .1 mR/HR to 10 R/HR covers sufficient scale to provide personnel protection and alerting the operator of potentially high fields. Portable survey instruments provide the full range and would be utilized whenever abnormally high radiation fields are expected.

(O) The steam line radiation monitors were designed and installed for the detection of steam generator tube leaks or rupture. While the monitors are not environmentally qualified for all possible harsh environmental conditions, they would not be effected by a steam generator tube rupture.

(P) The decay heat cooler outlet temperature is measured in normal operation to allow the operator to control the cooldown of the RCS. In post accident operation this parameter is not required to be monitored as maximum cooling is provided on SFAS actuation. Based on this consideration it recommended that this parameter be reclassified as category 3.

*(Q) The installed quench tank temperature range of 0 to 400°F is considered more than sufficient since the tank's rupture disc relieves at 100 PSIG which corresponds to 338°F. At 400°F, tank pressure would be approximately 250 PSIG and this tank would rupture long before obtaining this pressure.

*(R) For B&W NSSS there are no steam separators thus the range specified in Regulatory Guide 1.97 cannot be directly applied. It is Toledo Edison's interpretation that the range required is the range utilized for the safety grade auxiliary feedwater control to mitigate the effects of a small break LOCA. The indicated range is 0-250 inches with automatic level control between 33 and 96 inches.

Also available to the operators in the control room is steam generator operate level and full range level indication. This indication covers the range of 0-600 inches which is effectively tube sheet to tube sheet and as category 3 instruments, fulfill the requirements as backup indication to a key type D variable.

It has been determined that by reviewing Toledo Edison's steam generator level instrumentation with the requirements set forth in Regulatory Guide 1.97 that the instrumentation totally complies. However, the Control Room Design Review (CRDR) study has indicated that additional steam generator level information is required to support the operator in anticipating and evaluating Steam Feedwater Rupture Control System (SFRCS) trips and that this need will be under a review and evaluation in the form of an integrated SFRCS study to be established by the CRDR.

*(S) The maximum steam generator pressure for any design based accident (see USAR Chapter 15) is approximately 1100 PSIG based on steam relief capacity. Since the range is 0-1200 PSIG the pressure indication will remain on scale at all times with a 10% upper margin for the most severe design basis accident. It is therefore considered sufficient for pressure indication at Davis-Besse. Backup indication is provided by CRT display.

(T) The Radioactive Gas Holdup tanks, (Waste Gas Decay tanks), have automatic relief capabilities at 150 PSIG. The design pressure for these tanks is 150 PSIG and local, continuous pressure indication and computer based indication is provided from 0-200 PSIG. Also, a computer based alarm is provided and set at 140 PSIG increasing tank pressure. Since relief occurs at 150 PSIG Toledo Edison considers the range 0-200 PSIG sufficient although it does not cover 0-150% design pressure.

(U) Auxiliary feedwater flow indication to each steam generator is provided with backup flow indication from non-essential uninteruptable powered instruments. This configuration was reviewed (Safety Evaluation Report Davis-Besse Unit 1 implementation of recommendations of auxiliary feedwater system) and accepted by the NRC per letter dated February 21, 1984 (Log No. 1455) and is therefore considered to meet all requirements.

*(V) Containment sump temperature is not directly monitored and is not required to mitigate the consequences of design basis accidents. Because the minimum NPSH for the Decay Heat pumps and containment spray pumps is not dependent on the sump being sub-cooled and no automatic or manual actions are initiated based on this temperature, it is our contention that this variable need not be monitored. An alternative to measure this temperature is the Decay Heat Cooler inlet temperature lined up to recirculate the sump through the LPI/DH lines.

(W) Two of the three component cooling heat exchanger outlet temperatures are monitored in the control room via indicators or on the computer. However this parameter is not monitored during a design basis accident. During a design basis accident upon actuation of the Safety Features Actuation System (SFAS) Incident Level 2 the service water inlet valves to the CCW heat exchangers are failed open providing maximum cooling water to the heat exchanger. Since no actions are required based upon this temperature and since the valve positions/status indicated in the control room and the system/mechanism to fail those valves open meet the requirements for category 1, it is our contention that this variable provides backup, useful but not essential information to the control room operators and therefore is reclassified to category 3.

(X) Although the plant specific range does not fully cover the specified range, as per Regulatory Guide 1.97, the plant specific range of -4°F to 8°F covers the Pasquill Stability Class vs. ΔT as derived from Regulatory Guide 1.23 and specified in our USAR. Since the Pasquill Stability Class vs. ΔT does not change for <-2.2°F extremely unstable and >4.7°F extremely stable and since our plant specific range more than adequately covers this range the plant range is considered sufficient.

(Y) All post accident sampling will be performed utilizing the installed Post Accident Sampling System and dependent on the radiological considerations chemical analysis of such parameters as pH, chlorides, oxygen, etc. may be performed on site or deferred and sent for offsite analysis. In all aspects Toledo Edison is consistent with our letter submitted to the NRC dated April 23, 1983 (Serial No. 931) and in compliance with NUREG 0737 Item II.B.3.

The containment emergency sump can be sampled on long term recirculation via the LPI/DH pump discharge. The ECCS pump room sump is not sampled, however, the analysis of the ECCS pump room sump would be no worse than that of the containment sump.

*(Z) RCS hot leg temperature range is 120°F to 920°F which does not envelope the lower end of Regulatory Guide 1.97 recommended range. However at temperature less than 280°F the plant will be in the decay heat removal mode and this temperature is not required since the lower range is monitored by the decay heat instruments. Based on this consideration, this range is sufficient. In addition, Core Exit Temperature can be used as backup indication which will meet all category 1 requirements and cover the range from 0°-2300°F.

*(AA) Currently, no instrumentation exists to adequately measure this variable on line. The discussion of this variable is in the EGG report EE-6154, "Assessment of Generic Instrumentation Systems Used to Meet the Provisions of Regulatory Guide 1.97". This provides an excellent overview of the problem related to this measurement.

Existing instrumentation, letdown line radiation monitors, can be used to provide indication of fuel failure during normal operation. However, since the letdown line is isolated during serious accidents requiring containment isolation, it will not be available for long term measurement. Section II.B.3 of NUREG-0737 requires that capability exist at each plant to sample the RCS to assess the magnitude of fuel failures during post-accident conditions. As such, this measurement is the primary determinant of fuel failure during normal operation and post-accident. The letdown line radiation monitor is used as the initiator for sampling during normal operation.

It is recommended that this variable meet Category 3 requirements because state of the art equipment is unavailable and the primary means of monitoring this variable must therefore be by sampling and analysis.

The Post Accident Sampling System was installed per requirements of NUREG-0737 and therefore is fully qualified for this function.

(BB) The position indication of the Atmospheric Vent Valves (AVV) and the Main Stream Safety Valves (MSSV) is not monitored and is not required to mitigate the consequences of a design basis accident. AVV position is indicated in the control room via indicating lights on the SFAS panel and the Hand/Auto Stations indicators for the AVV's which are used to reduce and maintain SG pressure below MSSV setpoints. In addition, the sound emitted from the valves provides an audible indication to the operators when either the MSSV's or AVV's lift. When the AVV's are closed and the audible indication exists, it can be implied that the MSSV's are still open.

For release assessment, in accordance with NUREG-0578 and per our response dated March 21, 1983 (Serial No. 601), EP 1202.57 Steam Generator Tube Leak/ Ruptures and AD 1827.10 Emergency Off-Site Dose Estimate procedures are being used to conservatively quantify noble gas/radioiodine releases from the AVV's, MSSV's and auxiliary feedwater steam turbine exhaust utilizing the currently installed main steam line radiation monitors or the steam jet air ejector radiation monitor. In addition to the conservative calculation performed to assess the activity and extent of the release via AD 1827.10 and EP 1202.57, AD 1850.05 Radiation Monitoring Team Surveys are performed on-site and off-site to obtain actual radiation levels do to the release.

NUREG-0737 items II.F.1.1, clarification item (3) states, "Off-line monitors are not required for the PWR secondary side main steam safety valve and dump valve discharge lines. For this application, externally mounted monitors viewing the main steam line upstream of the valves are acceptable with procedures to correct for the low energy gammas the external monitors would not detect. Isotopic identification is not required". We comply with this requirement. Although the range of the main steam line monitors does not meet the requirement of Reg. Guide 1.97, the alternative method used to determine the activity is Steam Generator Secondary System Sampling. By using that concentration and the leak rate for the release calculation, it is assumed that all the activity leaking to the secondary side is escaping.

With the existing procedure in place to provide a conservative dose release assessment, we meet the intent of Reg. Guide 1.97 without providing the specific equipment defined in Reg. Guide 1.97.

(CC) For post accident sampling of the containment atmosphere, on-line monitors are provided to measure both H_2 concentration and radioisotopes. These instruments provide real time information pertaining to these parameters and meet Category 3 requirements. If required, backup grab samples may be obtained by tapping the exhaust return from the containment hydrogen analyzer.

(DD) Oxygen analysis is not required at Davis-Besse because no action could or would be taken as a consequences of this measurement. Since Davis-Besse does not have an inerted containment, it is assumed that the oxygen concentration is equal to atmospheric concentration. This leads back to the requirement to be able to accurately measure the hydrogen concentration and have the ability to dilute the containment hydrogen, the dilution of containment hydrogen is the only operator action that could be and would be taken. This action would be based on containment hydrogen and not oxygen, based on these considerations this parameter should be deleted.

*(EE) RCS cold leg temperature is not considered to be a key Type B parameter for Davis-Besse due to the following considerations.

1) Cold leg temperature is not required to establish or verify natural circulation. If RCS hot leg temperature and core exit temperature when compared to RCS pressure establishes that a subcooled condition exists and at least one steam generator has established auxiliary feedwater flow as indicated by steam generator level then natural circulation will be assured. It is due to this reasoning that Toledo Edison has identified RCS hot leg temperature, RCS pressure, and steam generator pressure as key Type A variables.

2) Davis-Besse does not have to monitor cold leg temperature in order to prevent thermal shock to the reactor vessel due to excessive HPI flow (throttling), since our reactor vessel does not have high copper or axial welds.

Based on these considerations Toledo Edison recommends that this parameter be reclassified as Type D Catagory 3 for Davis-Besse.

The range of the existing RCS cold leg indicators is 50-650°F. This does not envelope the recommended range of 50-700°F, however, the most severe loss of cooling/reactivity control design base event will result in an increased RCS cold leg temperature below 650°F, thus RCS cold leg temperature range is sufficient.

(FF) Wide range RCS pressure presently covered the Range 0-2500 PSIG. This range does not envelope the recommended range of 0-3000 PSIG, however, no new operator actions would be taken or performed with an extended range of 2500 to 3000 PSIG. Since operator actions occur within the range already provided there is no justification or increased reliability for increasing this range. Based on these considerations Toledo Edison considers the existing range sufficient.

*(GG) The indication of pressurized heater status is provided by a breaker closed/not closed status from 1E power source. Reactor coolant system pressure and pressurizer temperature are alternate indications of heater status.

(HH) Pressurizer level does not indicate top to bottom of tank. The design basis of range, however, fully covers all design basis transients such that loss of level indication would not occur as per the USAR chapter 15. Therefore Toledo Edison considers this range sufficient.

(II) Containment spray flow indication is provided on the SFAS panel located in the control room. The primary indication that this function has been accomplished is by indication of pump status and valve position on the SFAS panel. These indications are 1E and meet the requirements of Category 1 although as a key type D variable it is only required to meet category 2 requirements. Since flow indication is a backup alternate requiring only category 3 classification, Toledo Edison considers the primary indication stated to meet the requirements of R.G. 1.97.

(JJ) The means of determining that containment heat removal is being accomplished is by assuring 1) fans are functioning (hi/lo speed), 2) service water (SW) valves have opened, 3) monitor containment pressure and 4) as a backup to containment pressure, containment air temperature may be monitored at the inlet and outlet of the containment air coolers which as backup to a category 2 type D variable may be classified as a category 3. Since fan status, SW valve position, and containment pressure are instruments meeting Category 1 requirements, Toledo Edison consider these indications to meet the requirements of R.G. 1.97.

(KK) The level indication covers the linear portion of the tank. Since the non-linear caps of these tanks contain minimal volume this portion of the tank is considered insignificant. Also, good engineering practice dictates not putting taps at the "bottom" of a tank in order to preclude sedimentary line blockage.

(LL) Station and Instrument air pressure indication is provided in the control room but is not required since all air operated valves fail in their safety related positions on loss of pressure on their operators.

*(MM) The general design bases governing isolation valve requirements for containment piping penetrations are as indicated in TED's USAR chapter 6, section 6.2.4.2, which conforms to NRC General Design Criteria Nos. 54, 55, 56 and 57, and AEC Safety Guide No. 11 with the exceptions as listed in subsection 6.2.4.2.

In addressing the redundancy requirement, the typical valve arrangement of two automatic isolation valves in series where one valve is located inside containment and one valve outside containment, provides the necessary redundancy. Thus, redundant position indication on each valve is not necessary since there are no common ties such as a common power supply to both valves and the control room indication meets category 1 requirements. Thus, this type of penetration isolation meets the requirements of Reg. Guide 1.97.

Per the guidance provided in Reg. Guide 1.97, the check valves are excluded from those valves requiring position indication. Local manual valves do not have position indication. However, in the above two cases, the valves are maintained locked in their correct post-accident position via Periodic Test PT-5186.01 "Locked Valve Verification Periodic Test." Thus, a valve arrangement of one automatic isolation valve in series with a check valve or manual valve provides the necessary redundancy for the containment penetration, Redundant position indication is not required on the automatic isolation valve since the single failure criteria for penetration isolation does not apply.

For penetrations which do not have two isolation valves i.e., only an automatic or remote manual isolation valve on a line which is connected to a closed system within the containment, the closed loop system itself provides the redundant isolation. Category 1 indication is provided in the control room for the automatic isolation valves. Where single isolation or no indication is provided in the control room, isolation valve status can be inferred from system flow, pressure, temperature, and equipment status.

(NN) The Emergency Ventilation System (EVS) is designed to provide a negative pressure within the annulus space between the Shield Building and the Containment Vessel and in the penetration rooms following a loss-of-coolant-accident and to reduce the airborne fission product leakage to the environment by filtration prior to release of air through the station vent.

Following a LOCA, a Safety Feature Actuation signal starts the EVS fans, closes all containment isolation valves and purge system valves, which subsequently open the dampers located in the penetration rooms outlet ductwork (EVS fan inlet).

The EVS is comprised of two redundant trains of ventilation equipment including fans, dampers, and filter assemblies to preclude any single failure from preventing the EVS from performing its safety function. All fans and dampers are powered from an essential bus. The dampers to isolate the normal auxiliary building ventilation are installed in series, each with category 1 indication in the control room. The EVS fan inlet dampers do not have direct indication in the control room but are interlocked to open when the auxiliary building normal ventilation dampers are closed and positive indication can be inferred from the differential pressure transmitters across the filter banks which is provided to the control room via two computer points. Overall EVS system performance can be determined from the annulus to mechanical penetration differential pressure indicators located in the control room that meet the category 1 requirements.

Section II

A. Category 1 Instruments

1. Equipment Qualification

Toledo Edison's position on Category 1 is that environmental and seismic qualification applies from the sensor up to and including the display device. Environmental qualification is in accordance with 10 CFR 50.49 as amended January 17, 1983 and documented in report submitted to the NRC dated April 3, 1984 (Serial No. 1039). Seismic qualification is in accordance with the Davis-Besse USAR Seismic Class 1 Criteria, Section 3.7 and 3.10 .

2. Redundancy

Redundancy is provided for Category 1 variables to assure that no single failure within either the accident-monitoring instrumentation, its auxiliary supporting features, or its power sources, concurrent with the failures that are a condition or result of a specific accident, will prevent the operators from being presented the information necessary for them to determine the safety status of the plant and to bring the plant to and maintain it in a safe condition following that accident. Redundant or diverse channels are electrically independent and physically separated from each other, up to and including the isolation device. Within each redundant division of a safety system, redundant monitoring channels are not provided except for steam generator level instrumentation.

Where failure of one accident-monitoring channel results in information ambiguity (that is, the redundant displays disagree) that could lead operators to defeat or fail to accomplish a required safety function, additional information will be provided to allow the operators to deduce the actual conditions in the plant. This may be accomplished by providing additional independent channels of information of the same variable (addition of an identical channel) or by providing an independent channel to monitor a different variable that bears a known relationship to the multiple channels (addition of a diverse channel).

3. Power Source

Power is supplied to the entire instrument loop from vital power sources which are diesel and battery-backed. These power sources are seismically qualified. Power supplies are in a mild environment, and qualification is in accordance with 10 CFR 50.49 and documented in the EQ report submitted April 3, 1984, Serial No. 1039.

4. Channel Availability

The instrumentation channel will be available prior to an accident except as provided in paragraph 4.11, "Exception," as defined in IEEE 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations", or as specified in the technical specifications. This availability applies only to the qualified portions of the channels. This complies with the requirements in Reg. Guide 1.97.

5. Quality Assurance

The instrumentation systems are designed, procured, and installed per procedures contained in the Toledo Edison's Nuclear Quality Assurance Manual. Toledo Edison considers this to adequately assure the quality of these systems.

6. Display and Recording

Continuous real-time display (dial, digital display, or CRT) is available for at least one channel of all Category 1 variables. Additionally, data is continuously updated, stored in the computer memory, and may be displayed on demand. Intermittent displays, such as data loggers and scanning recorders, are used if no significant transient response information is likely to be lost by such devices.

7. Range

Where two or more instruments are needed to cover a particular range, overlapping of instrument span is provided. Where the required range of monitoring instrumentation results in a loss of sensitivity in the normal operating range, separate instruments are used. This complies with the requirements of Reg. Guide 1.97.

8. Equipment Identification

The method of delineating these variables to the Control Room operator is the responsibility of the CRDR Group.

9. Interfaces

Qualified instrument channels are electrically isolated from non-qualified portions of the instrument loop up to and including the isolation device.

10. Servicing, Testing, and Calibration

Category 1 instrumentation is part of the planned maintenance program. Testing is performed on instrument strings on a regular basis. The testpoints for the instrument strings are under administrative control (Technical specification, maintenance procedure, or administrative procedure) to prevent unannounced testing. The isolators for the instrument strings are accessible during and following a design basis event (considering radiation fields). Normal calibration of instrumentation located inside containment is on a refueling cycle basis.

11. Human Factors

A Human Factors Evaluation is a part of the Control Room Design Review process. Human factors analysis recommendations will be part of the CRDR submittal.

To the extent practicable, the same instruments are used for post accident monitoring as are used for the normal operations of the plant to enable the operators to use, during accident situations, instruments with which they are most familiar.

12. Direct Measurement

Monitoring instrumentation inputs are from sensors that directly measure the desired variables. This complies with the requirements of Reg. Guide 1.97.

B. Category 2 Instruments

1. Equipment Qualification

Environmental qualification applies from the sensor up to and including the isolation device or display. Environmental qualification is in accordance with 10 CFR 5.49 as amended January 17, 1983 and documented in a report submitted to the NRC dated April 3, 1984, Serial No. 1039.

Seismic qualification is not required of these instruments.

2. Redundancy

Redundancy is not required of Category 2 instruments. This complies with the provisions of Reg. Guide 1.97.

3. Power Source

Power is supplied to the Category 2 variables from battery backed sources up to and including the isolator or display. From an isolator to the display, power is provided from any available source of power including offsite power.

4. Channel Availability

The out-of-service interval is based on normal technical specification requirements for the system it serves, where applicable, or by other requirements. This complies with the provisions of Reg. Guide 1.97.

5. Quality Assurance

The instrumentation systems are designed, procured, and installed per procedures contained in Toledo Edison's Davis-Besse Nuclear Quality Assurance Manual. Toledo Edison considers this to adequately assure the quality of these systems.

6. Display and Recording

The variable is displayed on an instrument (meter, gauge, dial, digital, or strip chart recorder) or it is processed for computer display and/or recording on demand. Signals from effluent radioactivity monitors and area monitors are recorded either continuously or on demand. Where direct and immediate trend of transient information is essential for operator information or action, recording is continuously available on dedicated non-seismic recorders. Redundancy of recording is provided for these variables via on demand computer recording capability. This complies with the provisions of Reg. Guide 1.97.

7. Range

Where two or more instruments are needed to cover a particular range, overlapping of instrument span is provided. Where the required range of monitoring instrumentation results in a loss of sensitivity in the normal operating range, separate instruments are used. This complies with the provisions of Reg. Guide 1.97.

8. Equipment Identification

Category 2 instruments provide important information to the operator and will be identified via some method. The selection of the method for identifying Category 2 variables is the responsibility of the CRDR Group.

9. Interfaces

Qualified instrument channels are electrically isolated from non-qualified portions of the instrument loop up to and including the isolation device.

10. Servicing, Testing, and Calibration

Category 2 instrumentation is part of the planned maintenance program. Testing is performed on instrument strings on a regular basis. The testpoints for the instrument strings are under administrative control (technical specification, maintenance procedure, or administrative procedure) to prevent unannounced testing. The isolators for the instrument strings are accessible during and following a design basis event (considering postulated radiation fields). Normal calibration of instrumentation located inside containment is on a refueling cycle basis.

11. Human Factors

A Human Factors Evaluation is part of the Control Room Design Review process. Human factors analysis recommendations will be part of the CRDR submittal.

To the extent practicable, the same instruments are used for post accident monitoring as are used for the normal operations of the plant to enable the operators to use, during accident situations, instruments with which they are most familiar.

12. Direct Measurement

To the extent practicable, monitoring instrumentation inputs are from sensors that directly measure the desired variables as indicated on the position papers. This complies with the intent of the provisions of Reg. Guide 1.97.

C. Category 3 Instruments

1. Equipment Qualification

No specific provision.

2. Redundancy

No specific provision.

3. Power Source

No specific provision.

4. Channel Availability

No specific provision.

5. Quality Assurance

The instrumentation is of high quality commercial grade and is selected to withstand the normal power plant service environment. This complies with the provisions of Reg. Guide 1.97.

6. Display and Recording

These instruments do not play a key role in the management of an accident but they do add depth to the Category 1 and 2 instrumentation to the extent that they remain operable. The instrumentation signal is displayed on an instrument (meter, gauge, dial, digital, or strip chart recorder) or it is processed for computer display and/or recording on demand. Signals from effluent radioactivity monitors, area monitors, and meteorology monitors are recorded either continuously or on demand dependent on the instrument in question.

7. Range

Where two or more instruments are needed to cover a particular range, overlapping of instrument span is provided. Where the required range of monitoring instrumentation results in a loss of sensitivity in the normal operating range, separate instruments are used. This complies with the provisions of Reg. Guide 1.97.

8. Equipment Identification

No specific provision.

9. Interfaces

No specific provision.

10. Servicing, Testing, and Calibration

Instrumentation is part of the planned maintenance program. Testing is performed on instrument strings on a regular basis. The test-points for the instrument strings are under administrative control (technical specification, maintenance procedure, or administrative procedure) to prevent unannounced testing.

11. Human Factors

A Human Factors Evaluation is part of the Control Room Design Review process. Human factors analysis recommendations will be part of the CRDR submittal.

To the extent practicable, the same instruments are used for post accident monitoring as are used for the normal operations of the plant to enable the operators to use, during accident situations, instruments with which they are most familiar.

12. Direct Measurement

To the extent practicable, monitoring instrumentation inputs are from sensors that directly measure the desired variables.

APPENDIX A

Schedule for Completion of Post TMI-2 Modifications
Related to Regulatory Guide 1.97

REGULATORY ITEM (NUREG-0737)	INSTRUMENT	ESTIMATION OF COMPLETION
II.F.2	RCS Hot Leg Temperature	Completed
II.F.2	Core Exit Thermocouples	12 in Refueling Outage #6 4 when normal end of life occurs
II.F.2	Reactor Hot Leg Level	Refueling Outage #5
II.F.2	Degrees of Subcooling (Tsat Meter)	Completed
II.F.1.5	Containment Sump Level Indication	Completed
II.F.1.4	Containment Pressure Wide Range	Completed
II.F.1.6	Containment Hydrogen Concentration	Completed
II.D.3	Primary Safety Valve Position	Completed
II.E.1.2	Auxiliary Feedwater Flow	Completed
II.F.1.1 & 2	Radioisotopes from Common Plant Vent	Completed
II.F.1.3	Containment High Range Monitor	Completed
II.B.3	Post Accident Sampling System	Completed