

ACCELERATED DOCUMENT DISTRIBUTION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9302110262 DOC. DATE: 93/02/02 NOTARIZED: NO DOCKET # 05000275
 FACIL: 50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Ga
 AUTH. NAME: RUEGER, G.M. AUTHOR AFFILIATION: Pacific Gas & Electric Co.
 RECIP. NAME: RECIPIENT AFFILIATION: Document Control Branch (Document Control Desk)

SUBJECT: Forwards 30-day notification rept of significant changes in Westinghouse ECCS evaluation models that affect peak cladding temp calculations. New values remain within limit of 2,220 F specified in 10CFR50.46.

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 8
 TITLE: OR Submittal: General Distribution

NOTES:

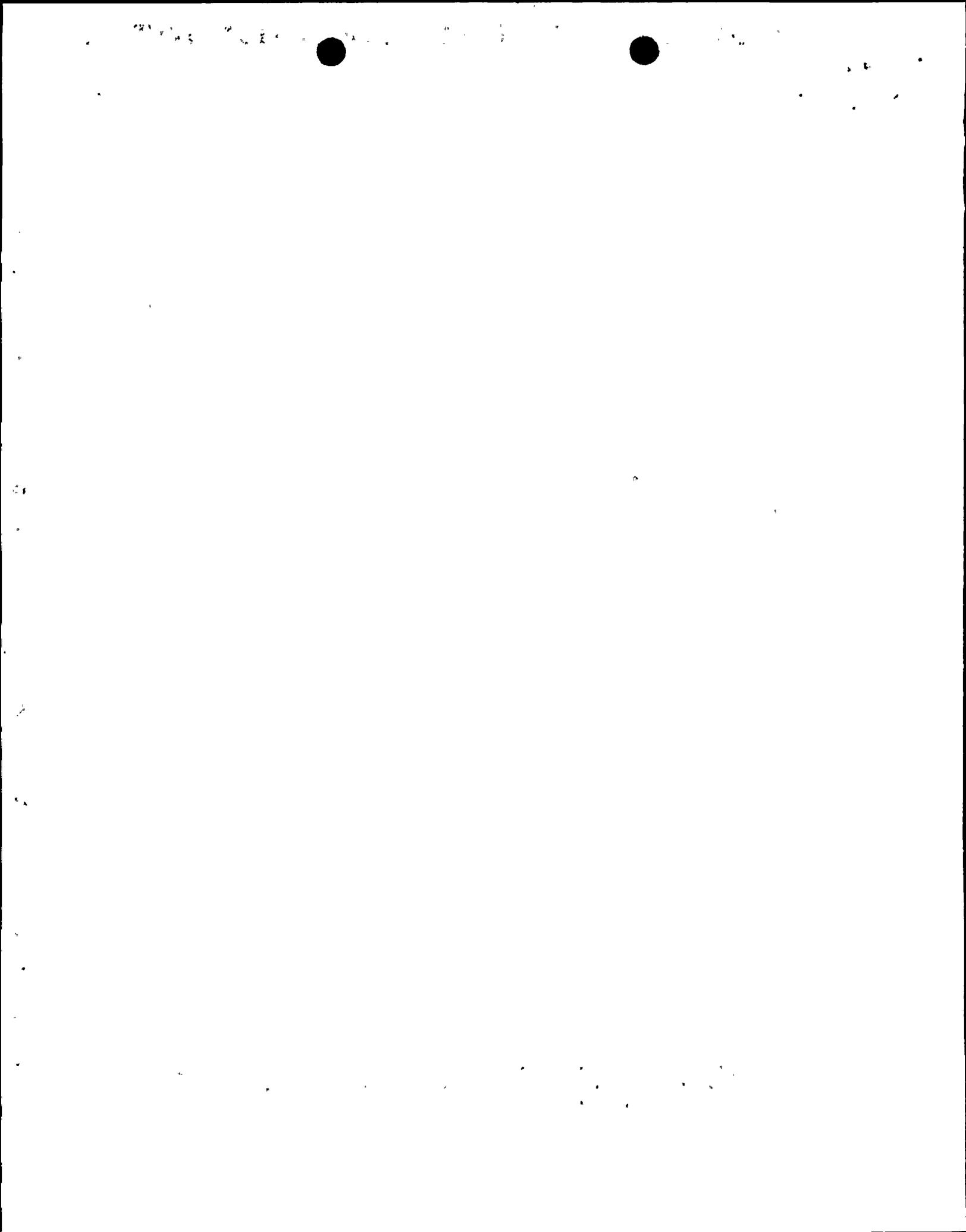
	RECIPIENT ID CODE/NAME	COPIES	L	T	ENCL	RECIPIENT ID CODE/NAME	COPIES	L	T	ENCL
	PD5 LA	1			1	PD5 PD	1			1
	PETERSON, S	2			2					
INTERNAL:	ACRS	6			6	NRR/DET/ESGB	1			1
	NRR/DOEA/OTSB11	1			1	NRR/DST/SELB 7E	1			1
	NRR/DST/SICB8H7	1			1	NRR/DST/SRXB 8E	1			1
	NUDOCS-ABSTRACT	1			1	OC/LEMB	1			0
	OGC/HDS1	1			0	<u>REG FILE</u> 01	1			1
EXTERNAL:	NRC PDR	1			1	NSIC	1			1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 504-2065) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTR 21 ENCL 19

R
I
D
S
/
A
D
D
S
/
A
D
D
S



Pacific Gas and Electric Company

77 Beale Street
San Francisco, CA 94106
415/973-4684

Gregory M. Rueger
Senior Vice President and
General Manager
Nuclear Power Generation

February 2, 1993

PG&E Letter No. DCL-93-029



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

Re: Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
10 CFR 50.46 30-Day Notification Report of Significant ECCS
Evaluation Model Changes that Affect Peak Cladding Temperature

Gentlemen:

Pursuant to 10 CFR 50.46, this letter provides a 30-day notification report of significant changes in the Westinghouse emergency core cooling system evaluation models that affect peak cladding temperature (PCT) calculations for Diablo Canyon Power Plant (DCPP) Unit 1. The nature of the changes are described in the enclosure. Based on these changes, the calculated PCT values for the DCPP Unit 1 large-break and small-break LOCA analyses have been reduced to 1938°F (previously 2150°F) and 1601°F (previously 1717°F), respectively. These new PCT values remain within the PCT limit of 2200°F specified in 10 CFR 50.46, and no further action by PG&E is required.

Sincerely,

A handwritten signature in black ink, appearing to read 'Gregory M. Rueger'. The signature is fluid and cursive.

Gregory M. Rueger

cc: Ann P. Hodgdon
John B. Martin
Mary H. Miller
Sheri R. Peterson
CPUC
Diablo Distribution

Enclosure

5978S/85K/JHA/371

9302110262 930202
PDR ADOCK 05000275
R PDR

090027

ADD 1/1



ENCLOSURE

**10 CFR 50.46 30-DAY NOTIFICATION REPORT OF SIGNIFICANT ECCS EVALUATION
MODEL CHANGES THAT AFFECT PEAK CLADDING TEMPERATURE**

Pursuant to 10 CFR 50.46, this letter provides a 30-day notification report of significant changes in the Westinghouse emergency core cooling system (ECCS) evaluation models that affect peak cladding temperature (PCT) calculations for Diablo Canyon Power Plant (DCPP) Unit 1.

On January 4, 1993, PG&E received a letter from Westinghouse that transmitted revised peak PCT margins for DCPP Unit 1 (Reference 1). Additional Westinghouse revisions to the PCT margin were received on January 29, 1993 (Reference 8). These margins affect the DCPP Unit 1 PCT, which was last reported to the NRC on August 14, 1992 (Reference 2), and reflect a combination of new margins and elimination of previous margins. Because the absolute value of the sum of the temperature changes is greater than 50°F, these changes are defined to be significant in accordance with 10 CFR 50.46. Accordingly, this 30-day notification report is submitted to the NRC to describe the nature of the changes.

Attachment A to this enclosure provides the nature of changes to the DCPP Unit 1 large-break LOCA evaluation model that affect PCT. Based on these changes, the calculated PCT for the large-break LOCA has been reduced to 1938°F, compared to the previous value of 2150°F.

Attachment B to this enclosure provides the nature of changes to the DCPP Unit 1 small-break LOCA evaluation model that affect PCT. Based on these changes, the calculated PCT for the small-break LOCA has been reduced to 1601°F, compared to the previous value of 1717°F.

These new PCT values remain within the PCT limit of 2200°F specified in 10 CFR 50.46, and no further action by PG&E is required.



Small, faint, illegible marks or characters in the top right corner.

Faint, illegible marks on the left side of the page.

Faint, illegible marks on the left side of the page.

Faint, illegible marks on the left side of the page.

Faint, illegible marks on the left side of the page.

Faint, illegible marks on the left side of the page.

Faint, illegible marks on the left side of the page.

Faint, illegible marks at the bottom center of the page.

Faint, illegible marks at the bottom right of the page.

ATTACHMENT A

DCPP UNIT 1 LARGE-BREAK LOCA ANALYSIS
PEAK CLAD TEMPERATURE CHANGES

Previous PCT

2150°F The previous large-break LOCA peak clad temperature (PCT) reported to the NRC was 2179°F (Reference 2), which was based on the PCT for Diablo Canyon Power Plant (DCPP) Unit 2 because it is bounding. The PCT unique to DCPP Unit 1 was 29°F less (Reference 3), resulting in a DCPP Unit 1 PCT of 2150°F.

New Margins

Nature of Change

-117°F Use of Inappropriate BASH Output A benefit has been assessed to reflect an error that was discovered by Westinghouse in the DCPP Unit 1 Final Safety Analysis Report (FSAR) Update large-break LOCA analysis to support plant operation with a full core of VANTAGE-5 fuel. In the course of completing the Accident Analysis Profile (AAP), Westinghouse discovered a discrepancy concerning the traceability of certain inputs to LOCBART, the computer code which is used to calculate the fuel rod heatup transient. LOCBART uses output from BASH, the computer code that is used to model the reflood portion of the transient. In the DCPP Unit 1 analysis, the pedigree behind the BASH calculation and associated output was questioned. The discrepancy was noted, further investigation was planned, and Westinghouse completed the AAP without using information from the suspect BASH calculation. After investigating the discrepancy, Westinghouse concluded that an inappropriate BASH calculation was utilized in the DCPP Unit 1 FSAR Update large-break LOCA analysis. Westinghouse's reanalysis using the appropriate BASH calculation resulted in a net PCT decrease of 117°F (Reference 1).

+ 14°F BOL Rod Internal Pressure A temporary penalty has been added to address the affects of a beginning-of-life (BOL) rod internal pressure uncertainty issue. Large-break LOCA analyses have historically been performed assuming BOL fuel rod conditions, which have previously been shown to be limiting in sensitivity studies. In the analysis of a large-break LOCA, the use of higher rod internal pressures typically results in earlier and greater rod burst and associated channel blockage, and ultimately an increase in the calculated PCT. Recently, questions were raised concerning the calculation of the BOL rod internal pressures used in the LOCA analyses. Using a conservative combination of actual BOL uncertainties results in a current estimate of a 65 psi bounding increase in the upper bound BOL rod internal pressures. Sensitivity studies have been performed that indicate that the increased pressure has a transient-specific effect on PCT. A temporary PCT penalty of 14°F has been assigned while the issue is investigated more completely by Westinghouse. Reporting of this penalty under 10 CFR 50.46 is being made as a conservative measure pending completion of Westinghouse's additional evaluation effort (Reference 1).



11
12
13
14
15

16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200

+ 30°F

Rod Internal Pressure - IFBA Fuel A temporary penalty has been added to address the affects of Integral Fuel Burnable Absorber (IFBA) fuel rods that are part of the DCP Unit 1 Cycle 6 core. The IFBA is a thin boride coating applied to the surface of fuel pellets that suppresses the fuel rod power until the coating gradually "burns" off through irradiation. This design feature can change the characteristics of the fuel rod, and Westinghouse identified a potential high temperature fuel rod burst phenomenon associated with IFBA fuel rods. Westinghouse performed a DCP Unit 1-specific LOCA analysis using an extended code version and, based upon the results of this analysis, Westinghouse assessed a 30°F temporary penalty to reflect the higher PCT calculated for the IFBA case. The high temperature fuel rod burst phenomenon is applicable to the IFBA fuel rod design for only the first 2500 MWD/MTU of the life of the IFBA fuel. Past that point, the IFBA fuel rods become comparable to the non-IFBA fuel and no longer have the potential for the high temperature burst phenomenon and associated PCT increase (Reference 6). Reporting of this penalty under 10 CFR 50.46 is being made as a conservative measure pending completion of Westinghouse's additional evaluation effort of this issue.

+ 4.7°F

Pressurizer Pressure Uncertainty A permanent penalty has been added to address a pressurizer pressure uncertainty issue identified in Reference 7. The pressurizer pressure span at Diablo Canyon is 1250 psi, versus the more typical span of 800 psi which is programmed into previous versions of the code used for calculating this uncertainty. The result of using the correct span is a pressurizer pressure control uncertainty of +/- 58.1 psi (with the presently installed transmitters) as compared to the previously reported value of +/-38.0 psi. This increase in pressurizer pressure uncertainty results in a PCT penalty of 4.7°F for the large-break LOCA (Reference 8).

- 25°F

Structural Metal Heat Model A discrepancy was discovered during review of the finite element heat conduction model used in the WREFLOOD-INTERIM code to calculate heat transfer from structural metal in the vessel during the reflood phase. Westinghouse noted that the material properties available in the code corresponded to those of stainless steel. While this is correct for the internal structures, it is inappropriate for the vessel wall, which consists of carbon steel with a thin stainless internal clad. The model was revised by replacing it with a more flexible one that allows detailed specification of structures. The estimated effect of this correction is a 25°F PCT benefit (Reference 8).

Elimination of
Previous Margins

Nature of Change

- 50°F

Core Transition - Hydraulic Mismatch A temporary core transition penalty (due to a hydraulic mismatch between standard fuel and VANTAGE-5 fuel) has been eliminated because DCP Unit 1 has completed the transition from standard fuel to VANTAGE-5 fuel. The 50°F penalty was originally reported to the NRC in Reference 3.



Small, faint, illegible marks or characters in the top right corner.

Faint, illegible vertical text or markings on the left side of the page.

- 37°F Core Transition - Grid Deformation A temporary core transition penalty (due to limited fuel assembly grid deformation computed to occur during a postulated LOCA plus seismic event) has been eliminated because of complete transition from standard fuel to VANTAGE-5 fuel. The 37°F penalty was originally reported to the NRC in Reference 3.

- 10°F Fuel Rod Initial Condition A fuel rod initial condition inconsistency penalty has been eliminated because the effects of this issue were captured in the 117°F benefit associated with the BASH error discussed above. The 10°F penalty was originally reported to the NRC in Reference 4.

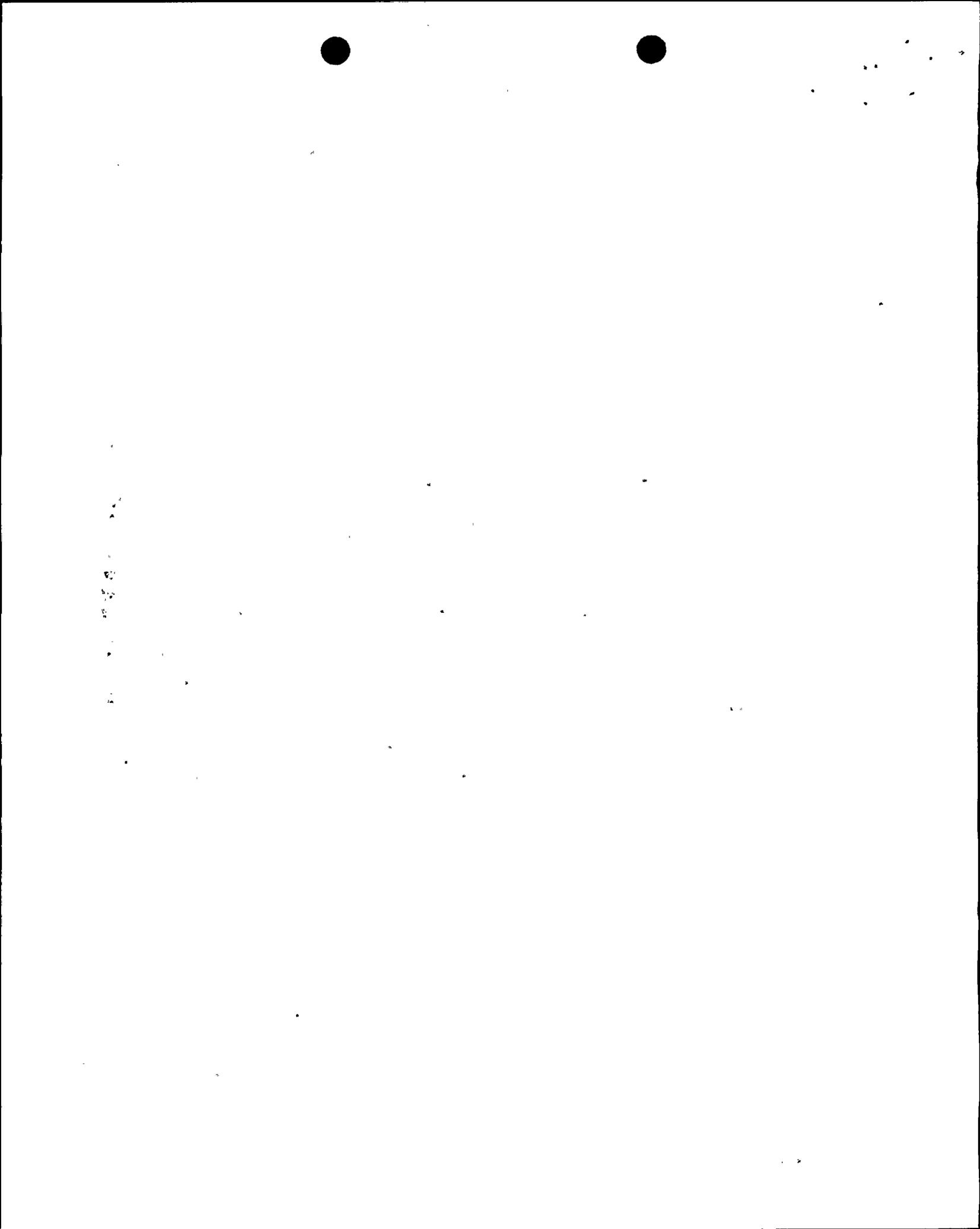
- 100°F Power Distribution Assumption A temporary power distribution assumption penalty has been eliminated through the use of the power shape sensitivity model (PSSM) for DCP Unit 1 Cycle 6. The 100°F penalty was originally reported to the NRC in Reference 4. The PSSM was developed to allow the assessment of shape specific PCT trends in large-break LOCA.

- + 52°F 0.05 Fq Margin A PCT benefit associated with the 0.05 Fq margin has been eliminated as a result of the PSSM application. The 52°F benefit was previously assessed to offset the 100°F large-break LOCA power distribution assumption penalty discussed above, and was originally reported to the NRC in Reference 4.

- + 26°F SG Tube Plugging Margin A steam generator (SG) tube plugging margin benefit associated with decreasing SG tube plugging margin from 14 percent to 7.5 percent was partially eliminated as a result of the PSSM application. A 7.5 percent margin is still required to offset the PCT penalty associated with the seismic/LOCA SG tube collapse issue. The full 56°F benefit associated with an SG tube plugging margin of 14 percent was originally reported to the NRC in Reference 4.

New PCT

1938°F The resulting large-break LOCA PCT for DCP Unit 1 is 1938°F, based on the previous PCT (2150°F) plus the sum of the PCT margin changes (- 212°F) described above.



ATTACHMENT B

DCPP UNIT 1 SMALL-BREAK LOCA ANALYSIS PEAK CLAD TEMPERATURE CHANGES

Previous PCT

1717°F The previous small-break LOCA PCT reported to the NRC was 1717°F (Reference 2).

New Margins

Nature of Change

- + 14°F Accumulator Pressure Uncertainty A permanent addition of penalty has been added to address an increase in the accumulator pressure uncertainty. PG&E identified that the accumulator pressure channel uncertainty is +/- 16 psig when calculated using the Westinghouse channel statistical allowance (CSA) of WCAP-11082. This pressure uncertainty corresponds to the lowest accumulator pressure of 594 psia, while Westinghouse used a value of 600 psia in the LOCA analyses. Westinghouse determined that the 6 psi decrease in accumulator pressure would impact the PCT for the small-break LOCA analysis because the accumulator injection "turns around" the cladding temperature transient for the 4-inch diameter limiting break size for DCPP. The difference of 6 psi could delay the time at which accumulator injection starts by as much as 6 seconds, thereby causing a delay in "turning around" the cladding temperature. Westinghouse determined that a decrease in the accumulator minimum pressure by 6 psi will result in a conservative PCT penalty of 14°F for DCPP Unit 1 (Reference 5).
- + 20°F BOL Rod Internal Pressure Uncertainty A temporary penalty to address the affects of the BOL rod internal pressure uncertainty issue has been added as discussed in Attachment A. Similar to the large-break LOCA analysis, an increase in rod internal pressure leads to an increase in the calculated PCT for the small-break LOCA analysis. However, modeling lower rod internal pressure could also result in decreased rod swelling away from the fuel pellets when the fuel rod internal pressure is greater than the reactor coolant pressure. A lower rod internal pressure could then result in a higher calculated PCT for an analysis that did not calculate fuel rod burst. Therefore, an assessment of the total affect of lower bound rod internal pressure, inclusive of increased lower bound BOL rod internal pressure certainties, has been performed and results in the temporary addition of 20°F of small-break LOCA margin for DCPP Unit 1 while the issue is investigated more completely. Reporting of this penalty under 10 CFR 50.46 is being made as a conservative measure pending completion of Westinghouse's additional evaluation effort (Reference 1).
- + 4.3°F Pressurizer Pressure Uncertainty A permanent penalty has been added to address the pressurizer pressure uncertainty issue previously discussed in Attachment A. An increase in pressurizer pressure uncertainty (current uncertainty of +/- 58.1 psi as



Handwritten marks and dots in the top right corner.

Faint vertical text or markings on the left side of the page.

compared to the previous value of +/- 38.0 psi) results in a PCT penalty of 4.3°F for the small-break LOCA (Reference 8).

Elimination of
Previous Margins

Nature of Change

- 154°F Core Transition - Grid Deformation A temporary penalty previously assessed to address postulated grid deformation during the transition from standard fuel to VANTAGE-5 fuel has been eliminated. The 154°F penalty was originally reported to the NRC in Reference 3.

New PCT

1601°F The resulting small-break LOCA PCT for DCP Unit 1 is 1601°F, based on the previous PCT (1717°F) plus the sum of the PCT margin changes (- 116°F) described above.



Small, faint, illegible marks or characters in the top right corner.

Small, faint mark on the left side.

REFERENCES

1. Westinghouse letter to PG&E dated December 22, 1992 (PGE-92-719), "Revised Peak Cladding Temperature Assessment"
2. PG&E letter to NRC dated August 14, 1992 (DCL-92-183), "10 CFR 50.46 Annual Report of Changes that Affect PCT"
3. PG&E letter to NRC dated August 22, 1990 (DCL-90-213), "10 CFR 50.46 Annual Reporting on ECCS Analysis Changes"
4. PG&E letter to NRC dated August 14, 1991 (DCL-91-204), "10 CFR 50.46 Annual and 30-Day Report of Changes to ECCS Evaluation Models"
5. Westinghouse letter to PG&E dated August 17, 1992 (PGE-92-641), "Accumulator Pressure Setpoint"
6. Westinghouse letter to PG&E dated October 5, 1992 (92PGE-G-0089), "Rod Internal Pressure Issue in Support of Cycle 6 Reload Safety Evaluation"
7. Westinghouse Potential Issue PI-92-014
8. Westinghouse letter to PG&E dated January 27, 1993 (PGE-93-518), "10 CFR 50.46 Notification and Reporting Information"

