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See ~~Reports~~ Proposed Change To Tech Specs

SUBJECT: Forwards application for amend for licenses DPR-80 & DPR-82 to change surveillance frequency for several TS re instrumentation channel surveillance tests from at least once every 18 months to at least once per interval.

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December 9, 1996

PG&E Letter DCL-96-213

U.S. Nuclear Regulatory Commission
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Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request 96-10
Revision of Technical Specifications to Support
Extended Fuel Cycles to 24 Months

Dear Commissioners and Staff:

Enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82 for Units 1 and 2 of the Diablo Canyon Power Plant (DCPP). This license amendment request (LAR) is the third in a series planned for submittal over a one-year period to support the DCPP 24-month cycle plans.

In the first two LARs, PG&E proposed a new frequency notation for 24-month intervals and provided evaluations for extending intervals of several Technical Specification (TS) surveillances (LAR 96-04, PG&E Letter DCL-96-052, dated February 14, 1996, and LAR 96-09, PG&E Letter DCL-96-129, dated May 31, 1996). This LAR proposes to change the surveillance frequency for several TS regarding instrumentation channel surveillance tests from at least once every 18 months to at least once per refueling interval (nominally 24 months). Due to a setpoint methodology change in support of the calibration extensions, revisions are proposed for most of the functions' allowable values. One setpoint change is proposed to provide adequate margin for instrument uncertainty for the pressurizer water level - high reactor trip. This LAR is also supported by a change to the safety analysis limit for the reactor coolant system loss of flow-low setpoint.

The changes have been evaluated in accordance with the guidance provided in Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," and are a part of those necessary to support implementation of extended fuel cycles at DCPP.

A001

— [illegible]

This LAR is composed of one enclosure with four attachments. Attachment A provides a listing of the affected TS and background information on the setpoint methodology, explains the relationship of this LAR with other previously submitted LARs, and provides the overall safety evaluation, the no significant hazards evaluation and determination, and the environmental evaluation. Attachment B provides marked-up TS. Attachment C provides proposed new TS pages. Attachment D provides item-specific safety and no significant hazards evaluations for each of the affected instrument channels.

As discussed earlier with the NRC, PG&E plans to use three transition cycles prior to converting DCPP to 24-month fuel cycles. The first transition cycle, Unit 2 Cycle 8 (U2C8), began in May 1996 and is designed for 21 months, ending in January 1998. PG&E proposes to use the 24-month cycle surveillance interval extensions to support the transition cycles This conservative approach is intended to avoid the use of the 25 percent allowance for surveillance extension during the transition cycles. For U2C8, the 18-month refueling surveillances will be due by October 1997, 18 months into the cycle. Therefore, PG&E requests that the NRC review the 24-month cycle LARs on a medium priority and approve them by July 1997. PG&E also requests that the TS changes requested in this LAR be effective upon issuance of the license amendment, with the provision that PG&E implement the changes within 90 days.

Sincerely,

Gregory M. Rueger

cc: Edgar Bailey, DHS
Steven D. Bloom
L. J. Callan
Kenneth E. Perkins
Michael D. Tschiltz
Diablo Distribution

Enclosure

ALN/2057

REVISION OF CHANNEL CALIBRATIONS AND SETPOINTS FOR VARIOUS TECHNICAL SPECIFICATIONS TO SUPPORT EXTENDED FUEL CYCLES

A. DESCRIPTION OF AMENDMENT REQUEST

This license amendment request (LAR) is the third in a series planned for submittal over a one-year period to support the first extended fuel cycle at Diablo Canyon Power Plant (DCPP) Units 1 and 2. This LAR proposes to extend the surveillance frequencies for the reactor trip system (RTS) and engineered safety features actuation systems (ESFAS) instrumentation channels, and make certain changes in trip setpoints and allowable values. Channel operational tests (COTs) and trip actuating device operational tests (TADOTs) associated with these channels are also proposed for extension.

As part of the first LAR in support of 24-month fuel cycles (LAR 96-04, PG&E Letter DCL-96-052, dated February 14, 1996), PG&E proposed a new frequency notation for 24-month intervals which will be used in this LAR. The notation "R24" was proposed for usage in the Technical Specification (TS) tables to differentiate those surveillances which would be extended from those that have not been evaluated or do not warrant extension. Therefore, the surveillance frequency for the specified channels would be extended from "R," defined as once per 18 months, to "R24," defined as at least once per 24 months.

In support of the calibration extensions and setpoint changes, this LAR presents a revised setpoint methodology based on drift evaluation and monitoring for the instrumentation channels. WCAP-11082, Revision 5, "Westinghouse Setpoint Methodology for Protection Systems, Diablo Canyon Units 1 and 2, 24 Month Fuel Cycle Evaluation," provides detailed information. The calibration extensions for instrumentation associated with both plant protective setpoints and plant control systems necessary for safe shutdown are supported by WCAP-11594, Revision 2, "Westinghouse Improved Thermal Design Procedure Instrument Uncertainty Methodology, Diablo Canyon Units 1 and 2, 24 Month Fuel Cycle Evaluation." Details of the drift methodology are supported by WCAP-14646, Revision 0, "Instrumentation Calibration and Drift Evaluation Process for Diablo Canyon Units 1 and 2, 24 Month Fuel Cycle Evaluation." The methodologies of the WCAPs are consistent. As discussed with the NRC Project Manager for Diablo Canyon on December 5, 1996, these WCAPs will be submitted under separate cover by January 31, 1997 (see PG&E Letter DCL-96-214).

The proposed TS format for the trip setpoints and allowable values is consistent with that currently used at DCPP. This format is also consistent with the two column format used in NUREG-1431, Revision 1, "Improved Standard Technical Specifications - Westinghouse Plants." Revisions to the appropriate TS Bases are provided to support the setpoint methodology and setpoint changes.

Setpoint or allowable value changes are proposed for the following items in TS 2.2.1, Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints. These changes are a result of the evaluations performed to support the surveillance extensions in TS 3/4.3.1, Table 4.3-1, Reactor Trip System Instrumentation Surveillance Requirements (Items 26 through 48).

Item	Technical Specification
1.	Functional Unit 2.a. - Power Range, Neutron Flux, Low Setpoint
2.	Functional Unit 2.b. - Power Range, Neutron Flux, High Setpoint
3.	Functional Unit 3. - Power Range, Neutron Flux High Positive Rate
4.	Functional Unit 4. - Power Range, Neutron Flux High Negative Rate
5	Functional Unit 5. - Intermediate Range, Neutron Flux
6.	Functional Unit 9. - Pressurizer Pressure, Low
7.	Functional Unit 10. - Pressurizer Pressure, High
8.	Functional Unit 11. - Pressurizer Water Level, High
9.	Functional Unit 12. - Reactor Coolant Flow, Low
10.	Functional Unit 13. - Steam Generator Water Level, Low-Low Reactor Trip
10a.	Functional Unit 13.a. and 13.b. - Steam Generator Water Level, Low-Low, RCS Loop ΔT equivalent to power
11.	Functional Unit 15. - Undervoltage-Reactor Coolant Pumps
12.	Functional Unit 22.a. - Reactor Trip System Interlocks, Intermediate Range Neutron Flux, P-6
13.	Functional Unit 22.b.1) - Reactor Trip System Interlocks, Low Power Reactor Trips Block, P-7, P-10 Input
14.	Functional Unit 22.b.2) - Reactor Trip System Interlocks, Low Power Reactor Trips Block, P-7, P-13 Input
15.	Functional Unit 22.c. - Reactor Trip System Interlocks, Power Range Neutron Flux, P-8
16.	Functional Unit 22.d. - Reactor Trip System Interlocks, Power Range Neutron Flux, P-9
17.	Functional Unit 22.e. - Reactor Trip System Interlocks, Power Range Neutron Flux, P-10

18. Functional Unit 22.f. - Reactor Trip System Interlocks, Turbine Impulse Chamber Pressure, P-13
19. Functional Unit 23 - Seismic Trip
20. Overtemperature ΔT and Overpower ΔT Notes 1 and 3 terminology change (Also Notes 1 and 3 in Table 3.3-4)
21. Overtemperature ΔT and Overpower ΔT Notes 1 and 3 clarification
22. Overtemperature ΔT Note 2 revision
23. Overpower ΔT Note 3 clarification
24. Overpower ΔT Note 4 revision

A change to the Bases section of TS 2.2.1 is proposed to support the changes made in Table 2.2-1.

<u>Item</u> <u>Technical Specification</u>

25. TS Bases 2.2.1 - Reactor Trip System Instrumentation Setpoints

The following TS 3/4.3.1, Table 4.3-1, Reactor Trip System Instrumentation Surveillance Requirements, for channel calibration, are proposed for extension. Certain functional units are also proposed to have additional surveillance tests revised, as noted.

<u>Item</u> <u>Technical Specification</u>

26. Functional Unit 2.a. - Power Range, Neutron Flux, High Setpoint
27. Functional Unit 2.b. - Power Range, Neutron Flux, Low Setpoint
28. Functional Unit 3. - Power Range, Neutron Flux, High Positive Rate
29. Functional Unit 4. - Power Range, Neutron Flux, High Negative Rate
30. Functional Unit 5. - Intermediate Range, Neutron Flux
31. Functional Unit 6. - Source Range, Neutron Flux
32. Functional Unit 7. - Overtemperature ΔT (OTΔT)
33. Functional Unit 8. - Overpower ΔT (OPΔT)
34. Functional Unit 9. - Pressurizer Pressure, Low
35. Functional Unit 10. - Pressurizer Pressure, High
36. Functional Unit 11. - Pressurizer Water Level, High
37. Functional Unit 12. - Reactor Coolant Flow, Low
38. Functional Unit 13.a. - Steam Generator Water Level, Low-Low reactor trip

39. Functional Unit 13.b. - Steam Generator Water Level, Low-Low, RCS Loop ΔT input, and clarified functional unit description
40. Functional Unit 15. - Undervoltage-Reactor Coolant Pumps
41. Functional Unit 16. - Underfrequency-Reactor Coolant Pumps
42. Functional Unit 20.a. - Reactor Trip System Interlocks, Intermediate Range Neutron Flux, P-6, and the associated COT
43. Functional Unit 20.b. - Reactor Trip System Interlocks, Low Power Reactor Trips Block, P-7, and the associated COT
44. Functional Unit 20.c. - Reactor Trip System Interlocks, Power Range Neutron Flux, P-8, and the associated COT
45. Functional Unit 20.d. - Reactor Trip System Interlocks, Power Range Neutron Flux, P-9, and the associated COT
46. Functional Unit 20.e. - Reactor Trip System Interlocks, Low Setpoint Power Range Neutron Flux, P-10, and the associated COT
47. Functional Unit 20.f. - Reactor Trip System Interlocks, Turbine Impulse Chamber Pressure, P-13, and the associated COT
48. Functional Unit 23. - Seismic Trip, and the associated TADOT and actuation logic test

Allowable value changes are proposed for the following items in TS 3/4.3.2, Table 3.3-4, Engineered Safety Features Actuation System Instrumentation Trip Setpoints. These changes are a result of the evaluations performed to support the surveillance extensions in TS 3/4.3.2, Table 4.3-2, ESFAS Instrumentation Trip Setpoints.

<u>Item</u> <u>Technical Specification</u>

49. Functional Unit 1.c. - Safety Injection, Containment Pressure - High
50. Functional Unit 1.d. - Safety Injection, Pressurizer Pressure - Low
51. Functional Unit 1.f. - Safety Injection, Steam Line Pressure - Low
52. Functional Unit 2.c. - Containment Spray, Containment Pressure - High-High
53. Functional Unit 3.b.3) - Containment Isolation, Phase B Isolation, Containment Pressure - High-High
54. Functional Unit 4.c. - Steam Line Isolation, Containment Pressure - High-High
55. Functional Unit 4.d. - Steam Line Isolation, Steam Line Pressure - Low
56. Functional Unit 4.e - Steam Line Isolation - Negative Steam Line Pressure Rate - High

57. Functional Unit 5.b. - Turbine Trip and Feedwater Isolation, Steam Generator Water Level - High-High
58. Functional Unit 6.c. - Auxiliary Feedwater, Steam Generator Water Level - Low-Low, initiation on Steam Generator Water Level - Low-Low
58a. Functional Unit 6.c.1) and 2) - Auxiliary Feedwater, Steam Generator Water Level - Low-Low, RCS Loop ΔT equivalent to power
59. Functional Unit 6.d. - Auxiliary Feedwater, Undervoltage - RCP
60. Functional Unit 8.a. - ESFAS Interlocks, Pressurizer Pressure, P-11

The following TS 3/4.3.2, Table 4.3-2, ESFAS Instrumentation Surveillance Requirements, for channel calibration, are proposed for extension. The TADOT for Functional Unit 6.d. Auxiliary Feedwater, Undervoltage, is also proposed for extension. Note that Functional Units 3.c.4) on containment ventilation isolation, 7.a) on loss of power level 1, and 7.b) on loss of power level 2 are not included here. Since Functional Unit 3.c.4) involves radiation monitoring channels, it will be evaluated with other plant radiation monitoring instrumentation in a future submittal. Functional Units 7.a) and 7.b) will also be evaluated in a future submittal.

<u>Item</u> <u>Technical Specification</u>

61. Functional Unit 1.c. - Safety Injection, Containment Pressure - High
62. Functional Unit 1.d. - Safety Injection, Pressurizer Pressure - Low
63. Functional Unit 1.f. - Safety Injection, Steam Line Pressure - Low
64. Functional Unit 2.c. - Containment Spray, Containment Pressure - High-High
65. Functional Unit 3.b.3) - Containment Isolation, Phase B Isolation, Containment Pressure - High-High
66. Functional Unit 4.c. - Steam Line Isolation, Containment Pressure - High-High
67. Functional Unit 4.d. - Steam Line Isolation, Steam Line Pressure - Low
68. Functional Unit 4.e. - Steam Line Isolation, Negative Steam Line Pressure Rate - High
69. Functional Unit 5.b. - Turbine Trip and Feedwater Isolation, Steam Generator Water Level - High-High
70. Functional Unit 6.c.1) - Auxiliary Feedwater, Steam Generator Water Level - Low-Low, initiation on Steam Generator Water Level - Low-Low

71. Functional Unit 6.c.2) - Auxiliary Feedwater, Steam Generator Water Level - Low-Low, RCS Loop ΔT input, and clarified functional unit description
72. Functional Unit 6.d. - Auxiliary Feedwater, Undervoltage - RCP and the associated TADOT
73. Functional Unit 8.a. - ESFAS Interlocks, Pressurizer Pressure, P-11

A change to the Bases section for TS 3/4.3.1 and 3/4.3.2 is proposed to support the changes made in those TS.

Item	Technical Specification
74.	TS Bases 3/4.3.1 and 3/4.3.2 - Reactor Trip System and Engineered Safety Features Actuation System Instrumentation

Changes to the TS are noted in the marked-up copies of the applicable TS pages provided in Attachment B. The new proposed TS pages are provided in Attachment C. An item-specific safety and no significant hazards evaluation for each proposed TS change is provided in Attachment D.

B. BACKGROUND

The RTS initiates a unit shutdown, based on the values of critical plant parameters, to protect against violating the core design limits, to protect the reactor coolant system (RCS) pressure boundary during anticipated operational occurrences, and to assist the ESFAS in mitigating accidents. The RTS and ESFAS have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of the parameters directly monitored by the RTS/ESFAS, as well as specifying limiting conditions for operation on other reactor system parameters and on equipment performance. The LSSS establish the threshold for protective action to prevent exceeding acceptable limits during design basis accidents.

The RTS/ESFAS receive inputs from field transmitters or process sensors. These analog devices provide a measurable electronic signal based on the physical characteristics or value of the parameter being measured. Most process inputs are received by the Eagle 21 process protection racks and the nuclear instrumentation system. The racks provide signal conditioning, setpoint comparison, process algorithm

actuation, and compatible electrical signal output to protection system devices and control board/control room indications. The trip setpoints are set in the Eagle 21 or nuclear instrumentation process racks. Some setpoints are set in dry-contact output devices, such as an undervoltage relay, which input directly into protection system devices.

For each LSSS, a trip setpoint and its associated allowable value have been established. The trip setpoints and allowable values together ensure that safety limits are not exceeded. The trip setpoints are the nominal values at which the bistable/outputs (Eagle 21 central processing unit (CPU) or contact trip outputs) are set. Any bistable/contact output device is considered to be properly adjusted when the as-left value is within the band for comparator calibration accuracy, known as the as-left desired band. For instrument loops which use Eagle 21 process racks, the setpoints can be set at the nominal setpoint values. The trip setpoints for the CPU/bistables are based on the analytical limits stated in the Final Safety Analysis Report (FSAR) Update. The selection of the trip setpoints is such that adequate protection is provided when all uncertainties associated with the process, sensor, and rack are taken into account. When rack performance is verified through either a quarterly COT or a channel calibration (each refueling outage), the as-found value of the setpoint is compared to the allowable value. If the setpoint is found outside the allowable value, it is reset within the as-left tolerance; if the setpoint cannot be reset within the as-left tolerance, then the channel is declared inoperable.

Unlike the two previously submitted LARs 96-04 and 96-09, this LAR focuses on instrument calibration data and addresses the issues discussed in Enclosure 2 of Generic Letter (GL) 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle." Therefore, the same perspective is not used for the evaluation of industry experience, surveillance test results, maintenance history, and operating history as was used for these considerations in the previous LARs. Industry experience is considered in this LAR as a basis for assumed drift values in cases where there are insufficient DCPP instrument calibration data to establish a statistically significant sample for drift.

Also, the two previous submittals used the historical review of maintenance and surveillance results to justify interval extension, but for this LAR the review of instrument calibration results is used instead. The calibrations reflect instrument maintenance and operating experience, in that the instruments are continuously operated, and maintenance is

typically performed only as required by the equipment qualification program or in response to an as-found or as-left out-of-tolerance condition which is captured in the calibration data.

C. TECHNICAL SPECIFICATION PAGES AFFECTED BY PREVIOUSLY SUBMITTED LARs

Several of the TS items included in this LAR are also the subject of, or their pages are affected by, previously submitted LARs. Each of the pending TS changes were evaluated with respect to this LAR and found not to conflict. Table 1 identifies the TS pages, previous LARs, and submittal dates. Issuance of License Amendments (LA) for the LARs listed in the table may require submittal of revised TS pages for this LAR.

TABLE 1 - TS PAGES AFFECTED BY PREVIOUS LARs

TS PAGE	LAR
3/4 3-10	96-04, Extended Fuel Cycles, February 14, 1996
3/4 3-11	96-04, Extended Fuel Cycles, February 14, 1996
3/4 3-12	96-04, Extended Fuel Cycles, February 14, 1996
3/4 3-32	96-04, Extended Fuel Cycles, February 14, 1996 96-09, Extended Fuel Cycles, May 31, 1996
3/4 3-33	96-04, Extended Fuel Cycles, February 14, 1996
3/4 3-34	96-04, Extended Fuel Cycles, February 14, 1996
3/4 3-35	96-04, Extended Fuel Cycles, February 14, 1996

LAR 96-04, PG&E Letter DCL-96-052, dated February 14, 1996, was the first in the series of extended fuel cycle LARs. The LAR proposed the "R24" terminology used in this submittal and proposed extension of several TADOTs. Testing performed to meet TADOT requirements for manual initiations and other non-instrument-related equipment is independent of channel calibration frequency.

LAR 96-09, PG&E Letter DCL-96-129, dated May 31, 1996, was the second in the series of extended fuel cycle LARs. The LAR proposed extension of various TS, including the TADOT for containment spray manual initiation on TS page 3/4 3-32. Testing performed to meet TADOT requirements for manual initiation is independent of channel calibration frequency.

D. JUSTIFICATION

The changes proposed in this LAR are required to support implementation of extended fuel cycles at DCPP. The primary benefits of extended cycles will be fewer refuelings, improved outage scheduling, reduced personnel dose, and reduced radwaste.

The proposed channel calibration interval extensions have been evaluated in accordance with the guidance of GL 91-04, Enclosure 2, and are similar to changes recently approved for Indian Point 2 and 3 and changes proposed for Millstone 3. The trip setpoint change for the pressurizer water level - high reactor trip, the safety analysis limit change for RCS loss of flow - low reactor trip, and the allowable value changes for the parameters are required to account for increased instrument uncertainties and changes in methodology associated with these channels. WCAP-11082, Revision 5, provides the basis for extending the RTS and ESFAS instrument channel calibrations and revising the setpoint and allowable values. WCAP-11594, Revision 2, provides complementary bases to WCAP-11082, Revision 5, for the extension of calibrations for instrument channels which provide protection input and which also control plant parameters that are inputs to the DCPP Improved Thermal Design Procedure analysis.

The proposed COT and TADOT extensions for the instrument channels also were evaluated in accordance with GL 91-04 and are required to support extended cycle operation. The seismic trip actuation logic test interval reduction restores consistency with other RTS actuation logic test requirements in the DCPP TS and is a more stringent requirement than the current TS.

E. SAFETY EVALUATION

Overview

PG&E has addressed the issue of increased uncertainty caused by drift in RTS and ESFAS instrumentation in order to justify an increase in calibration intervals to accommodate a 24-month fuel cycle. PG&E and Westinghouse have evaluated the effects of an increased calibration interval on instrument uncertainty to confirm that drift will not result in instrument errors for setpoints that exceed the assumptions of the safety analysis. Instrument drift affects the capability of a system to perform its safety function and is a consideration for determining safety system setpoints. PG&E has reviewed DCPP operating experience and vendor

specifications on instrument performance to develop information on the increase in instrument errors that could occur with an increased calibration interval. This information, together with a program to monitor and assess the long-term effects of instrument drift, provides the basis for increasing the refueling outage related calibration intervals for instruments that perform automatic safety functions.

In this LAR, one trip setpoint change in TS 2.2.1, Table 2.2-1, is proposed to provide additional margin for instrument uncertainty: the pressurizer water level - high reactor trip setpoint would be changed from less than or equal to 92 percent span to less than or equal to 90 percent span. In addition, there is a safety analysis limit change required for the reactor coolant flow - low reactor trip to support the current TS Table 2.2-1 setpoint. With the safety analysis limit change, there is no change necessary to the TS reactor coolant flow - low setpoint. Finally, most of the channel functional units are proposed to have allowable value changes in order to support the Westinghouse setpoint methodology.

The frequency of performing certain COTs and TADOTs is being extended. The past performance of these tests was reviewed in accordance with GL 91-04, Enclosure 1 and, with few exceptions, all tests were performed successfully. The evaluations of the COT and TADOT changes are discussed in Attachment D.

The frequency of performing the seismic trip functional unit actuation logic test is being revised from each refueling outage to monthly. The solid state protection system (SSPS) processes the seismic trigger output. Therefore, the monthly SSPS actuation logic test for all of its inputs also checks this functional unit.

General Methodology

The analysis of the uncertainty for the majority of the RTS and ESFAS setpoints is reported in WCAP-11082, Revision 5. PG&E performed the evaluation for turbine impulse pressure (P-13 Interlock) using the Westinghouse methodology. PG&E will also perform the evaluation for the ESFAS loss of power relays since these relays are planned for replacement within the next fuel cycle. The evaluation of radiation monitoring inputs for containment ventilation isolation will be performed for a subsequent submittal on all of the radiation monitoring channels.

The evaluations in WCAP-11082 are based on a methodology responsive to the GL 91-04 guidance: that uncertainty calculations

should be performed in a manner which results in drift values at a high probability and a high confidence level. To address the requirements for a definitive basis for drift, function-specific calculations were performed to determine appropriate drift values for the sensors and process racks. The statistical analysis of instrument drift is based solely on the use of DCPP plant-specific instrument calibration data. Because statistically-based drift values use actual plant data, Westinghouse modified the basic uncertainty algorithm for the calculation of setpoint error to be consistent with the use of the new values. This modified algorithm was also used by Westinghouse to support the Millstone and Indian Point 2 and 3 extended fuel cycle submittals. The major difference between these plants and DCPP in the application of this algorithm is the determination of allowable values; the DCPP allowable values are small in relation to those of other plants due to the drift characteristics of the Eagle 21 process protection racks.

Allowable values were reviewed in accordance with the WCAP-11082, Revision 5, methodology. New numbers for most of the allowable values have been proposed to support the calibration extensions. The only allowable values not changed were those for reactor coolant pump (RCP) underfrequency and source range neutron flux. The allowable values from WCAP-11082, Revision 5, are determined using the sum of rack drift and rack measuring and test equipment (M&TE) errors for those items which have rack hardware. The racks are checked quarterly for compliance to the allowable values during the COT. The instrument loops for some of the TS items do not have rack hardware. For example, the seismic triggers and RCP undervoltage and underfrequency trip relays do not have associated racks. For such items, the sensor drift and M&TE errors are used to determine the allowable value at an appropriate interval. The allowable values for the seismic triggers contain proportionately more allowance for drift because the sensors are calibrated every refueling outage, rather than checked quarterly as is done for the racks and relays.

The Westinghouse methodology and uncertainty algorithm reflects the calibration and operability verification processes at DCPP. A determination was made of which error parameters are statistically or functionally dependent. Those errors that were determined to be independent were combined using a square-root-sum-of-the-squares (SRSS) summation of the various error components. For those errors that were determined to be dependent, appropriate (conservative) summation techniques were used. The SRSS technique has been used in WCAP-11594 and other Westinghouse reports. 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.

Uncertainties for several RTS channels were not recalculated using the 24-month fuel cycle algorithm. These channels are: (1) the power range neutron flux high and low setpoints; (2) the power range neutron flux high positive and high negative rate setpoints; (3) the intermediate range neutron flux setpoints; and (4) the source range neutron flux setpoints. The channel statistical allowance (CSA) equation (algorithm) used for combining the uncertainty components for these channels is the same one used in Revision 2 of WCAP-11082, "Westinghouse Setpoint Methodology for Protection Systems, Diablo Canyon Stations, Eagle 21 Version," supporting the current DCPP TS setpoints for those channels. That CSA equation assumed that calibration accuracy, drift, and sensor measuring and test equipment are dependent terms, and results in a more conservative CSA than would be obtained if these channels were reevaluated with the equation from the 24-month fuel cycle evaluation.

Drift Evaluation

The plant-specific drift equals the difference between the as-found and the previous as-left calibration data and, therefore, involves the actual sensor drift and the error in the calibration M&TE. The plant-specific drift data were statistically analyzed to establish sensor performance characteristics. The details of the statistical analysis of the DCPP calibration data are reported in WCAP-14646, "Instrumentation Calibration and Drift Evaluation Process for Diablo Canyon Units 1 and 2, 24 Month Fuel Cycle Evaluation." Once expected performance characteristics are established, the sensor as-found calibration data indicate whether or not the sensor input/output relationship stayed within reasonable allowances over the interval since the last calibration. The combination of as-left calibration data and plant specific sensor drift provide the basis for the allowance within which it is reasonable to expect the sensor to continue to perform for future cycles.

To evaluate instrument drift, the plant as-left and as-found calibration data were organized into computer spreadsheets. The data were pooled, in that the data from the 0, 25, 50, 75, and 100 percent span cardinal calibration points (some instruments were calibrated at additional cardinal points) were analyzed as a combined sample. This approach was based on the performance of statistical tests on various data samples which indicated that it was acceptable statistically to use the pooled data for determination

of drift population mean, standard deviation, and correlation coefficient of drift with calibration interval (time).

Outliers

An integral part of the evaluation process was the screening for data integrity and the removal, as appropriate, of non-representative drift data sets based on the identification of mechanistic causes or statistical outliers. A drift data set is the as-found, minus as-left, data from two consecutive calibrations of the same instrument. Drift data were removed from the sample due to a mechanistic cause only if it was identified that the questionable data were due to component failure or a flaw in the data recording process (which could affect only a single data point).

The second approach used to evaluate questionable data was a statistical outlier test based on a standard industry approach. This test was applied to the drift data points in a set, with the objective of demonstrating that the entire set could be considered to be flawed. The removal of the entire data set (even the good data within the drift data set) is conservative since this results in a larger drift value than would otherwise result had the good data within the outlier set been retained.

Leaving in all data sets (omitting outlier testing) would have resulted in larger statistical drift allowances. Since drift allowance is a component of transmitter operability criteria (reference WCAP-11082, Revision 5, Section 4.2), an allowance that is larger than the expected transmitter performance may cause a failing transmitter to not be fully investigated. Using the outlier method results in drift allowances that are representative of normally expected transmitter performance and should enhance the initiation of investigations of possibly failing equipment.

Determination of Drift Values

The pooled data were examined with respect to distribution type using commercially available software, which was used to compare the input distribution to many different continuous distribution types. For the input data, and each of the selected distribution types, the available output includes (but is not limited to) descriptive statistics, target values, histogram (comparison) plots, probability plots, and difference plots. The standard deviation(s) was conservatively selected from the descriptive statistics for the distribution type identified by the commercial software.

For the final data set, the 95/95 tolerance interval (k*s) for drift was calculated. The tolerance factor (k) reflects the size of the population, the probability (proportion), and the confidence level, and was selected from standard statistics tables for the distribution. Two-sided distribution k factors were used due to the design of the DCPP control and protection system, i.e., the same transmitter is frequently used for control (high and low), protection (high and/or low) and indication (high and low). Thus, the most appropriate assumption is the use of a two-sided distribution. For all drift evaluations, the values of k reflect a 95 percent probability at a 95 percent confidence level or better, since only RTS/ESFAS and critical control functions were evaluated.

<u>Sensors With Insufficient Data</u>

Finally, the drift data were examined for indications of time dependence and adjustments were made, as appropriate, to yield instrumentation drift allowances applicable to a 24-month fuel cycle (i.e., a maximum surveillance interval of 30 calendar months). Only the pressurizer level sensors exhibited a significant correlation of drift with time. However, the correlation was with decreasing drift over time. The remaining sensor drifts were judged to be independent of time or calibration interval. Consequently, the 18-month based drift values are applicable to the 24-month fuel cycle.

Statistically-based 95/95 drift values were determined for all sensors except where there was insufficient data due to recent sensor replacement. In these cases, a thirty (30) month drift value was determined through engineering judgment which considered manufacturer specifications, drift exhibited by devices of the same manufacturer in similar applications at DCPP, and Westinghouse experience. Drift for the following devices was not statistically based: the RCP undervoltage relays, and the Rosemount transmitters used to measure pressurizer pressure, containment pressure, turbine impulse pressure, and steam line pressure. The drift values assumed for these instruments are treated as being time-independent, which is consistent with almost all other DCPP statistical results (pressurizer level transmitters being the one exception).

<u>Comparison Of PG&E Evaluation To GL 91-04 Guidance</u>

The NRC provided specific guidance on extension of instrumentation calibration surveillances in GL 91-04. Enclosure 2 of GL 91-04 provides seven issues and suggested actions related to justification of increased calibration intervals.

1. *Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records has not, except on rare occasions, exceeded acceptable limits for a calibration interval.*

   The surveillance and maintenance history for instrument channels has been reviewed. It is notable that the statistically derived drifts are almost the same as the previously used vendor drifts in WCAP-11082, Revision 2, except for the pressurizer level instrument. The comparable magnitudes of these drifts indicate that the instrument as-found data did not exceed acceptable limits except on rare occasions. The only exception is the pressurizer level transmitters, which may be affected by nondrift-related phenomena. The results of these reviews, and the result for pressurizer water level sensors, in particular, are discussed in parameter-specific evaluations in Attachment D.

2. *Confirm that the values of drift for each instrument type (make, model, and range) and application have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.*

   PG&E worked with Westinghouse to evaluate the DCPP plant-specific data under the Westinghouse methodology to determine instrument drift for a 24-month fuel cycle with a high probability and high degree of confidence. This process was based on the analysis of actual plant data from which instrument drift of at least a 95 percent probability and 95 percent confidence was determined. A summary of the methodology used to determine the rate of instrument drift with time is included in the discussion of "Drift Evaluation" above. The tests for correlation of drift with time showed that there was small correlation with time (less than 0.24 correlation coefficient except in one case). Consequently, it was assumed that the drift defined by the conservative tolerance intervals from the 18-month calibration data are applicable, without modification, to drift behavior for 30 months between calibrations. The only exception for drift correlation with time was for the drift of the pressurizer level transmitters which had a correlation coefficient with time of 0.64. This correlation was not safety significant because the absolute magnitude of the drift decreased with increasing calibration interval such that it was

statistically conservative and safe to assume the 18-month based drift was applicable to the 30-month calibration interval.

3. *Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument type (make, model number, and range) and application that performs a safety function. Provide a list of the channels by TS section that identifies these instrument applications.*

   Drift magnitude has been confirmed for the DCPP RTS/ESFAS instrumentation and is discussed in Attachment D for each parameter. The Westinghouse methodology used for this evaluation includes the consideration of high probability and high confidence levels (95/95) required for the instrument drift associated with the possible 30-month calibration interval. The instrument applications affected by this LAR are listed in Part A above by TS section.

4. *Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate larger drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in a revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits and safety analysis assumptions are not exceeded.*

   PG&E verified that the projected values of instrument drift for the increased calibration interval are consistent with the values of drift errors used in determining safety system setpoints. This check is documented in WCAP-11082, Revision 5. There was one function for which the previous instrument drift allowance used to establish trip setpoints for safety systems would have been exceeded (pressurizer level, high) and one function for which the previous channel uncertainty used to establish trip setpoints for safety systems could have been exceeded (RCS loss of flow, low).

   For the pressurizer level, high, a revised trip setpoint is proposed. The proposed TS change is included in Attachment B. In that Attachment, the pressurizer water level high setpoint is proposed to be changed from less than or equal to 92 percent level to less than or equal.to 90 percent level.

For the RCS loss of flow-low, the 30-month CSA was larger than that previously calculated, and it approached the allowance between the TS setpoint and the safety analysis limit. Westinghouse evaluated the safety analysis limit to determine whether it could be reduced so as to support the existing setpoint of greater than or equal to 90 percent of minimum measured flow (MMF) per loop.

The existing DCPP safety analysis is based on an assumed RCS loss of flow-low limit of 87 percent of MMF. The Westinghouse evaluation concluded that the limit can be lowered to 85 percent of MMF, with no impact on the DCPP safety analysis. RCS loss of flow-low is credited in two analyzed accidents, the partial loss of forced reactor coolant flow and the single RCP locked rotor.

For the partial loss of forced flow accident, the basis for the conclusion of no impact on the DCPP safety analysis results was that the minimum Departure From Nucleate Boiling Ratio (DNBR) is more limiting for the complete loss of flow accident (FSAR Update, Section 15.3.4) than for the partial loss of flow accident (FSAR Update, Section 15.2.5). A very short additional time delay (0.2 seconds) due to the new 85 percent safety limit evaluation, was considered in the partial loss of flow accident. The minimum DNBR of the partial loss of flow accident, where the RCS loss of flow-low setpoint is credited, was evaluated to be bounded by the complete loss of flow accident minimum DNBR. The protection credited for the complete loss of flow accident is the RCP undervoltage and underfrequency reactor trips. The results of the complete loss of flow accident can be considered to bound the partial loss of flow accident because the complete loss of flow accident (a Condition III fault) was evaluated to the Condition II criteria applicable to the partial loss of flow accident.

The second accident in which the RCS loss of flow-low setpoint is credited is the single RCP locked rotor or RCP shaft break accident (FSAR Update, Section 15.4.4). The lower safety analysis limit of 85 percent MMF was evaluated to delay rod motion by only 0.01 seconds and has a negligible effect on the conditions at the limiting point of the accident transient. The Westinghouse evaluation concluded that the existing conclusions in the DCPP FSAR Update remain valid.

PG&E has reviewed and agrees with the Westinghouse conclusions that the lower safety analysis limit of 85 percent MMF provides

sufficient allowance for the RCS loss of flow-low setpoint considering the new CSA (WCAP-11082, Revision 5).

5. *Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.*

   The TS changes proposed in this LAR do not involve change to any plant parameters associated with instrumentation used to effect a safe shutdown. Changes to these parameters will be discussed in a subsequent submittal in support of 24-month fuel cycles.

6. *Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for channel checks, channel functional tests, and channel calibrations.*

   PG&E used DCPP plant procedures and tests as input to the 24-month fuel cycle evaluation. The new acceptance criteria, as represented in the proposed allowable value and pressurizer water level, high, setpoint changes, will be added to the existing procedures when the LAR is approved. PG&E has confirmed that the safety analysis limit change for the RCS loss of flow-low setpoint will not impact DCPP procedures.

   On receipt of the LA, PG&E will reconfirm that instrument drift and other assumptions of the setpoint analyses are consistent with the acceptance criteria included in plant surveillance procedures. This review will include channel checks, channel functional tests, and the calibration of channels for which surveillance intervals are being increased. The Eagle 21 plant protection system will be updated to the new pressurizer water level setpoint on receipt of the LA. Updating may be done during the quarterly COT test and does not require plant shutdown.

7. *Provide a summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals on instrument drift and its effect on safety.*

   PG&E will continue to monitor instrument calibration results and review the effect on instrument drift that may accompany the increase in calibration intervals. This formal program will monitor the data from each RTS and ESFAS sensor calibration to ensure that the drift as

determined by the difference between the as-found value and the previous as-left data is within the statistically derived drift value found in the current setpoint study. If sensor drift values are found outside the statistically derived drift values, an evaluation will be performed and appropriate actions will be taken. Drift values may also be recalculated and lowered if supported by plant data. The monitoring program will assure that assumptions related to the effects of the increased calibration surveillance intervals are met, such that there is no significant change to a margin of safety.

<u>Summary</u>

PG&E has reviewed the evaluations of the instrument channels in accordance with the methodology discussed above, in conjunction with the function-specific details furnished in Attachment D, and believes that these evaluations confirm the acceptability of extending the instrument surveillance intervals. No assumptions in the plant licensing basis are invalidated on the basis of performing any surveillance at the proposed bounding interval. For the channel uncertainty increases that required a setpoint change (pressurizer level, high) and a safety analysis limit change (RCS loss of flow-low), evaluation has concluded that safety limits and safety analysis assumptions are not exceeded. In all cases, PG&E concludes that the proposed TS changes will not adversely affect the health and safety of the public.

F. NO SIGNIFICANT HAZARDS EVALUATION

PG&E has evaluated the no significant hazards considerations involved with the proposed amendment, focusing on the three standards set forth in 10 CFR 50.92(c) as set forth below:

> *"The commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards considerations, if operation of the facility in accordance with the proposed amendment would not:*
>
> *(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or*
>
> *(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or*

(3) Involve a significant reduction in a margin of safety."

The following evaluation is provided for the no significant hazards considerations.

1. *Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?*

   The proposed TS channel calibration, COT, and TADOT interval increases from 18 to 24 months, the setpoint change, and the allowable value changes do not alter the intent or method by which the channel calibrations are conducted, do not alter the way any structure, system, or component functions, and do not change the manner in which the plant is operated. The calibration and maintenance histories indicate that the equipment will continue to perform satisfactorily with longer surveillance intervals. With the exception of the pressurizer water level - high instrument, no recurring surveillance or maintenance problems were identified for the RTS or ESFAS instrumentation channels.

   The pressurizer water level instruments do not have a safety limit and are not credited in the DCPP safety analysis. The recurring surveillance problems were mainly due to calibration zero shift which is reflected in the statistically determined drift and in the proposed pressurizer water level high setpoint. The zero shift problem of these transmitters was a recurring problem with the calibration procedure. The procedures for calibrating these instruments have been revised to improve the repeatability of the surveillance activity.

   The trip setpoint and allowable value changes for pressurizer water level - high are each in the more restrictive direction. The revised setpoint would tend to trip the reactor sooner than the present settings. These changes ensure that sufficient margin is maintained for the pressurizer water level to accommodate the channel statistical uncertainty resulting from a 30-month operating cycle.

   A statistical analysis of channel uncertainty for a bounding 30-month operating cycle has been performed. There is sufficient margin between the existing TS limits and the licensing basis safety analysis limits to accommodate the channel statistical uncertainty resulting from a 30-month operating cycle. The existing margin between the TS limits and the safety analysis limits provides assurance that plant

protective actions will occur as required. However, a change to the safety analysis limit is proposed in order to provide additional margin for the RCS loss of low-low setpoint.

Westinghouse has evaluated the safety analysis limit for the RCS loss of flow-low setpoint and has determined that the limit can be changed from 87 percent of MMF to 85 percent of MMF with no impact on the probability and insignificant impact on the consequences of accidents already analyzed. The existing conclusions of the DCPP FSAR Update remain valid with the safety analysis limit change. Using the new safety analysis limit, sufficient margin exists between the TS limit and the safety analysis limit to accommodate the channel statistical uncertainty resulting from a 30-month operating cycle.

The proposed changes to the allowable values ensure that drift assumptions regarding the protection racks and direct input functions are met.

There are no known mechanisms that would significantly degrade the performance of the evaluated instrument channels during normal plant operation. All potential time-related degradation mechanisms have insignificant effects in the time frame of interest (maximum of 30 months). PG&E will continue to perform the maintenance required to maintain the qualification of this safety related equipment.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?*

The proposed pressurizer water level trip setpoint, RCS flow safety analysis limit, and various allowable value changes provide adequate margin to accommodate instrument channel uncertainty over a 30-month operating cycle. Plant equipment, which will be set at, or more conservative than, the trip setpoints, will provide protective functions to assure that the safety analysis limits are not exceeded. The change to the RCS loss of flow safety analysis limit does not create the possibility of a new or different kind of accident since the setpoint will remain as currently specified and only results in an insignificant delay in the plant response to the accident.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the change involve a significant reduction in a margin of safety?*

For almost all the existing DCPP RTS/ESFAS setpoints, the existing difference between the safety analysis limit and the setpoints was sufficient to accommodate any changes in instrument uncertainty.

The change in the pressurizer water level - high setpoint does not affect a safety analysis limit and, therefore, has no effect on a margin to safety. Since the normal pressurizer level is maintained at 60 percent span and the no-load T_{avg} control level is 22 percent span, a change in the setpoint from less than or equal to 92 percent span to less than or equal to 90 percent span is not significant to either DCPP plant operation or safety.

The change in the RCS loss of flow-low safety analysis limit from 87 percent MMF to 85 percent MMF does not affect the existing plant setpoint and was evaluated to have a negligible effect on the limiting conditions of a partial loss of flow accident, a single RCP locked rotor, or RCP shaft break accident. This safety limit change was also found to have no effect on the DCPP minimum DNBR since the minimum DNBR is associated with the complete loss of flow accident. The complete loss of flow accident was evaluated to the Condition II fault criteria applicable to the partial loss of flow accident evaluation and was acceptable.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

G. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the above safety evaluation, PG&E concludes that the changes proposed by this LAR satisfy the no significant hazards consideration standards of 10 CFR 50.92(c), and accordingly a no significant hazards finding is justified.

H. ENVIRONMENTAL EVALUATION

PG&E has evaluated the proposed changes and determined the changes do not involve (i) a significant hazards consideration, (ii) a significant

change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.