WCAP-11785

CALCULATION OF STEAM GENERATOR LEVEL LOW & LOW-LOW TRIP SETPOINTS WITH USE OF A ROSEMOUNT 1154 TRANSMITTER

DIABLO CANYON UNITS 1 & 2

March, 1988

C. R. Tuley

WESTINGHOUSE ELECTRIC CORPORATION
Power Systems
P. O. Box 355
Pittsburgh, Pennsylvania 15230

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

1.0 INTRODUCTION

Westinghouse was requested by Pacific Gas and Electric to evaluate the impact of a Steam Generator Level transmitter changeout, removal of the Barton 764, installation of the Rosemount 1154DP4R. The reason for this change is the very significant reduction in the Environmental Allowance (EA) term, [$]^{+a,c}$ for the Barton and ± 1.4 % Upper Range Level (2.0 % span) for the Rosemount (as identified by Pacific Gas and Electric). This allows a large reduction in the Nominal Trip Setpoint for the Steam Generator Level Low reactor trip and Low-Low reactor trip and auxiliary feedwater initiation. The current trip setpoint is ≥ 15.0 % span, while using the Rosemount transmitter with the Westinghouse setpoint methodology results in a revised trip setpoint of ≥ 7.2 % span. This change would result in a significant decrease in the probability of a inadvertent trip.

A brief description of the Westinghouse setpoint methodology is provided in Sections 2.1 through 2.4. The detailed calculational assumptions and results are noted in Tables 2-1 through 2-3. The conclusions of this work are provided in Section 2.6.

2.0 COMBINATION OF ERROR COMPONENTS

2.1 METHODOLOGY

The methodology used to combine the error components for a channel is an appropriate combination of those groups which are statistically independent, i.e., not interactive. Those errors which are not independent are placed arithmetically into groups that are and can then be systematically combined.

The methodology used is the "square root of the sum of the squares" which has been utilized in other Westinghouse reports. This technique, or others of a similar nature, have been used in WCAP-10395(1) and WCAP-8567(2). WCAP-8567 is approved by the NRC noting acceptability of statistical techniques for the application requested. Also, various ANSI, American Nuclear Society, and Instrument Society of America standards approve the use of probabilistic and statistical techniques in determining safety-related setpoints(3)(4). The methodology used in this report is essentially the same as that used for V. C. Summer in August, 1982; approved in NUREG-0717, Supplement No. 4(5).

---

(1) Grigsby, J. M., Spier, E. M., Tuley, C. R., "Statistical Evaluation of LOCA Heat Source Uncertainty", WCAP-10395 (Proprietary), WCAP-10396 (Non-Proprietary), November, 1983.

(2) Chelemer, H., Boman, L. H., and Sharp, D. R., "Improved Thermal Design Procedure," WCAP-8567 (Proprietary), WCAP-8568 (Non-Proprietary), July, 1975.

(3) ANSI/ANS Standard 58.4-1979, "Criteria for Technical Specifications for Nuclear Power Stations."

(4) ISA Standard S67.04, 1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants."

(5) NUREG-0717, Supplement No. 4, "Safety Evaluation Report related to the Operation of Virgil C. Summer Nuclear Station, Unit No. 1", Docket No. 50-395, August, 1982.

The relationship between the error components and the total error for a channel is noted in Equation 2.1,

$$CSA = \{(PMA)^2 + (PEA)^2 + (SCA + SMTE + SD)^2 + (SPE)^2 + (STE)^2 + (RCA + RMTE + RCSA + RD)^2 + (RTE)^2\}^{1/2} + EA \qquad \text{(Eq. 2.1)}$$

where:

CSA	=	Channel Statistical Allowance
PMA	=	Process Measurement Accuracy
PEA	=	Primary Element Accuracy
SCA	=	Sensor Calibration Accuracy
SMTE	=	Sensor Measurement and Test Equipment Accuracy
SD	=	Sensor Drift
SPE	=	Sensor Pressure Effects
STE	=	Sensor Temperature Effects
RCA	=	Rack Calibration Accuracy
RMTE	=	Rack Measurement and Test Equipment Accuracy
RCSA	=	Rack Comparator Setting Accuracy
RD	=	Rack Drift
RTE	=	Rack Temperature Effects
EA	=	Environmental Allowance

As can be seen in the equation, drift and calibration accuracy allowances are interactive and thus not independent. The environmental allowance is not necessarily considered interactive with all other parameters, but as an additional degree of conservatism is added to the statistical sum. It should be noted that for this document, it is assumed that the accuracy effect on a channel due to cable degradation in an accident environment is less than 0.1 % of span. This magnitude of impact is considered negligible and is not factored into the calculations. An error due to this cause, in excess of 0.1 % of span is directly added as an environmental error.

2.0 COMBINATION OF ERROR COMPONENTS

2.1 METHODOLOGY

The methodology used to combine the error components for a channel is an appropriate combination of those groups which are statistically independent, i.e., not interactive. Those errors which are not independent are placed arithmetically into groups that are and can then be systematically combined.

The methodology used is the "square root of the sum of the squares" which has been utilized in other Westinghouse reports. This technique, or others of a similar nature, have been used in WCAP-10395[(1)] and WCAP-8567[(2)]. WCAP-8567 is approved by the NRC noting acceptability of statistical techniques for the application requested. Also, various ANSI, American Nuclear Society, and Instrument Society of America standards approve the use of probabilistic and statistical techniques in determining safety-related setpoints[(3)(4)]. The methodology used in this report is essentially the same as that used for V. C. Summer in August, 1982; approved in NUREG-0717, Supplement No. 4[(5)].

---

(1) Grigsby, J. M., Spier, E. M., Tuley, C. R., "Statistical Evaluation of LOCA Heat Source Uncertainty", WCAP-10395 (Proprietary), WCAP-10396 (Non-Proprietary), November, 1983.

(2) Chelemer, H., Boman, L. H., and Sharp, D. R., "Improved Thermal Design Procedure," WCAP-8567 (Proprietary), WCAP-8568 (Non-Proprietary), July, 1975.

(3) ANSI/ANS Standard 58.4-1979, "Criteria for Technical Specifications for Nuclear Power Stations."

(4) ISA Standard S67.04, 1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants."

(5) NUREG-0717, Supplement No. 4, "Safety Evaluation Report related to the Operation of Virgil C. Summer Nuclear Station, Unit No. 1", Docket No. 50-395, August, 1982.

The relationship between the error components and the total error for a channel is noted in Equation 2.1,

$$CSA = \{(PMA)^2 + (PEA)^2 + (SCA + SMTE + SD)^2 + (SPE)^2 + (STE)^2 + (RCA + RMTE + RCSA + RD)^2 + (RTE)^2\}^{1/2} + EA \quad \text{(Eq. 2.1)}$$

where:

CSA	=	Channel Statistical Allowance
PMA	=	Process Measurement Accuracy
PEA	=	Primary Element Accuracy
SCA	=	Sensor Calibration Accuracy
SMTE	=	Sensor Measurement and Test Equipment Accuracy
SD	=	Sensor Drift
SPE	=	Sensor Pressure Effects
STE	=	Sensor Temperature Effects
RCA	=	Rack Calibration Accuracy
RMTE	=	Rack Measurement and Test Equipment Accuracy
RCSA	=	Rack Comparator Setting Accuracy
RD	=	Rack Drift
RTE	=	Rack Temperature Effects
EA	=	Environmental Allowance

As can be seen in the equation, drift and calibration accuracy allowances are interactive and thus not independent. The environmental allowance is not necessarily considered interactive with all other parameters, but as an additional degree of conservatism is added to the statistical sum. It should be noted that for this document, it is assumed that the accuracy effect on a channel due to cable degradation in an accident environment is less than 0.1 % of span. This magnitude of impact is considered negligible and is not factored into the calculations. An error due to this cause, in excess of 0.1 % of span is directly added as an environmental error.

The Westinghouse setpoint methodology results in a value with a 95 % probability with a high confidence level. With the exception of Process Measurement Accuracy and Rack Drift, all uncertainties assumed are the extremes of the ranges of the various parameters, i.e., are better than two sigma values, or are the calculated values based on the design specifications. Rack Drift is assumed, based on a survey of reported plant LERs, and with Process Measurement Accuracy, is considered a conservative value.

2.2 MARGIN CALCULATION

As noted, Westinghouse utilizes the square root of the sum of the squares for summation of the various components of the channel breakdown. This approach is valid where no dependency is present. An arithmetic summation is required where an interaction between two parameters exists. The equation used to determine the margin, and thus the acceptability of the parameter values used, is:

$$\text{Margin} = TA - ((PMA)^2 + (PEA)^2 + (SCA + SMTE + SD)^2 + (SPE)^2 + (STE)^2 + (RCA + RMTE + RCSA + RD)^2 + (RTE)^2)^{1/2} - EA \quad \text{(Eq. 2.2)}$$

where:

TA = Total Allowance (Safety Analysis Limit - Nominal Trip Setpoint),

all other parameters are as defined for Equation 2.1.

Using Equation 2.1, Equation 2.2 may be simplified to:

$$\text{Margin} = TA - CSA \quad \text{(Eq. 2.3)}$$

Table 2-1 provides the calculation of the Rosemount SPE, STE, SD and EA terms, based on Rosemount and Pacific Gas & Electric specifications. Tables 2-2 and 2-3 provide individual channel breakdown and CSA, TA, T_1, T_2 and margin calculations for two different cases. The first is based on the Safety Analysis Limit used for Loss of Normal Feedwater, Feedbreak, and Station Blackout. The second is based on the Safety Analysis Limit used for Mass and Energy Release Outside of Containment. Westinghouse evaluates both cases when a setpoint study is performed. In most cases the Feedbreak results are most limiting and determine the Nominal Trip Setpoint and Allowable Value noted in the plant Technical Specifications. However, due to the significant reduction in the transmitter temperature error and the relatively small error for reference leg heatup in adverse environmental conditions, this is no longer the most limiting case. For Diablo Canyon, with the changeout of the transmitters, the most limiting case is now the Mass and Energy Release Outside of Containment.

2.3 DEFINITIONS FOR PROTECTION SYSTEM SETPOINT TOLERANCES

To insure a clear understanding of the channel breakdown used in this report, the following definitions are noted. The uncertainty values provided in these definitions are typical for Westinghouse supplied equipment.

1. Trip Accuracy

The tolerance band containing the highest expected value of the difference between (a) the desired trip point value of a process variable and (b) the actual value at which a comparator trips (and thus actuates some desired result). This is the tolerance band, in % of span, within which the complete channel must perform its intended trip function. It includes comparator setting accuracy, channel accuracy (including the sensor) for each input, and environmental effects on the rack-mounted electronics. It comprises all instrumentation errors; however, it does not include process measurement accuracy.

2. Process Measurement Accuracy

Includes plant variable measurement errors up to but not including the sensor. Examples are the effect of fluid stratification on temperature measurements and the effect of changing fluid density on level measurements.

3. Actuation Accuracy

Synonymous with trip accuracy, but used where the word "trip" does not apply.

4. Indication Accuracy

The tolerance band containing the highest expected value of the difference between (a) the value of a process variable read on an indicator or recorder and (b) the actual value of that process variable. An indication must fall within this tolerance band. It includes channel accuracy, accuracy of readout devices, and rack environmental effects, but not process measurement accuracy such as fluid stratification. It also assumes a controlled environment for the readout device.

5. Channel Accuracy

The accuracy of an analog channel which includes the accuracy of the primary element and/or transmitter and modules in the chain where calibration of modules intermediate in a chain is allowed to compensate for errors in other modules of the chain. Rack environmental effects are not included here to avoid duplication due to dual inputs, however, normal environmental effects on field mounted hardware is included.

6. Sensor Allowable Deviation

The accuracy that can be expected in the field. It includes drift, temperature effects, field calibration and for the case of d/p transmitters, an allowance for the effect of static pressure variations.

The tolerances (with typical values for Westinghouse supplied equipment) are as follows:

a. Reference (calibration) accuracy - [ ]+a,c unless other data indicates more inaccuracy. This accuracy is the SAMA reference accuracy as defined in SAMA standard PMC 20.1-1973[1].

b. Measurement and Test Equipment accuracy - usually included as an integral part of (a), Reference (calibration) accuracy, when less than 10 % of the value of (a). For equipment (DVM, pressure gauge, etc.) used to calibrate the sensor with larger uncertainty values, a specific allowance is made.

c. Temperature effect - [ ]+a,c based on a nominal temperature coefficient of [ ]+a,c/100 ^{o}F and a maximum assumed change of 50 ^{o}F.

d. Pressure effect - usually calibrated out because pressure is constant. If not constant, a nominal [ ]+a,c is used. Present data indicates a static pressure effect of approximately [ ]+a,c/1000 psi.

---

(1) Scientific Apparatus Manufacturers Association, Standard PMC 20.1-1973, "Process Measurement and Control Terminology"

e. Drift - change in input-output relationship over a period of time at reference conditions (e.g., constant temperature - [ ]$^{+a,c}$ of span).

7. Rack Allowable Deviation

The tolerances (with typical values for Westinghouse supplied equipment) are as follows:

a. Rack Calibration Accuracy

The accuracy that can be expected during a calibration at reference conditions. This accuracy is the SAMA reference accuracy as defined in SAMA standard PMC 20.1-1973[1]. This includes all modules in a rack and is a total of [ ]$^{+a,c}$ of span, assuming the chain of modules is tuned to this accuracy. For simple loops where a power supply (not used as a converter) is the only rack module, this accuracy may be ignored. All rack modules individually must have a reference accuracy within [ ]$^{+a,c}$.

b. Measurement and Test Equipment Accuracy

Is usually included as an integral part of (a), Reference (calibration) accuracy, when less than 10 % of the value of (a). For equipment (DVM, current source, voltage source, etc.) used to calibrate the racks with larger uncertainty values, a specific allowance is made.

---

(1) Scientific Apparatus Manufacturers Association, Standard PMC 20.1-1973, "Process Measurement and Control Terminology".

c. Rack Environmental Effects

Includes effects of temperature, humidity, voltage and frequency changes of which temperature is the most significant. An accuracy of [ ]$^{+a,c}$, is used which considers a nominal ambient temperature of 70 ^{o}F with extremes to 40 ^{o}F and 120 ^{o}F for short periods of time.

d. Rack Drift

Instrument channel drift - change in input-output relationship over a period of time at reference conditions (e.g., constant temperature) - ± 1.0 % of span.

e. Rack Comparator Setting Accuracy

Assuming an exact electronic input, (note that the "channel accuracy" takes care of deviations from this ideal), the tolerance on the precision with which a comparator trip value can be set, within such practical constraints as time and effort expended in making the setting.

The tolerances assumed for Diablo Canyon are as follows:

(a) Fixed setpoint with a single input - [ ]$^{+a,c}$ accuracy. This assumes that comparator nonlinearities are compensated by the setpoint.

(b) Dual input - an additional [ ]$^{+a,c}$ must be added for comparator nonlinearities between two inputs. Total accuracy is [ ]$^{+a,c}$.

Note: The following four definitions are currently used in the Standardized Technical Specifications (STS).

8. Nominal Safety System Setting

The desired setpoint for the variable. Initial calibration and subsequent recalibrations should be made at the nominal safety system setting ("Trip Setpoint" in STS).

9. Limiting Safety System Setting

A setting chosen to prevent exceeding a Safety Analysis Limit ("Allowable Values" in STS).

10. Allowance for Instrument Channel Drift

The difference between (8) and (9) taken in the conservative direction.

11. Safety Analysis Limit

The setpoint value assumed in safety analyses.

12. Total Allowable Setpoint Deviation

Maximum setpoint deviation from a nominal due to instrument (hardware) effects.

2.4 WESTINGHOUSE SETPOINT METHODOLOGY

Recognizing that Diablo Canyon does not use the Westinghouse five column approach for the protection function Technical Specification requirements, calculations were performed to determine the Allowable Value. In the simplistic sense, the Allowable Value may be the arithmetic sum of the various rack calibration and drift uncertainties, this is defined as:

$$T_1 = (RCA + RMTE + RCSA + RD) \qquad \text{(Eq. 2.4)}$$

However, this ignores the fact that the Total Allowance may be insufficient in magnitude to substantiate such a large value when Sensor Drift and calibration uncertainties are accounted for in a more rigorous statistical manner. A second calculation is defined by the extraction of the sensor uncertainties and those parameters for which there is no surveillance possible on any periodic basis:

$$T_2 = TA - ((A) + (S)^2)^{1/2} - EA \qquad \text{(Eq. 2.5)}$$

where:

$A = (PMA)^2 + (PEA)^2 + (SPE)^2 + (STE)^2 + (RTE)^2$

$S = (SCA + SMTE + SD)$

EA, TA and all other parameters are as defined for Equation 2.1.

It should be noted that these two equations are the same as those used by Westinghouse for the five column approach, but without the flexibility of evaluating the current sensor condition in the determination of channel acceptability. For this plant, a violation of the Allowable Value is considered a determination of the unacceptability of the channel and the channel must be placed in the Tripped Condition or returned to an operable condition within six hours. This is really not operationally significant since typically, the channel can be returned to an operable condition by the recalibration of the rack modules in a reasonably short period of time. For the determination of the Allowable Value in the Technical Specifications for the Steam Generator Level - Low and Low-Low functions, the smaller of the two values, T_1 or T_2 is used.

2.5 ELIMINATION OF MARGIN LICENSE CONDITION

In NUREG-0675 Supplement No. 9(1) the NRC staff required that the instrument channel uncertainty for the Steam Generator Level - Low-Low include a margin of 3.0 % span. This was based upon the Safety Analysis Limit of 0.0 % span (used in the Feedbreak analysis) and the staff perception that the instrument channel (specifically the transmitter) exhibited some undesirable characteristics when indicating near the low level tap. Based on past indication of Rosemount 1153 transmitters in other plants (the base design for the 1154), Westinghouse believes the revised trip setpoint noted on Table 2-3 is acceptable for use. Westinghouse has no indication that the 1153 or 1154 transmitters exhibit any unexpected characteristics in the level region near the bottom tap. These transmitters would be in the upper range (18 to 20 mA) when the Steam Generator level was approaching the bottom tap (0 % span). Westinghouse has not noted any of the following: (1) that the transmitter is any more difficult to calibrate for this region of operation, (2) that the transmitter exhibits any significant non-linearity not already accounted for and (3) that the stability of the output of the transmitter in this range is any different than in the mid-range. Based on the above, the available margin noted on Tables 2-2 and 2-3 and the limiting case Safety Analysis Limit, Westinghouse believes the NRC requirement for maintaining the 3.0 % margin in the determination of the Trip Setpoint is not necessary and contributes to inadvertent trips on indicated Low-Low level.

---

(1) NUREG-0675, Supplement No. 9, "Safety Evaluation Report related to the operation of Diablo Canyon Nuclear Power Station, Units 1 and 2", Docket Nos. 50-275 and 50-323, June, 1980.

2.6 CONCLUSIONS

As can be seen from the results noted on Tables 2-2 and 2-3, the most limiting case for the determination of the revised Steam Generator Level - Low and Low-Low Trip Setpoints is Mass and Energy Release Outside of Containment. For both analysis cases, there is margin available with a Trip Setpoint of 7.2 % span. The most limiting value for the Allowable Value is also based on the Mass and Energy Release Outside of Containment and is 6.2 % span.

TABLE 2-1

MISCELLANEOUS CALCULATIONS

$$SPE = \{(0.2\ \%\ URL)^2 + (0.5\ \%\ SPAN)^2\}^{1/2}\ *$$

$$= \frac{\{((0.002)(150\ in\ H_2O))^2 + ((0.005)(106\ in\ H_2O))^2\}^{1/2}(100\ \%)}{(106\ in\ H_2O)}$$

$$STE = (0.75\ \%\ URL + 0.5\ \%\ span)/(100\ ^oF)\ *$$
for a 50 ^oF change

$$= \frac{((0.0075)(150\ in\ H_2O) + (0.005)(106\ in\ H_2O)(50\ ^oF)(100\ \%)}{(106\ in\ H_2O)(100\ ^oF)}$$

$$SD = (0.25\ \%\ URL)/(6\ months)\ *$$
for an 18 month interval

$$= \frac{(0.0025)(150\ in\ H_2O)(18\ months)(100\ \%)}{(6\ months)(106\ in\ H_2O)}$$

EA = 1.4 % URL per Pacific Gas and Electric specification

$$= \frac{(0.014)(150\ in\ H_2O)(100\ \%)}{(106\ in\ H_2O)}$$

SPE = 0.57 % span

STE = 0.78 % span

SD = 1.06 % span

EA = 1.98 % span

* per Rosemount Product Data Sheet 2514, 1984

TABLE 2-2

STEAM GENERATOR LEVEL - LOW-LOW (FEEDBREAK)

Parameter	Allowance*
Process Measurement Accuracy Density variations with load due to recirculation ratio changes**	+a,c
Primary Element Accuracy	
Sensor Calibration Accuracy Measurement & Test Equipment Accuracy	
Sensor Pressure Effects	
Sensor Temperature Effects	
Sensor Drift	
Environmental Allowance Transmitter Reference Leg Heatup	
Rack Calibration Measurement & Test Equipment Accuracy	
Rack Comparator Setting Accuracy One input	
Rack Temperature Effects	
Rack Drift	

Total Allowance	= 7.2 % span	
Channel Statistical Allowance	=	+a,c
Margin	=	
T_1	=	
T_2	=	

Safety Analysis Limit	= 0.0 % span
Nominal Trip Setpoint	$\geq$ 7.2 % span
Allowable Value	$\geq$ 5.6 % span

* In % instrument span (100 % Level)
** See Table 2-4

TABLE 2-3

STEAM GENERATOR LEVEL - LOW-LOW (MASS and ENERGY RELEASE)

Parameter	Allowance*
Process Measurement Accuracy	
Density variations with load due to recirculation ratio changes**	+a,c
Primary Element Accuracy	
Sensor Calibration Accuracy	
Measurement & Test Equipment Accuracy	
Sensor Pressure Effects	
Sensor Temperature Effects	
Sensor Drift	
Environmental Allowance	
Transmitter	
Reference Leg Heatup	
Rack Calibration	
Measurement & Test Equipment Accuracy	
Rack Comparator Setting Accuracy	
One input	
Rack Temperature Effects	
Rack Drift	

Total Allowance = 4.0 % span

Channel Statistical Allowance = +a,c

Margin =

T_1 =

T_2 =

Safety Analysis Limit = 3.2 % span
Nominal Trip Setpoint ≥ 7.2 % span
Allowable Value ≥ 6.2 % span

* In % instrument span (100 % Level)
** See Table 2-4

TABLE 2-4

STEAM GENERATOR LEVEL DENSITY VARIATIONS

Because of density variations with load due to changes in recirculation, it is impossible without some form of compensation to have the same accuracy under all load conditions. The recommended calibration point is at 50 % power conditions. Approximate errors at 0 % and 100 % water level readings and also for nominal trip points of 10 % and 70 % level are listed below for a typical 50 % power condition calibration. This is a general case and will change somewhat from plant to plant. These errors are only from density changes and do not reflect channel accuracies, trip accuracies or indicated accuracies which have been defined as Delta-P measurements only.(1)

INDICATED LEVEL (50 % Power Calibration)

	0%	10%	70%	100%
Actual Level 0 % Power				
Actual Level 100 % Power				

+a,c

(1) Miller, R. B., "Accuracy Analysis for Protection/Safeguards and Selected Control Channels", WCAP-8108 (Proprietary), March 1973.

APPROVAL FOR RELEASE OF TECHNICAL REPORT

REPORT NUMBER: WCAP-11784

W PROPRIETARY CLASS: 2

THIS REPORT HAS BEEN REQUESTED BY: C. R. TULEY/WEC E 324/W-284-4343

FOR RELEASE TO: PACIFIC GAS & ELECTRIC/NRC

FOR THE FOLLOWING REASON(S): CONTRACTUAL OBLIGATION

PREVIOUS RELEASE: NONE

REPORT TITLE: CALCULATION OF STEAM GENERATOR LEVEL LOW-LOW TRIP SETPOINT WITH USE OF A ROSEMOUNT 1154 TRANSMITTER DIABLO CANYON UNITS 1 & 2

REPORT FUNDED BY:

DATE OF ISSUE: MAR. 1988

DATE STARTED ROUTING: 03/17/88

SIGNATURE		CHECK BOX RELEASE	DO NOT RELEASE*	DATE
W. J. JOHNSON (signed: [illegible]/for)	AUTHOR DEPARTMENT MANAGER	[✓]	[ ]	3/22/88
	PATENT REPRESENTATIVE[1,2]	[ ]	[ ]	
R. A. WIESEMANN (signed)	REGULATORY & LICENSING MGR[2]	[✓]	[ ]	3/21/88
J. C. HOEBEL (signed)	PROJECT MANAGER[2]	[✓]	[ ]	3/18/88
B. A. BURY	INFORMATION RESOURCE CENTER	[ ]	[ ]	

*IF APPROVAL IS NOT GIVEN, STATE REASON(S) BELOW. DO NOT CONTINUE ROUTING! RETURN TO: INFORMATION RESOURCE CENTER - WEC E-209.

[1]IF REPORT IS W PROPRIETARY CLASS 2, THEN SIGNATURE IS NOT REQUIRED AS PER NS-RAW-87-014.

[2]IF NDR/POP REPORT, THEN SIGNATURES ARE NOT REQUIRED AS PER CE-86-054 AND NS-RAW-86-018.

APPROVAL FOR RELEASE OF TECHNICAL REPORT

REPORT NUMBER: WCAP-11785

W PROPRIETARY CLASS: 3

THIS REPORT HAS BEEN REQUESTED BY: C. R. TULEY/WEC E 324/W-284-4343

FOR RELEASE TO: UNRESTRICTED DISTRIBUTION

FOR THE FOLLOWING REASON(S):

PREVIOUS RELEASE: NONE

REPORT TITLE: CALCULATION OF STEAM GENERATOR LEVEL LOW-LOW TRIP SETPOINT WITH USE OF A ROSEMOUNT 1154 TRANSMITTER DIABLO CANYON UNITS 1 & 2

REPORT FUNDED BY:

DATE OF ISSUE: MAR. 1988

DATE STARTED ROUTING: 03/17/88

SIGNATURE		CHECK BOX RELEASE	DO NOT RELEASE*	DATE
W. J. JOHNSON /for	AUTHOR DEPARTMENT MANAGER	[✓]	[ ]	3/22/88
D. P. ADOMAITIS	PATENT REPRESENTATIVE[1,2]	[✓]	[ ]	3/23/88
R. A. WIESEMANN	REGULATORY & LICENSING MGR[2]	[✓]	[ ]	3/21/88
J. C. HOEBEL	PROJECT MANAGER[2]	[✓]	[ ]	3/18/88
B. A. BURY	INFORMATION RESOURCE CENTER	[ ]	[ ]	

*IF APPROVAL IS NOT GIVEN, STATE REASON(S) BELOW. DO NOT CONTINUE ROUTING! RETURN TO: INFORMATION RESOURCE CENTER - WEC E-209.

[1]IF REPORT IS W PROPRIETARY CLASS 2, THEN SIGNATURE IS NOT REQUIRED AS PER NS-RAW-87-014.

[2]IF NDR/POP REPORT, THEN SIGNATURES ARE NOT REQUIRED AS PER CE-86-054 AND NS-RAW-86-018.

Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94106
415/973-4684
TWX 910-372-6587

James D. Shiffer
Vice President
Nuclear Power Generation

April 18, 1988

PG&E Letter No.: DCL-88-089

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

Re: Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request 88-03
Revision of Technical Specification 2.2.1, "Reactor Trip System Instrumentation Setpoints" and Associated Bases to Reduce Steam Generator Water Level Low and Low-Low Setpoints

Gentlemen:

Enclosure 1 is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82. The license amendment request (LAR) proposes to revise Technical Specification 2.2.1 and associated Bases to reduce the steam generator water level low and low-low setpoints from 15 to 7.2 percent of the narrow range span. Reducing the setpoints is a part of PG&E's Trip Reduction Program and is expected to decrease the number of unnecessary reactor trips from (1) steam generator water level low-low and (2) steam generator water level low coincident with steam/feedwater flow mismatch. This will in turn reduce the number of challenges to the reactor protection systems and impose fewer thermal transients on the plant, thus enhancing the long-term safety of the plant.

During the current refueling outage for Unit 1 and the next refueling outage for Unit 2 (Fall of 1988), PG&E plans to replace the existing Barton 764 steam generator level transmitters with more accurate Rosemount 1154 transmitters. The requested setpoint changes will be made as soon as practical thereafter following issuance of a license amendment by the NRC.

A similar license amendment has been previously issued by the NRC for Salem on May 5, 1983 (Amendment 53 to DPR-70 and Amendment 21 to DPR-75).

Enclosure 2 provides WCAP-11784 "Calculation of Steam Generator Level Low and Low-Low Trip Setpoint With Use of A Rosemount 1154 Transmitter," dated March 1988. This WCAP provides the analysis and calculation of the steam generator level setpoints. The methodology used to calculate the setpoints is essentially the same as that used for the V. C. Summer plant, which was approved by the NRC Staff in NUREG-0717, Supplement No. 4, dated August 1982.

A001
1/1
w/check $150
#8209250082S

CHANGE	LTR	ENCL
LPDR	1	1 NP
NSIC	1	1 NP
NRC PDR	1	1 NP

As WCAP-11784 contains information proprietary to Westinghouse Electric Corporation, it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations. It is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations. Accordingly, included in Enclosure 2 is a Westinghouse authorization letter (CAW-88-019), proprietary information notice, and accompanying affidavit. Correspondence with respect to the proprietary aspects of the Application for Withholding or the supporting Westinghouse affidavit should reference CAW-88-019 and should be addressed to R. A. Wiesemann, Manager Regulatory and Legislative Affairs, Westinghouse Electric Corporation, P.O. Box 335, Pittsburgh, Pennsylvania 15230-0355.

Pursuant to 10 CFR 170.12(c), an application fee of $150.00 is enclosed.

Kindly acknowledge receipt of this material on the enclosed copy of this letter and return it in the enclosed addressed envelope.

Sincerely,

J. D. Shiffer

J. D. Shiffer

cc: J. B. Martin
J. Hickman
M. M. Mendonca
P. P. Narbut
B. Norton
H. Rood
B. H. Vogler
CPUC
Diablo Distribution

Enclosures

1953S/0056K/RLJ/1823