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ComEd

February 7, 1997

JSPLTR 97-0022

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

Subject: Dresden Nuclear Power Station Units 2 and 3
Plant Specific ECCS Evaluation Changes - 10CFR50.46 Report
DPR-29 and DPR-30
NRC Docket Nos. 50-237 and 50-249

Reference: "Dresden Nuclear Power Station Units 2 and 3, Plant Specific ECCS Evaluation Changes - 30 Day 10CFR50.46 Report DPR-19 and DPR-25, NRC Docket Nos. 50-237 and 50-249," letter to USNRC from J. Stephen Perry (ComEd), November 6,1996.

This letter fulfills the thirty day reporting requirement of 10CFR50.46(a)(3) for Unit 2 and Unit 3 of Dresden Nuclear Power Station because the cumulation of the absolute magnitude of changes in the ECCS evaluation models (or their application) has resulted a calculated Peak Clad Temperature (PCT) difference of more than 50°F. This letter also fulfills the annual reporting requirement of 10 CFR 50.46(a)(3) for Unit 2 and Unit 3 of Dresden Nuclear Power Station.

Attachment 1 provides updated information regarding the PCT of the limiting Loss of Coolant Accident evaluations for Dresden Nuclear Power Station. Attachment 1 also includes all assessments as of January 24, 1997. The assessment notes provide a detailed description for each change or error reported.

Siemens Power Corporation has evaluated issues which have resulted in PCT assessments to the LOCA analyses for Dresden Nuclear Power Station. Siemens Power Corporation and ComEd have determined that these issues do not constitute substantial safety hazards, and Dresden Nuclear Power Station continues to comply with the requirements of 10 CFR 50.46. Reanalysis is underway for the introduction of ATRIUM-9B fuel and will appropriately bound both units' operation at that time.

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If there are any questions or comments concerning this letter, please refer them to Frank Spangenberg, Dresden Station Regulatory Assurance Manager at (815) 942-2920, extension 3800.

Respectfully,

J. Stephen Perry
Site-Vice President
Dresden Station

Attachment 1:	Dresden 10CFR 50.46 Report
Attachment 2.	Prior PCT Assessment Notes for Dresden Units 2 and 3
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cc: A. Bill Beach, Regional Administrator - RIII
J. F. Stang, Project Manager - NRR
C. L. Vanderniet, Senior Resident Inspector - Dresden
Office of Nuclear Facility Safety - IDNS

Dresden 10CFR 50.46 Report

PLANT NAME: Dredsen Unit 2
ECCS EVALUATION MODEL: EXEM BWR LOCA Analysis
REPORT REVISION DATE: 1/24/97
CURRENT OPERATING CYCLE: 15

ANALYSIS OF RECORD

Evaluation Model Methodology: EXEM BWR [XN-NF-80-19(P)(A)]
Calculation: Advanced Nuclear Fuels Corporation ANF-88-191, dated December 1988
Fuel: (8x8 reflood time used) 9x9-2 (Note 5)
Limiting Single Failure: LPCI Injection Valve
Limiting Break Size and Location: Double Ended Guillotine of Recirculation Suction Piping

Reference PCT	**PCT = 2045°F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

Reactor Recirculation Discharge Valve Isolation Delay Time Increase (Note 1)	ΔPCT = +0°F
Various Valve Stroke Times Increased (Note 2)	ΔPCT = <+1°F
Reactor Recirculation Discharge Valve Closure Time Increase (Note 3)	ΔPCT = +0°F
Replacement Access hole cover modification (Note 4)	ΔPCT = +10°F
Reflood time based on a full core of 9x9-2 fuel (Note 5)	ΔPCT = -157°F
Bottom Head Drain Flowpath (Note 6) combined with analysis performed using latest version of FLEX (Note 7)	ΔPCT = -42°F
Core Shroud Leakage (Note 8) combined with CS Line Leakage (Note 9)	ΔPCT = +28°F
Recalculation of Core Spray Leakages (Attachments 3 and 5)	ΔPCT = +118°F
ECCS Fluid Temperature (Attachment 6)	ΔPCT = +28°F
Prior Assessments PCT	**PCT = 2030°F**

B. CURRENT LOCA MODEL ASSESSMENTS

Single Failure LPCI Loop Selection Logic with reduced Core Spray runout flow based on insufficient net positive suction head (NPSH) (Attachment 7)	ΔPCT = +133°F
NET PCT	**PCT = 2163°F**

PLANT NAME: Dresden Unit 3
ECCS EVALUATION MODEL: EXEM BWR LOCA Analysis
REPORT REVISION DATE: 1/24/97
CURRENT OPERATING CYCLE: 14

ANALYSIS OF RECORD

Evaluation Model Methodology: EXEM BWR [XN-NF-80-19(P)(A)]
Calculation: Advanced Nuclear Fuels Corporation ANF-88-191, dated December 1988
Fuel: (8x8 reflood time used) 9x9-2 (Note 5)
Limiting Single Failure: LPCI Injection Valve
Limiting Break Size and Location: Double Ended Guillotine of Recirculation Suction Piping

Reference PCT	**PCT =**	**2045°F**

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

Reactor Recirculation Discharge Valve Isolation Delay Time Increase (Note 1)	ΔPCT =	+0°F
Various Valve Stroke Times Increased (Note 2)	ΔPCT =	<+1°F
Reactor Recirculation Discharge Valve Closure Time Increase (Note 3)	ΔPCT =	+0°F
Replacement Access hole cover modification (Note 4)	ΔPCT =	+10°F
Reflood time based on a full core of 9x9-2 fuel (Note 5)	ΔPCT =	-157°F
Bottom Head Drain Flowpath (Note 6) combined with analysis performed using latest version of FLEX (Note 7)	ΔPCT =	-42°F
Recalculation of Core Spray Leakages (Attachments 4 and 5)	ΔPCT =	+146°F
ECCS Fluid Temperature (Attachment 6)	ΔPCT =	+28°F
Prior Assessments PCT	**PCT =**	**2030°F**

B. CURRENT LOCA MODEL ASSESSMENTS

Single Failure LPCI Loop Selection Logic with reduced Core Spray runout flow based on insufficient net positive suction head (NPSH) (Attachment 7)	ΔPCT =	+133°F

NET PCT	**PCT =**	**2163°F**

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Attachment 2: Prior PCT Assessment Notes for Dresden Units 2 and 3

1. Reactor Recirculation Discharge Valve Isolation Delay Time Increase

   This PCT assessment was applied to both Dresden Units with the change of the reactor recirculation discharge valve isolation delay time increase. This isolation delay time was increased from 7 seconds to 23 seconds. This change did not affect the PCT for the limiting case as the RDV delay time only affects the single failure of the diesel generator case (SF-DG) LOCA rather than the LPCI injection valve single failure (SF-LPCI). This change did affect the amount of PCT margin existing between the SF-DG and the SF-LPCI by less than 49°F resulting in a new margin greater than 53°F. The SF-LPCI PCT still remains limiting. This assessment was documented in letter JMR:129:90 from SPC to ComEd dated May 4, 1990.

2. Various Valve Stroke Times and Delay Times Increase

   This PCT assessment was applied to Dresden with the change of the following delay times and valve stroke times:

   LPCI initiation delay time increased from 11 seconds to 14 seconds.
   CS initiation delay time increased from 11 seconds to 14 seconds.
   RDV isolation delay time increased from 7 seconds to 23 seconds.
   LPCI valve stroke time increased from 22 seconds to 27 seconds.
   CS valve stroke time increased from 17 seconds to 22 seconds.
   HPCI valve stroke time increased from 20 seconds to 22 seconds.

   The effect of the increased delays and valve stroke times was insignificant for the SF-LPCI but changed the PCT margin between the SF-LPCI and SF-DG to 60°F. Hence the SF-LPCI still remains limiting and had no change in PCT. This assessment was documented in letter JMR:269:90 from SPC to ComEd dated September 18, 1990. The reason that this 60°F of margin is greater than the 53°F of margin listed in Note 1 is that Note 1 results were based on a bounding engineering evaluation, while an analysis was performed to support the multiple stroke time and delay time increases.

3. Reactor Recirculation Discharge Valve Closure Time Increase

   This PCT assessment was applied to Dresden with the change of the reactor recirculation discharge valve (RDV) closure time increase. This valve closure time was increased from 33 seconds to 40 seconds resulting from a change out of the motor operated valve gear ratios. This change did not affect the PCT for the limiting case as the RDV delay time only affects the single failure of the diesel generator (SF-DG) LOCA rather than the LPCI injection valve single failure (SF-LPCI). This change did affect the amount of PCT margin existing between the SF-DG and the SF-LPCI resulting in a new margin of 40°F. The SF-LPCI PCT still remains limiting. This assessment was documented in letter JMR:280:91 from SPC to ComEd dated September 27, 1991.

4. Replacement access hole cover (PCT increase)

This PCT increase was applied to Dresden with the modification on Unit 2 only of the access covers in the core shroud support plate. It was installed during the Dresden Unit 2 Reload 13 outage in January of 1993. This modification has not been installed in Dresden Unit 3 to date. See Attachments 3, 4, and 5 for a summary of the application of access hole cover leakage on current LOCA analyses. These removable covers allow access from the downcomer region to the lower plenum region. This modification was needed to repair cracks identified during in vessel visual inspections. It changed the design of the access cover from a welded design to a bolted design. This PCT penalty is carried through on Unit 3 only for conservatism and consistency in PCT for both units. The small amount of leakage associated with the bolted joint was analyzed in ANF-88-191, Supplement 1 and resulted in less than a 10°F PCT increase. Note that leakage from these access covers was included in each of the subsequent LOCA evaluations. The calculation of this leakage is documented on pages 11 and 12 of the following: RDE 59-0792, Revision 2, DRF B11-00546, January 1993, 'Safety Evaluation for Quad-Cities Units 1 and 2 and Dresden Units 2 and 3 Replacement Access Hole Covers, as well as in Section 6.3.2.2.3.1 of the Dresden UFSAR.

5. Reflood time based on a full core of 9x9-2 fuel (PCT decrease)

The Peak Clad Temperature (PCT) results reported in ANF-88-191 were based on a reflood time determined for a full core of 8x8-1 fuel. The 8x8-1 reflood time is longer than the reflood time for a full 9x9-2 core, and was used in ANF-88-191 to provide conservative results for transition cores. Starting with Cycle 14 (May of 1993 for Unit 2 and August of 1994 for Unit 3) for both units, the core was composed entirely of 9x9-2 fuel assemblies; therefore it is appropriate to use the 9x9-2 reflood time and corresponding 157°F PCT reduction for Cycle 14 and subsequent cycles composed entirely of 9x9-2 fuel. This reflood time was first analyzed in ANF-88-191, Supplement 1, which uses the NRC approved EXEM BWR [XN-NF-80-19(P)(A)] methodology. All subsequent analyses (ANF-88-191 Supplements 2, 3, and 4) also account for this reflood time, but use the NRC approved EXEM BWR [ANF-91-048(P)(A)] methodology.

6. Bottom Head Drain (BHD) flowpath (PCT increase)

In march of 1995 ComEd asked GE to evaluate the impact of additional reactor coolant lost during a LOCA due to the cross tie of the bottom head drain (BHD) to the recirculation piping. ComEd also requested SPC to evaluate the impact for Dresden. ANF-88-191, Supplement 2 reported that the impact of the Reactor Pressure Vessel (RPV) bottom head drain (BHD) providing an additional flow path for coolant loss (286 gpm of leakage) under LOCA conditions was an increase of approximately 10°F on the PCT. General Electric reported this issue to the USNRC in December 15, 1995 and February 20, 1996 submittals. ComEd tracked this issue and reported it in a January 12, 1996 thirty day 50.46 report when accumulated PCT changes were greater than 50°F. Continuous Reactor Water Cleanup (RWCU) system operation takes suction from the

BHD and from the Recirculation suction piping which are connected at a common point. A design basis LOCA where the break is on the recirculation suction piping would allow water in the lower plenum of the reactor vessel to be lost through the RWCU piping where it connects to the recirculation suction piping. Siemens originally determined that a maximum 286 gpm of BHD leakage could occur in the DBA LOCA scenario. This was documented in SPC letter YUF:098:95, "Impact of the Reactor Vessel Bottom Head Drain Line on Dresden Units 2 and 3 LOCA Analysis," to R. J. Chin from U. Fresk, dated March 14, 1995. Since that time, Siemens has recalculated the maximum BHD leakage. This is documented on page 7-1 of EMF-93-176, Revision 2, "Updated Principal LOCA Analysis Parameters for Dresden Units 2 and 3," September 1996, Siemens Power Corporation. Please refer to Attachments 3 and 4 for a summary of the most recent calculations for leakage.

7. Reanalysis performed using the latest version of the FLEX computer code (PCT decrease)

ANF-88-191, Supplement 2 reported that the combined impact of the bottom head drain leakage (which alone would result in a PCT increase of approximately 10°F see Note 6) and the reanalysis using the NRC approved EXEM BWR [ANF-91-048(P)(A)] methodology, version of the FLEX computer code would result in a PCT decrease of approximately 42°F. The use of a more recently NRC approved version of the FLEX code subsequent to the ANF-88-191 analysis result in a reduced reflood time. This reduced reflood time allowed the hot node reflood to occur earlier in time; thereby reducing the PCT experienced during the limiting LOCA.

8. Shroud repair including access hole cover (PCT increase)

ComEd submittals to NRC were made in March through July of 1994 for the Dresden core shroud issue. NRC issued SERs on and July 21, 1994 for Unit 3 and December 6, 1995 for repairs on both units. No through wall shroud cracks were identified for Unit 3. To support Unit 2, ANF-88-191, Supplement 3 reported the combined impact of the shroud repair leakage combined with CS line leakage (see Note 9) to be a PCT increase of approximately 28°F. Repairs to the Dresden core shroud were completed with the startup of Unit 2 Cycle 15 and will be performed for the upcoming Unit 3 Reload 14 outage. These repairs included installation of hardware which required machining of holes in the shroud and shroud support plate. Each of these holes have some clearance which will allow some leakage to occur at the hole's location. This repair resulted in a PCT increase when compared to the LOCA analysis without any shroud leakage. This PCT increase was not quantified individually, as it was evaluated concurrently with CS line leakage (see Note 9). Included in the assessment was the replacement access hole cover leakage. This PCT increase is associated with the leakage (184 gpm) from the shroud repair. This leakage was documented in a ComEd letter from R. W. Tsai (ComEd) to J. H. Riddle (SPC) dated October 23, 1995.

9. CS Line Leakage (PCT increase)

ANF-88-191, Supplement 3 reported the combined impact of the shroud repair leakage (see Note 8) and CS line leakage to be a PCT increase of approximately 28°F. This leakage was included to account for the postulated leakage from cracks in the CS line. The end of life leakage associated with the crack in the CS line was calculated to be 83 gpm. As this results in a reduction of the core spray delivered to the core, the PCT increases. The amount of this increase can not be quantified separately as it was evaluated together with the shroud repair leakage (see Note 8), which also increases the PCT. This leakage was calculated and documented in the following submittal P. Piet letter to U.S. NRC, dated September 12, 1995, "Dresden Unit 2 Core Spray Flaw Evaluation." Please refer to Attachments 3 and 4 for a summary of the most recent calculations for leakage.

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Attachment 3: Dresden Unit 2 ECCS Leakage Calculation Summary

Several new leakage values have been calculated for Dresden Units 2 and 3 and were recently quantified by a Sargent and Lundy calculation. The following tables address the source of the leakage, the amount of leakage, the change in this leakage if it was previously quantified, and the effect on PCT as compared to the previously reported PCT for each unit. All of the leakages identified below for both Unit 2 and Unit 3 were either calculated or documented in calculation number 9389-64-DQ, Sections 32, 33, 34, and 35, revision 0. See Attachment 5 for the currently analyzed leakages.

Dresden Unit 2 ECCS Leakage Calculation Summary

Source	Current Calculated Leakage (GPM)	Change From Previously Calculated Leakage (ΔGPM)	Affect on PCT
RPV penetration assembly Design Leakage for Core Spray (2-Loop)	2 x 190 380 total	380*	Increase
Upper T-box vent hole Leakage for Core Spray (2-Loop)	2 x 8 16 total	16*	Increase
Core spray piping weld Cracks End of Cycle Leakage **** (2-Loop)	1 x 2 2 Total	-81 **	Decrease
Core shroud repair	184	0	None
Access hole cover	78	0	None
Bottom head drain line	286	0***	None

* The RPV penetration assembly leakage for Core Spray and the Upper T-box vent hole leakage were not accounted for in the previous LOCA PCT analysis. These leakages had previously been accounted for in the core spray pump surveillance excess capacity. The pump surveillance is performed at 4600 gpm/pump; however only 4500 gpm/pump was credited in the analyses prior to accounting for flaw leakage. This allowed for up to 200 gpm of total thermal sleeve leakage (RPV penetration assembly leakage + Upper T-box vent hole leakage) as this was the original design leakage of the system. This original design leakage of 100 gpm per loop was not well described in the original design and licensing basis. The decision has been made to explicitly account for this thermal sleeve leakage in the LOCA analysis rather than to account for any leakage in the CS system excess capacity. All analyses will still continue to assume 4500 gpm/pump prior to accounting for any leakage from the system. As this results in an increased leakage in the CS system beyond that assumed in previous analyses, this results in an increase in PCT.

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Attachment 3: Dresden Unit 2 ECCS Leakage Calculation Summary

** The CS line postulated total crack leakage has decreased by 81 gpm. This is the result of recalculated leakage in the CS line along with the difference arising between end-of-life versus end-of-cycle crack leakage. As a greater amount of leakage was previously assumed, the effect of this decrease in CS line leakage results in a decrease in PCT. CS flaw evaluation has identified only one crack postulated to leak which was quantified to be 1.4 gpm. This end-of-cycle for 21 months of projected crack growth leakage has been rounded to 2 gpm. ComEd submitted a Unit 2 Core Spray Flaw Evaluation in P. Piet letter to USNRC dated September 12, 1995. Attachments to this letter quantified crack leakage of 1.4 GPM for the end of a 21 month period and 83 GPM for a end of predicted life sensitivity case. Leakage of 70 GPM at a flow rate of 4600 GPM was shown to increase PCT by approximately 8°F in that submittal. However, ComEd selected to conservatively bound the estimated crack leakage in the previous 10CFR50.46 submittal dated January 12, 1996. That 10CFR50.46 submittal used a total of 83 GPM leakage which conservatively bounded the expected 1.4 GPM crack end of 21 month period leakage for Unit 2 Cycle 15 identified in the September 12, 1995 CS Flaw evaluation submittal.

*** Note 6 of Attachment 2 continues to describe the basis for BHD leakage values. However, Siemens has recalculated the maximum BHD leakage to be 225 GPM which is 61 gpm less than the leakage assumed in this analyses. This was documented in EMF-93-176, 'Updated Principal LOCA Analysis Parameters for Dresden Units 2 and 3," dated September 1996. The most recent calculation for BHD leakage will be not be used until D3C15. The overall effect of using 286 GPM in the current analysis (ANF-88-191, Supplement 4) instead of the new 225 GPM BHD leakage provided additional conservatism.

**** The end-of-cycle postulated crack growth leakages for 21 months of were used for this analysis. Previous submittals to NRC had used end-of-life crack leakages. ComEd's projected crack growth period used in the LOCA analysis for a given flaw is consistent with the associated scheduled re-inspection for that flaw. This ensures that appropriate leakage is used in the LOCA PCT evaluation. ComEd will use end of life leakage flows for flaws which can not be verified by re-inspection.

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Attachment 4: Dresden Unit 3 ECCS Leakage Calculation Summary

Several new leakage values have been calculated for Dresden Units 2 and 3 and were recently quantified by a Sargent and Lundy calculation. The following tables address the source of the leakage, the amount of leakage, the change in this leakage if it was previously quantified, and the effect on PCT as compared to the previously reported PCT for each unit. All of the leakages identified below for both Unit 2 and Unit 3 were either calculated or documented in calculation number 9389-64-DQ, Sections 32, 33, 34, and 35, revision 0. See Attachment 5 for the currently analyzed leakages.

Dresden Unit 3 ECCS Leakage Calculation Summary

Source	Current Calculated Leakage (GPM)	Change From Previously Calculated Leakage (ΔGPM)	Affect on PCT
RPV penetration assembly Design Leakage for Core Spray (2-Loop)	2 x 115 230 total	230*	Increase
Upper T-box vent hole Leakage for Core Spray (2-Loop)	2 x 8 16 total	16*	Increase
Core spray piping weld Cracks End of Cycle Leakage ****(2-Loop)	3 + 17 20 Total	+ 20 **	Increase
Core shroud weld	0	0	None
Access hole cover	0	-78*****	Decrease
Bottom head drain line	286	0***	None

* The RPV penetration assembly leakage for Core Spray and the Upper T-box vent hole leakage were not accounted for in the previous LOCA PCT analysis. This is the basis for the 230 GPM increase in leakage from previous 10CFR50.46 submittals. Prior to 1994, the total design leakages per loop were in the range of 100 to 200 gpm. The original design leakage was not well described in the original design and licensing basis. These leakages had previously been accounted for in the core spray pump surveillance excess capacity. Design leakage combined with postulated cracks and CS piping repairs are debited from the 4700 GPM CS capacity per loop as described in P. Piet letter to U.S. NRC, dated June 20, 1994, "Dresden Unit 3 Core Spray Flaw Evaluation." The decision has been made to explicitly account for these design leakages in the LOCA analysis rather than to account for any leakage in the CS system excess capacity. All analyses will still continue to assume 4500 gpm/pump prior to accounting for any leakage from the system. As this results in an increased leakage in the CS system beyond that assumed in previous analyses, this results in an increase in PCT.

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Attachment 4: Dresden Unit 3 ECCS Leakage Calculation Summary

** The CS line postulated crack leakage has increased by 20 gpm since this Unit 3 specific leakage was not accounted for in the previous LOCA PCT analysis. This is the basis for the 20 GPM increase in leakage from previous 10CFR50.46 submittals. This is the result of repairs to the CS line along with the difference arising between end-of-life versus end-of-cycle crack leakage. As a greater amount of leakage was previously assumed, the effect of this decrease in CS line leakage results in a decrease in PCT. Design leakage combined with postulated cracks and CS piping repairs are from the 4700 GPM CS capacity as described in P. Piet letter to U.S. NRC, dated June 20, 1994, "Dresden Unit 3 Core Spray Flaw Evaluation." This submittal calculated the Unit 3 CS flaw leakage for a postulated 360 degree crack in the pipe with the clamp repair leakage as 166 GPM per loop. Since these flaws will be re-inspected during the D3R14 refuel outage it is appropriate to utilize the end of cycle crack length (which includes 24 months of crack growth) to determine the end of cycle leakage from the cracks. Utilizing the end of cycle crack length results in a leakage of 20 gpm total. The decision has been made to explicitly account for the flaw leakage in the LOCA analysis rather than to account for any leakage in the CS system excess capacity. All analyses will still continue to assume 4500 gpm/pump prior to accounting for any leakage from the system. As this results in an increased leakage in the CS system beyond that assumed in previous analyses, this results in an increase in PCT.

*** Note 6 of Attachment 2 continues to describe the basis for BHD leakage values. However, Siemens has recalculated the maximum BHD leakage to be 225 GPM which is 61 gpm less than the leakage assumed in this analyses. This was documented in EMF-93-176, "Updated Principal LOCA Analysis Parameters for Dresden Units 2 and 3," dated September 1996. The most recent calculation for BHD leakage will be not be used until D3C15. The overall effect of using 286 GPM in the current analysis (ANF-88-191, Supplement 4) instead of the new 225 GPM BHD leakage provided additional conservatism.

**** The end-of-cycle postulated crack growth leakages for 24 months of were used for this analysis. Previous submittals to NRC had used end-of-life crack leakages. ComEd's projected crack growth period used in the LOCA analysis for a given flaw is consistent with the associated scheduled re-inspection for that flaw. This ensures that appropriate leakage is used in the LOCA PCT evaluation. ComEd will use end of life leakage flows for flaws which can not be verified by re-inspection.

***** The Access hole cover modification has not been made to Unit 3. However, this leakage was considered in the previous analysis for Unit 3. This relates into an extra 78 gpm of leakage being accounted for that does not exist. This leakage has continued to be accounted for as an added conservatism in the Unit 3 LOCA PCT assessment.

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Attachment 5: Dresden Units 2 and 3 Currently Analyzed ECCS Leakages

Dresden Units 2 & 3 ECCS Leakage Currently Analyzed

Source	Current Unit 2 Calculated Leakage (GPM)	Current Unit 3 Calculated Leakage (GPM)	Currently Analyzed Leakage (GPM)
RPV penetration assembly Design Leakage (2-Loop)	2 x 190 380 total	2 x 115 230 total	400*
Upper T-box vent hole Leakage (2-Loop)	2 x 8 16 total	2 x 8 16 total	0*
Core spray piping weld Cracks End of Cycle Leakage ****(2-Loop)	2 2 Total	3 + 17 20 Total	0*
Core shroud weld	184	0**	184
Access hole cover	78	0**	78
Bottom head drain line	225***	225***	286

* The 400 gpm of RPV assembly penetration leakage listed in the table is equivalent to 400 gpm of total leakage for the RPV assembly leakage, Upper T-box vent hole leakage, and the CS line postulated crack leakage. Since all of these leakages occur in the CS line between its entry into the vessel and the penetration of the core shroud, the distribution of these leakages is insignificant. Conservatively, none of the Core Spray leakage flow is credited to enter the vessel.

** The access hole cover and core shroud repair leakage are not present at Unit 3. The ANF-88-191, Supplement 4 analysis conservatively assumes that these leakages are present for both units. Rather than re-performing a Unit 3 specific analysis, this additional leakage is assumed in order to provide additional conservatism.

*** The bottom head drain leakage (see Note 6 of Attachment 2) was recalculated by Siemens Power Corporation and determined to be 61 gpm less than the leakage assumed in the previous analyses. It should be noted that this decrease in bottom head drain leakage was not used in the current analysis (ANF-88-191, Supplement 4) and provides additional conservatism.

**** The end-of-cycle crack lengths (including unit specific projected crack growth) were used to calculate the leakages used for this analysis. Previous submittals to NRC had used end-of-life crack leakages. ComEd's projected crack growth period used in the LOCA analysis for a given flaw is consistent with the scheduled for re-inspection of that flaw. This ensures that appropriate leakage is used in the LOCA PCT evaluation. ComEd will use end of life leakage flows for flaws which can not be verified by re-inspection.

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Attachment 6: Dresden Units 2 and 3 ECCS Temperature Sensitivity

This change was made as the result of a question by the Dresden Independent Safety Inspection team regarding the appropriateness of using the 95°F initial ECCS injection temperature. The previously utilized method (EXEM BWR [XN-NF-80-19(P)(A)]) included the use of an initial 95°F ECCS injection temperature, consistent with the analysis model used. The currently used methodology (EXEM BWR [ANF-91-048(P)(A)]) should have used a more representative, elevated ECCS injection temperature.

ComEd concluded that it is more appropriate to utilize an initial temperature of 170°F as the initial ECCS injection temperature. This temperature was derived from the suppression pool analysis performed for the Quad Cities station, which is representative of the Dresden design. This temperature is conservative with respect to the predicted fluid injection temperature. This temperature should have been used in analyses performed since October 1995, when ANF-88-191, Supplement 2 was first used.

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Attachment 7: Dresden Units 2 and 3 Single Failure LPCI Loop Selection Logic

This PCT assessment was applied to both Dresden Units based on a conservative Core Spray (CS) runout flow for a single failure of the LPCI Loop Selection logic (SF-LSL) which results in reduced net positive suction head (NPSH) available to the CS pumps. This event is similar to and bound by a LPCI injection valve failure (SF-LPCI) with reduced CS runout flow consistent with the CS runout flow associated with the SF-LSL case. The PCT increase associated with using the reduced CS runout flow based on the SF-LSL for the EXEM BWR [ANF-91-048(P)(A)] methodology is 133°F. This was identified and stated in the ANF-88-191, Supplement 5 analysis.

For conservatism the SF-LSL is modeled as a recirculation suction break, which will result in higher peak cladding temperatures based on ANF-88-191. The pump suction side break will still allow for LPCI injection in the event of a SF-LSL, however, this flow is all assumed to pour out the break. The pump discharge break with a SF-LSL will result in degraded flow if the break is downstream of the LPCI injection point and no LPCI flow if the break is upstream of the LPCI injection point. Modeling the SF-LSL as a suction side break without crediting any LPCI flow is conservative. Analyses currently underway for the introduction of ATRIUM-9B fuel show that a suction break with only CS flow available for mitigation results in a PCT approximately 88°F higher than a discharge side break with only CS flow available for mitigation.

GE SIL-151 provides the background information for the SF-LSL as well as the associated NPSH implications.

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Attachment 8: Supplement 5 to ANF-88-191

Dresden Units 2 and 3 LOCA-ECCS Analysis MAPLHGR Results for ANF 9x(Fuel