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SUBJECT: Forwards 10CFR50.46 annual reporting on ECCS analysis changes for 890323 to 900322.

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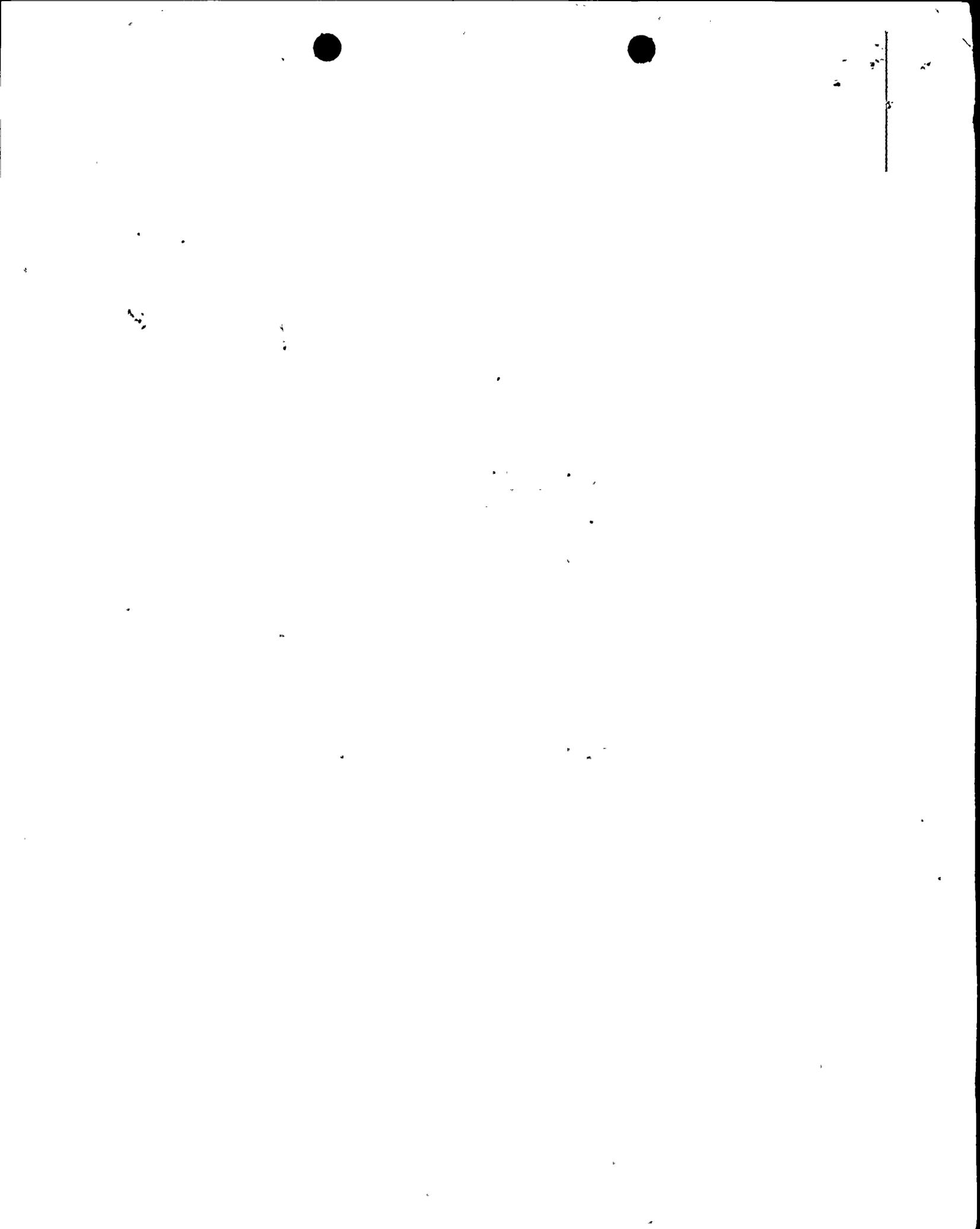
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James D. Shiffer
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August 22, 1990

PG&E Letter No. DCL-90-213



U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Re: Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
10 CFR 50.46 Annual Reporting on ECCS Analysis Changes

Gentlemen:

Pursuant to 10 CFR 50.46(a)(3)(ii), PG&E is submitting the enclosed reports, covering the annual period from March 23, 1989 to March 22, 1990, concerning changes in the Emergency Core Cooling System (ECCS) analysis and the estimated effect on the limiting ECCS analysis. Enclosure 1 summarizes the effect of Westinghouse ECCS evaluation model modifications on the loss-of-coolant accident (LOCA) analysis results, and Enclosure 2 summarizes the safety evaluations performed by Westinghouse on the LOCA analysis results. The effects of the ECCS model modifications and the safety evaluations described in Enclosures 1 and 2, respectively, were evaluated for the current licensing basis LOCA analysis. The large break LOCA peak cladding temperature (PCT) for Units 1 and 2 is 2183°F. The small break LOCA PCTs for Units 1 and 2 are 1582°F and 1665°F, respectively. Therefore, compliance with 10 CFR 50.46 is maintained for Diablo Canyon Units 1 and 2.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'J. D. Shiffer'. The signature is written in a cursive style.

J. D. Shiffer

cc: A. P. Hodgdon
J. B. Martin
P. P. Narbut
P. J. Morrill
H. Rood
CPUC
Diablo Distribution

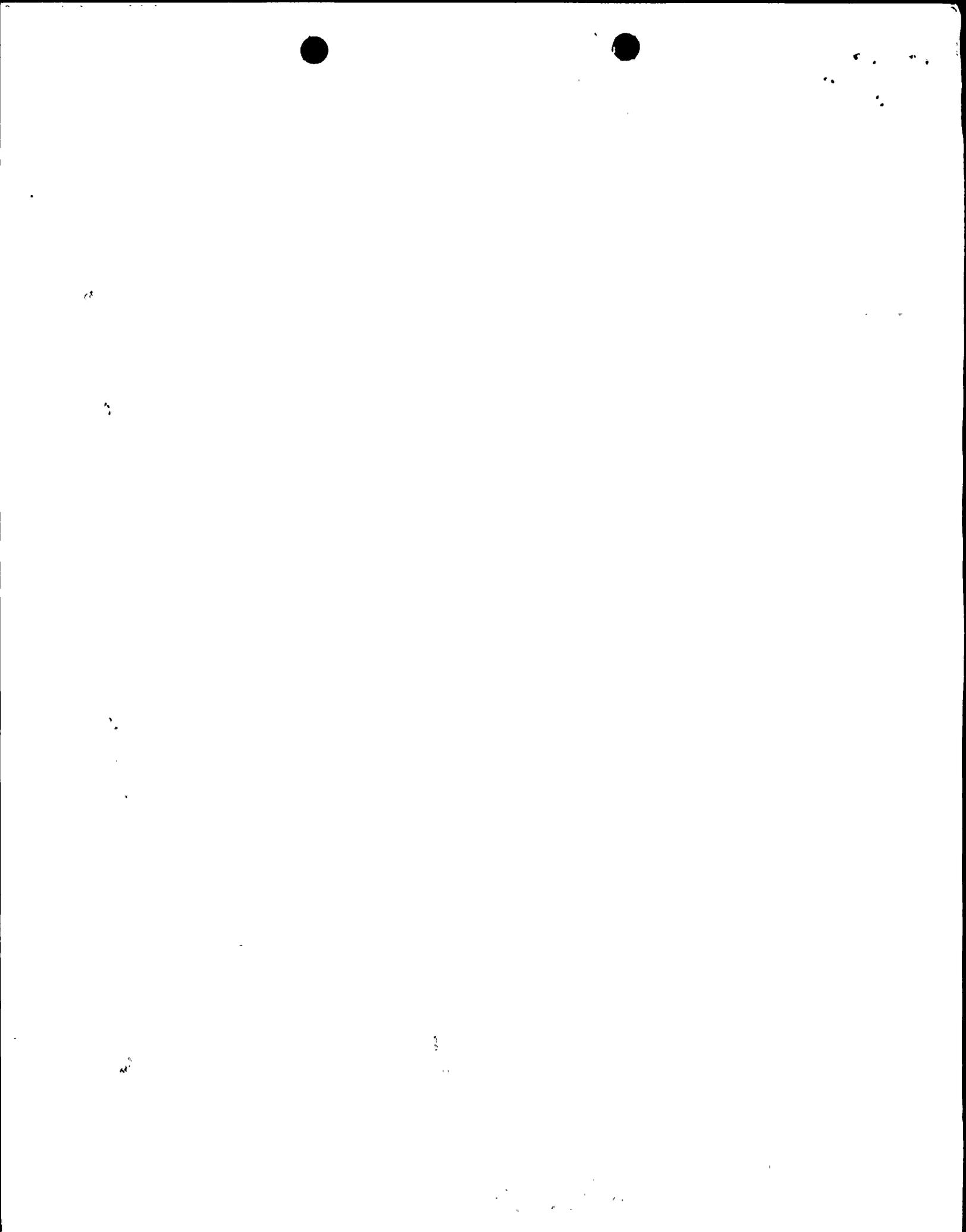
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Enclosures

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ENCLOSURE 1

EFFECT OF WESTINGHOUSE ECCS EVALUATION MODEL
MODIFICATIONS ON THE LOCA ANALYSIS RESULTS
IN SECTIONS 15.3 AND 15.4 OF THE FSAR UPDATE

Summarized below is an assessment of the effect of the modifications to the Westinghouse Emergency Core Cooling System (ECCS) Evaluation Models on the loss-of-coolant-accident (LOCA) analysis results provided in Appendix B of Attachment 4 of the Diablo Canyon Units 1 and 2 License Amendment Request (LAR) 88-08, dated November 29, 1988, DCL-88-288 for 17x17 VANTAGE 5 fuel pertaining to sections 15.3 and 15.4 of the FSAR Update.

LARGE BREAK LOCA - EVALUATION MODEL CHANGES

The large break LOCA analysis for Diablo Canyon Units 1 and 2 was examined by Westinghouse to assess the effect of the applicable modifications to the Westinghouse large break LOCA ECCS Evaluation Model on the peak cladding temperature (PCT) results reported in DCL-88-288. The large break LOCA analysis results were calculated using the 1981 version of the Westinghouse large break LOCA ECCS Evaluation Model incorporating the BASH analysis technology (Reference 1).

For Diablo Canyon Units 1 and 2, the limiting large break is a double-ended guillotine rupture of the cold leg piping with a discharge coefficient of $CD = 0.4$. The calculated PCT is 2042°F for Diablo Canyon Unit 1 and 2071°F for Diablo Canyon Unit 2.

Due to having both 17x17 VANTAGE 5 and 17x17 LOPAR fuel in the core while each of the Diablo Canyon Units transitions to a full core of VANTAGE 5 fuel, two transition core penalties have been assessed. The first penalty is due to limited fuel assembly grid deformation computed to occur during a postulated LOCA plus seismic event. Therefore, a core coolable geometry analysis was performed for Diablo Canyon Unit 2 (more limiting of the two units) and a 37°F penalty was assessed. The core coolable geometry analysis resulted in a PCT of 2108°F.

The second penalty is due to hydraulic mismatch between the 17x17 LOPAR and 17x17 VANTAGE 5 assemblies in the core. The results of a generic evaluation for transition cores must be applied to the large break LOCA analysis results. As discussed in DCL-88-288, a 50°F penalty is added to the large break LOCA results until such time that the core is entirely VANTAGE 5 fuel. Adding this penalty to the results increases the current licensing basis PCT to 2158°F.

While there are no adverse effects of the changes and improvements made to the BASH computer code related to the tracking of fluid interfaces, which apply to Diablo Canyon Units 1 and 2, Westinghouse determined that a conservative estimate of 10°F penalty will be assessed and tracked in evaluating the available margin with respect to the limits of 10 CFR 50.46.



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Modifications to the Westinghouse large break LOCA ECCS Evaluation Model could affect the result by altering the PCT.

	<u>Unit 2</u>
	(Limiting Unit)
	2158°F
Analysis result:	
Modifications to Westinghouse ECCS Evaluation Model:	+ <u>10°F</u>
Resultant PCT:	= <u>2168°F</u>

SMALL BREAK LOCA - EVALUATION MODEL CHANGES

The small break LOCA analysis for Diablo Canyon Units 1 and 2 was also examined by Westinghouse to assess the effect of the applicable modifications to the Westinghouse small break LOCA ECCS Evaluation Model on PCT results reported in DCL-88-288. The small break LOCA analysis results were calculated using the 1985 version of the Westinghouse small break LOCA ECCS Evaluation Model incorporating the NOTRUMP analysis technology (References 2 and 3).

For Diablo Canyon Units 1 and 2, the limiting size small break is a 4-inch equivalent diameter break in the cold leg. The calculated PCT is 1275°F for Unit 1 and 1358°F for Unit 2. In addition, due to having both 17x17 VANTAGE 5 and 17x17 LOPAR fuel in the core while each unit transitions to a full core of VANTAGE 5 fuel, a core coolable geometry (grid deformation) safety evaluation was performed applicable to each unit and a penalty was assessed. The results of that evaluation, which are included in DCL-88-288, include a 154°F penalty while some 17x17 LOPAR fuel remains in the core. This would increase the licensing basis PCT to 1429°F for Unit 1 and 1512°F for Unit 2.

The effect of the potentially significant ECCS Evaluation Model modifications, which are discussed in Reference 3 and 4, on the small break LOCA analyses for Diablo Canyon Units 1 and 2 could result in a penalty in the PCT calculation if taken into account. For conservatism in estimating the available margin, a PCT penalty of approximately 42°F should be added to the analysis calculations as a result of ECCS Evaluation Model changes when determining the available margin to the limits of 10 CFR 50.46.

Modifications to the Westinghouse small break LOCA ECCS Evaluation Model could affect the small break LOCA analysis result by altering the PCT.

	<u>Unit 1</u>	<u>Unit 2</u>
Analysis result:	1429°F	1512°F
Modifications to Westinghouse ECCS Evaluation Model	+ <u>42°F</u>	+ <u>42°F</u>
Resultant PCT:	= <u>1471°F</u>	<u>1554°F</u>



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CONCLUSIONS

An evaluation of the effect of modifications to the Westinghouse ECCS Evaluation Model, as reported in References 4 and 5, was performed for both the large break LOCA and small break LOCA analyses results documented in DCL-88-288. When the effects of the ECCS model changes are combined with the current plant analysis results, it was determined that compliance with the requirements of 10 CFR 50.46 would be maintained.



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REFERENCES

1. J. J. Besspiata, et al., 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code, WCAP-10266-P-A, Revision 2 (Proprietary), WCAP-10267-A, Revision 2 (Non-Proprietary), March 1967.
2. P. E. Meyer, et al., NOTRUMP - A Nodal Transient Small Break and General Network Code, WCAP-10079-P-A (Proprietary), WCAP-10060-A (Non-Proprietary), August 1985.
3. N. Lee, et al., Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code, WCAP-10054-P-A (Proprietary), WCAP-10081-A (Non-Proprietary), August 1985.
4. "10CFR50.46 Annual Notification for 1989 of Modifications in the Westinghouse ECCS Evaluation Models," Letter from W. J. Johnson (Westinghouse) to T. E. Murley (NRC), NS-NRC-69-3463, October 5, 1989.
5. "Correction of Errors and Modifications to the NOTRUMP Code in the Westinghouse Small Break LOCA ECCS Evaluation Model Which Are Potentially Significant," Letter from W. J. Johnson (Westinghouse) to T. E. Murley (NRC), NS-NRC-69-3464, October 5, 1989.



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ENCLOSURE 2

EFFECT OF SAFETY EVALUATIONS PERFORMED
BY WESTINGHOUSE ON THE LOCA ANALYSIS RESULTS
FOR DIABLO CANYON UNITS 1 AND 2

LARGE BREAK LOCA - SAFETY EVALUATION PENALTIES

The large break LOCA analysis has been supplemented by several safety evaluations performed by Westinghouse. However, a penalty to the large break LOCA PCT was assessed for only one evaluation. This evaluation was for an input deviation related to containment spray system (CSS) modeling, which was reported to PG&E by Westinghouse in Reference 1. The penalty to the PCT was as follows:

A safety evaluation of the effect of modeling one CSS pump instead of two at each of the Diablo Canyon Units 1 and 2 was performed by Westinghouse. An evaluation of the effect of the input deviation on the large break LOCA analysis PCT was performed. This evaluation determined that the large break LOCA analysis PCT results could be adversely affected by a maximum penalty of 15°F.

Although several evaluations have been performed, the large break LOCA analysis results have not been assessed any penalties due to the safety evaluations for plant design changes implemented under the provisions of 10 CFR 50.59. Therefore, no additional penalties have been assessed to the PCT beyond the input deviation related to CSS pump.

	<u>Unit 2</u> (Limiting Unit)
Resultant PCT from ECCS Evaluation Model Modifications:	2168°F
CSS Modeling Safety Evaluation:	+ <u>15°F</u>
Resultant PCT:	= <u>2183°F</u>

CONCLUSIONS

The above large break LOCA total PCT remains below the 10 CFR 50.46 PCT limit of 2200°F. Note also that the large break LOCA transition core penalties of 50°F for hydraulic mismatch and 37°F for grid deformation (Enclosure 1) can be eliminated when the transition to 17x17 VANTAGE 5 fuel is complete. This will increase the margin by an additional 87°F for Units 1 and 2.

SMALL BREAK LOCA - SAFETY EVALUATION PENALTIES

The small break LOCA analysis results have been supplemented by several safety evaluations. The following presents a summary of only those evaluations that assessed penalties to the PCT:



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A safety evaluation for the effect of purging the steam generator auxiliary feedwater piping of the residual main feedwater during a small break LOCA was performed by Westinghouse. As reported in Reference 2, this evaluation determined that the small break LOCA analysis PCT results for the Diablo Canyon Units 1 and 2 could increase by a maximum of 111°F.

	<u>Unit 1</u>	<u>Unit 2</u>
Resultant PCT from ECCS Evaluation Model Modifications:	1471°F	1554°F
Safety Evaluation for the Auxiliary Feedwater Enthalpy Delay:	+ <u>111°F</u>	<u>111°F</u>
Resultant PCT:	= <u>1582°F</u>	<u>1665°F</u>

CONCLUSIONS

The above small break LOCA total PCTs remain below the 10 CFR 50.46 PCT limit of 2200°F. Note also that the small break LOCA transition core penalty of 154°F (Enclosure 1) for grid deformation can be eliminated when the transition to 17x17 VANTAGE 5 fuel is complete. This will increase the margin by an additional 154°F for Units 1 and 2.



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REFERENCES

1. "Pacific Gas and Electric Company Nuclear Plant, Diablo Canyon Units 1 and 2 LOCA Analysis Input Deviation," Letter from S. A. McHugh (Westinghouse) to J. D. Shiffer (PG&E), PGE-89-722, September 15, 1989.
2. "Disposition of LOCA-Related PIs for Diablo Canyon Unit 1 (PG&E) Cycle 4 Reload," NS-SAT-SAI-89-415, September 11, 1989.



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