ENCLOSURE 5 TO

NRC-08-0046

DTE Energy ENRICO FERMI 2 SAFER/GESTR Loss-of-Coolant Accident Analysis for GE11 Fuel

GE-NE-0000-0047-1716 Revision 1
[NON-PROPRIETARY VERSION]

HITACHI

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GEH NON-PROPRIETARY VERSION

DTE Energy
ENRICO FERMI 2
SAFER/GESTR Loss-of-Coolant Accident Analysis for GE11 Fuel

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1.0 INTRODUCTION

The purpose of this document is to supplement the ECCS-LOCA evaluation results for the ENRICO FERMI 2 documented in the Reference 1 analysis. Specifically, using the limiting cases, results are provided for GE11 fuel. The plant ECCS parameters and analysis methodology are consistent with those defined in Reference 1.

2.0 DESCRIPTION OF MODELS

Consistent with Reference 1, the ECCS-LOCA results are generated using the standard four GE-NE computer models. These models are LAMB, TASC, SAFER and GESTR-LOCA. See Reference 1 for further details.

3.0 ANALYSIS PROCEDURE

3.1 LICENSING CRITERIA

Consistent with Reference 1, the acceptance criteria for the ECCS-LOCA results are based on the Code of Federal Regulations, 10 CFR 50.46. See Reference 1 for further details.

3.2 SAFER/GESTR-LOCA LICENSING METHODOLOGY

Consistent with Reference 1, the ECCS-LOCA analysis was generated using the SAFER/GESTR-LOCA licensing methodology (References 2, 3 and 4) as approved by the NRC (References 5 and 6).

3.3 GENERIC ANALYSIS

The generic ECCS-LOCA analysis for the BWR-3/4 product line is described in Reference 1.

3.4 ENRICO FERMI 2 SPECIFIC ANALYSIS

The ENRICO FERMI 2 specific analysis in Reference 1 demonstrated that the nominal and Appendix K PCT trends as a function of break size were consistent with one another and with the generic results. For large breaks, the DBA recirculation suction break with Division II Battery is the limiting break/failure combination for both Nominal and Appendix K assumptions. The Division I Battery failure is the limiting failure for small breaks.

4.0 INPUT TO ANALYSIS

The Operating Parameters List 4/5 (OPL4/5) parameters used in this analysis are given in Appendix A. The plant heat balance conditions utilized in this analysis are presented in Table 1. The GE11 fuel parameters are given in Table 2.

All known ECCS-LOCA analysis errors (up to and including error # 2007-01) have been accounted for in this analysis.

Table 1
Plant Operational Parameters

Plant Parameters	Nominal	Appendix K
Core Thermal Power* (MWt) / (% of Current Operating Thermal Power)	3952 / (115.2)	4031 / (117.5)
Core Flow (Mlb/hr) / (% of Rated Core Flow)	100.0 / (100)	100.0 / (100)
Vessel Dome Pressure (psia)	1045	1060

*Current Operating Thermal Power (CLTP) is 3430 MWt.
Extended Power Uprate (EPU) Thermal Power is 3952 MWt.

Table 2
GE11 Fuel Parameters

Fuel Parameter		**Analysis Value**
PLHGR* (kW/ft)	-LOCA Analysis Limit	[[ ]]
	-Appendix K	[[ ]] x 1.02
	-Nominal	[[ ]]
MAPLHGR* (kW/ft)	-LOCA Analysis Limit	13.42
	-Appendix K	13.42 x 1.02
	-Nominal	12.86
Worst Case Pellet Exposure for ECCS Evaluation (MWd/MTU)		[[ ]]
Initial Operating MCPR*	-LOCA Analysis Limit	1.25
	-Appendix K	1.25 ÷ 1.02
	-Nominal	1.25 + 0.02
R-Factor		[[ ]]
Number of Fuel Rods per Bundle		74

* PLHGR: Peak Linear Heat Generation Rate
MAPLHGR: Maximum Average Planar Linear Heat Generation Rate
MCPR: Minimum Critical Power Ratio

5.0 RESULTS

5.1 LARGE RECIRCULATION LINE BREAKS

The limiting large break LOCA event for ENRICO FERMI 2 is the maximum recirculation suction line break. Several large recirculation suction line breaks were analyzed for GE11 with Nominal and Appendix K assumptions to confirm the limiting break and single failure combination. [[

]] The results of these analyses are given in Table 3 and Figures 1 and 2. These results show that the limiting large break and single failure combination at EPU power level and 100% flow condition is the maximum recirculation suction line break with Division II Battery for both Nominal and Appendix K assumptions. [[

]]

For the maximum recirculation suction line break with Division II Battery and nominal assumptions, there is a rapid vessel depressurization due to vessel inventory loss through the break (Figure 1b). [[

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The system response to a maximum recirculation suction line break with Division II Battery and Appendix K assumptions is similar to the case with nominal assumptions. There is a rapid vessel depressurization due to vessel inventory loss through the break (Figure 2b) but is slightly faster due to higher break flow from the Appendix K Moody Slip Flow Model. [[

]] This process can be observed in the hot bundle water level (Figure 2a), the peak cladding temperature (Figure 2c) and the hot node heat transfer coefficients (Figure 2d). Overall the bundle heatup for the Appendix K case is higher than the nominal case due to higher bundle power and decay heat.

5.2 SMALL RECIRCULATION LINE BREAKS

The most limiting single failure for small recirculation line breaks at the EPU power level is the Division I Battery failure. The small break cases were reanalyzed for GE11 with Nominal and Appendix K assumptions to determine the small break with the highest PCT. The results of these analyses are given in Table 4 and Figures 3 and 4. [[

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5.3 NON-RECIRCULATION LINE BREAKS

The analysis in Reference 1 demonstrated that the non-recirculation line break cases are clearly non-limiting and therefore not re-analyzed for GE11 transition. Note that the feedwater line break basis includes an assumption of operator action to depressurize the reactor during the Division I Battery failure scenario. This is necessary since HPCI may be lost through the break and therefore is unable to restore level or depressurize the reactor.

5.4 ALTERNATE OPERATING MODES

The limiting large break, the maximum recirculation suction line break, was reanalyzed for the MELLLA, Feedwater Temperature Reduction (FWTR), Increased Core Flow (ICF), and Single-Loop Operation (SLO) operating modes.

The analysis for MELLLA condition was performed at 86.8% of EPU thermal power (3430 MWt) and 79.9% of rated flow. The MELLLA condition at EPU thermal power is not specifically analyzed since the core flow for this case is at 99% of rated core flow. This case is essentially covered by the rated flow case at EPU thermal power. [[

]] Therefore there is no

additional LHGR or MAPLHGR multiplier, beyond the ARTS thermal limit reductions at the SLO power/flow point, is required from an ECCS-LOCA analysis viewpoint.

5.5 Compliance Evaluations

5.5.1 Licensing Basis PCT Evaluation

The Appendix K results confirm that the limiting break is the limiting small recirculation suction line (SBA). [[

]] The Licensing Basis PCT for ENRICO FERMI 2 is calculated for GE11 fuel based on the above Appendix K PCT and using the SAFER/GESTR-LOCA licensing methodology approved by NRC in Reference 5. ENRICO FERMI 2 unique variable uncertainties, including backflow leakage, ECCS signal, stored energy, gap pressure, and ADS time-delay, were evaluated specifically for GE11 fuel to determine plant-specific adders. The calculated licensing Basis PCT is 1830°F.

5.5.2 Removal of the Current Requirement for Evaluation of Upper Bound PCT

The NRC SER approving the original SAFER/GESTR-LOCA application methodology (described in Reference 3) placed a restriction of 1600°F on the Upper Bound PCT calculation. Additional supporting information was needed to support the use of the methodology for Upper Bound PCTs in excess of this limit. GENE provided this information on a generic basis in Reference 4. GENE received a SER from the NRC (Reference 6) eliminating the 1600°F restriction on the Upper Bound PCT. The elimination of the restriction on the Upper Bound PCT is applicable to all plants using the SAFER/GESTR-LOCA application methodology described in Reference 3, including ENRICO FERMI 2. In addition, the 1600°F restriction on the Upper Bound PCT is no longer applicable when evaluating the impact of changes and errors reported under the requirements of 10CFR50.46.

Plant-specific Upper Bound PCT Calculation

The primary purpose of the Upper Bound PCT calculation is to demonstrate that the Licensing Basis PCT is sufficiently conservative by showing that the Licensing Basis PCT is higher than the Upper Bound PCT. The NRC SER approving the SAFER/GESTR-LOCA application methodology also required confirmation that the plant-specific operating parameters have been conservatively bounded by the models and inputs used in the generic calculations. The SER also required confirmation that the plant-specific ECCS configuration is consistent with the referenced plant class ECCS configuration for the purpose of applying the generic LTR Upper Bound PCT calculations to the plant-specific analysis. Because of the wide variation in plant specific operating parameters and ECCS performance parameters within the BWR product lines, it is difficult to judge whether an individual plant is bounded by the generic calculations. Therefore, the practice has been to calculate the Upper Bound PCT on a plant-specific basis rather than rely on the generic Upper Bound PCT calculations in order to demonstrate that the Licensing Basis PCT is sufficiently conservative.

Reference 4 provided generic justification that the Licensing Basis PCT will be conservative with respect to the Upper Bound PCT and that the plant-specific Upper Bound PCT calculation was no longer necessary. The NRC SER in Reference 6 accepted this position by noting that since plant-specific Upper Bound PCT calculations have been performed for all plants, other means may be used to demonstrate compliance with the original SER limitations. These other means are acceptable provided there are no significant changes to the plant configuration that would invalidate the existing Upper Bound PCT calculations. For the purposes of the Upper Bound PCT calculation, the plant configuration includes the plant equipment and equipment performance (e.g., ECCS pumps and flow rates), fuel type, and the plant operating conditions (e.g., core power and flow) that may affect the PCT calculation. In order to demonstrate continued compliance with the original SER limitations, the PCT impact due to the changes in the plant configuration must be reviewed in order to confirm that the conclusions based on the original Upper Bound PCT calculation have not been invalidated by the changes.

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The results showed that the licensing basis PCT for the most limiting case is below the 10CFR50.46 limit of 2200°F and the licensing basis PCT bounds the corresponding Upper Bound PCT. Therefore, 10CFR50.46 acceptance criteria and the NRC SER requirements for SAFER/GESTR methodology are met for all the operating conditions.

As discussed above, the Upper Bound is no longer restricted by the 1600°F limit. Therefore, when evaluating the impact of changes and errors reported under the requirements of 10CFR50.46, the impact on the Upper Bound PCT no longer needs to be evaluated.

Table 3
Summary of Large Recirculation Line Break Results

[[					]]

Table 4
Summary of Small Recirculation Line Break Results(1)

[[

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Table 5
SLO Analysis for GE11 Fuel – Division II Battery Failure

[[

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* Considering the off-rated transient ARTS thermal limits as defined in Reference 7 the ECCS-LOCA SLO multiplier is 1.0.
** A flow dependent LHGR and MAPLHGR multiplier [LHGRFAC(f)/MAPFAC(f)] of 0.7616 is used for the SLO conditions.

Table 6
FWTR Analysis – Division II Battery Failure

[[

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FFWTR: Final Feedwater Temperature Reduction

Note: 100.0% EPU = 3952 MWt
100.0% F = 100 Mlbm/hr
Nominal Dome Pressure = 1045 psia
Appendix K Dome Pressure = 1060 psia

6.0 CONCLUSIONS

The analysis contained in this report demonstrates that for GE11 fuel, the limiting break and single failure combination is the limiting small recirculation line suction break with Division I Battery failure for both Nominal and Appendix K assumptions.

Based on the limiting large and small breaks and applying the SAFER/GESTR ECCS-LOCA methodology, the ENRICO FERMI 2 ECCS-LOCA analysis was performed for the limiting LOCA event for GE11 fuel [[ ]] The results are summarized in Table 7. The analyses demonstrate that the Licensing Basis PCT corresponds to the limiting small recirculation suction line break. These results meet all licensing and SAFER/GESTR methodology analysis limits. ECCS-LOCA analysis results for all alternate modes (MELLLA, ICF, SLO and FWTR) also meet all licensing limits.

The thermal limits applied to the GE11 fuel in the ECCS-LOCA evaluation are summarized in Table 8.

Reference 8 concluded that HPCI flow changes above 1135 psia did not impact the LOCA evaluation. The reasons for this are two-fold.

1. The limiting LOCA evaluation at the time did not credit HPCI flow and,
2. Reactor pressure is less than the 1135 psia threshold by the time HPCI initiates for the Appendix K analysis.

While the limiting small break is now an event that credits HPCI, and is the limiting LOCA event, there is still no impact because reactor pressure is sufficiently low at the time of HPCI initiation. However, the limiting small break with the Division I battery failure was analyzed with no HPCI flow above 1135 psia, consistent with the OPL-4 in Appendix A, so a change in HPCI flow above 1135 psia continues to have no effect on the LOCA evaluation.

Table 7
ECCS-LOCA Analysis Results for GE11

Parameter	Analysis Result	10CFR50.46 Acceptance Criteria
1. Licensing Basis PCT	1830°F	≤ 2200°F*
2. Maximum Local Oxidation	2 %	≤ 17 %*
3. Core-Wide Metal-Water Reaction	0.1 %	≤ 1.0 %*
4. Coolable Geometry	See results from Items 1 and 2 above	Maintain coolable geometry, which is satisfied by meeting PCT ≤2200 °F and Maximum Local Oxidation ≤ 17 %.
5. Core Long-Term Cooling	Satisfied by either: core reflooded above TAF or core reflooded to elevation of jet pump suction and one core spray system in operation	Core Temperature acceptably low and long-term decay heat removed

* 10 CFR 50.46 ECCS-LOCA Analysis Acceptance Criteria

Table 8
Thermal Limits for GE11

Fuel Parameter	**Analysis Value**	
LHGR – Exposure Limit Curve	GWD/MT	kW/ft
	[[	
		]]
MAPLHGR – Exposure Limit Curve	GWD/MT	kW/ft
	0.00	13.42
	21.74	13.42
	30.00	12.29
	70.00	8.90
Worst Case Pellet Exposure for ECCS Evaluation (MWd/MTU)	[[ ]]	
Initial Operating MCPR -LOCA Analysis Limit	1.25	
R-Factor	[[ ]]	
Off-Rated Thermal Limits ▪ Core Flow, % of Rated Flow ▪ LHGRFAC(f) / MAPFAC(f)	 48 0.7616	
SLO Multiplier on LHGR & MAPLHGR	1.0	

7.0 REFERENCES

1. NEDC-31982P, " Fermi-2 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," July 1991.

2. NEDC-32950P, "Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," January 2000.

3. NEDC-23785-1-PA, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology," Revision 1, General Electric Company, October 1984.

4. NEDE-23785P-A, Vol. III, Supplement 1, Revision 1, "GESTR-LOCA and SAFER Models for Evaluation of Loss-of Coolant Accident Volume III, Supplement 1, Additional Information for Upper Bound PCT Calculation," March 2002.

5. Letter, C.O. Thomas (NRC) to J.F. Quirk (GE), *Acceptance for Referencing of Licensing Topical Report NEDE-23785P, Revision 1, Volume III (P), "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident,"* June 1, 1984.

6. Letter, S.A. Richards (NRC) to J.F. Klapproth (GENE), *Review of NEDE-23785P, Vol. III, Supplement 1, Revision 1, "GESTR-LOCA and SAFER Models for Evaluation of Loss-of Coolant Accident Volume III, Supplement 1, Additional Information for Upper Bound PCT Calculation," (TAC No. MB2774),* February 1, 2002.

7. NEDC-31843P, "Maximum Extended Operating Domain Analysis for Detroit Edison Company Enrico Fermi Energy Center Unit 2," July 1990.

8. GHNE-0000-0075-7779-R0, "Enrico Fermi Energy Center Unit 2 Impact of Revised HPCI Discharge Head Capability on the ECCS-LOCA Evaluations," October 2007.

Figure 1-a Water Level in Hot and Average Channels. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Nominal Assumptions]

[[

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Figure 1-b Reactor Vessel Pressure. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Nominal Assumptions]

[[

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Figure 1-c Peak Cladding Temperature. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Nominal Assumptions]

[[

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Figure 1-d Heat Transfer Coefficients. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Nominal Assumptions]

[[

]]

Figure 1-e ECCS Flows. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Nominal Assumptions]

[[

]]

Figure 2-a Water Level in Hot and Average Channels. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Appendix-K Assumptions]

[[

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Figure 2-b Reactor Vessel Pressure. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Appendix-K Assumptions]

[[

]]

Figure 2-c Peak Cladding Temperature. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Appendix-K Assumptions]

[[

]]

Figure 2-d Heat Transfer Coefficients. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Appendix-K Assumptions]

[[

]]

Figure 2-e ECCS Flows. Maximum Recirculation Line Suction Break, Division II Battery (2LPCI + 1LPCS + 4 ADS Available) [Appendix-K Assumptions]

[[

]]

Figure 3-a Water Level in Hot and Average Channels. Limiting Small Recirculation Line Break [[ ], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Nominal Assumptions]

[[

]

Figure 3-b Reactor Vessel Pressure. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Nominal Assumptions]

[[

]]

Figure 3-c Peak Cladding Temperature. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Nominal Assumptions]

[[

]]

Figure 3-d Heat Transfer Coefficients. Limiting Small Recirculation Line Break [[ ], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Nominal Assumptions]

[[

]]

Figure 3-e ECCS Flows. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Nominal Assumptions]

[[

]]

Figure 4-a Water Level in Hot and Average Channels. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Appendix K Assumptions]

[[

]]

Figure 4-b Reactor Vessel Pressure. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Appendix K Assumptions]

[[

]]

Figure 4-c Peak Cladding Temperature. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Appendix K Assumptions]

[[

]]

Figure 4-d Heat Transfer Coefficients. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Appendix K Assumptions]

[[

]]

Figure 4-e ECCS Flows. Limiting Small Recirculation Line Break [[ ]], Division I Battery (HPCI + 2LPCI + 1LPCS Available) [Appendix K Assumptions]

[[

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Appendix A
Operating Plant Licensing Parameters (OPL-4/5)

The OPL-4/5 parameters shown in the "Resolved for Analysis" column are used for the ECCS-LOCA analysis. When the values are not shown, the inputs in the "Proposed by Customer" are used instead.

Report:	**OPL4/5**	**eDRF:**	**neDRF 0000-0015-4730, neDRFSection 0000-0015-4734, Rev. 1**	**Responsible Engineer**	**W.I. Roman**
Project:	**Fermi-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407)**	**Plant:**	**Fermi-2**	**Date:**	**August 15, 2003**

Report: OPL4/5 eDRF: neDRF 0000-0015-4730, neDRF Section 0000-0015-4734, Rev. 1 RE: W.I. Roman

Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Operational Parameters-Rated Conditions [120% of OLTP (EPU)]									
1	Core thermal power-Nominal	MWt	3952.0	Ref. 4		3952.0	1-2		3952.0	
2	Core thermal power-Appendix K	MWt or 102% of nominal	4031.0			4031.0	1-2		4031.0	
3	Vessel steam dome pressure-Nominal	psia	1045.0	Ref. 12		1045.0	1-2		1045.0	
4	Vessel steam dome pressure-Appendix K	psia	1060.0	Ref. 13		1060.0	1-2 and 1-4			
5	Vessel steam output-Nominal	Mlbm/hr	Note (1)		1	17.204	1-2			
6	Vessel steam output-Appendix K	Mlbm/hr	Note (1)		1	17.621	1-2			
7	Core flow	Mlbm/hr	100.0	Ref. 12		100.0			100.0	GE Note 23
8	Recirculation drive flow-Loop A	Mlbm/hr	16.500	Ref.12		16.34	1-3	1C		
9	Recirculation drive flow-Loop B	Mlbm/hr	16.500	Ref. 12		16.34	1-3	1C		

Report: OPL4/5 eDRF: neDRF 0000-0015-4730, neDRF Section 0000-0015-4734, Rev. 1 RE: W.I. Roman

Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
10	Feedwater temperature-Nominal	°F	Note (2)		2	428.2	1-2			
11	Feedwater temperature-Appendix K	°F	Note (2)		2	430.2	1-4			
B.	Alternate Operation Mode Parameters-[MEOD/MELLLA] (EPU)									
1	Core thermal power-Nominal	MWt	3952.0	Ref. 4		3952.0	1-2		3952.0	GE Note 23
2	Core thermal power-Appendix K	MWt or 102% of nominal	4031.0			4031.0	1-4		4031.0	
3	Vessel steam dome pressure-Nominal	psia	1045.0	Ref. 12		1045.0	1-2		1045.0	GE Note 23
4	Vessel steam dome pressure-Appendix K	psia	1060.0	Ref. 13		1060.0	1-2 and 1-4			
5	Vessel steam output-Nominal	Mlbm/hr	Note (1)		1	Value to be consistent with Task 100 heat balance model at this				

Report: OPL4/5 eDRF: neDRF 0000-0015-4730, neDRF Section 0000-0015-4734, Rev. 1 RE: W.I. Roman

Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

1 - Plant Operational Parameters										
No.	**Parameter**	**Units**	**Proposed by GE**	**GE Ref**	**GE Notes**	**Proposed by Customer**	**Cust. Ref.**	**Cust. Notes**	**Resolved for Analysis**	**Resol. Notes**
						condition.				
6	Vessel steam output-Appendix K	Mlbm/hr	Note (1)		1	=1.023*1.B.5	1-4			
7	Core flow (99.0% of 1.A.7)	Mlbm/hr	99.0	Ref. 12		99.0			99.0	
8	Recirculation drive flow-Loop A (99.0% of 1.A.8)	Mlbm/hr	16.335			16.18				
9	Recirculation drive flow-Loop B (99.0% of 1.A.9)	Mlbm/hr	16.335			16.18				
10	Feedwater temperature-Nominal	°F	Note (2)		2	428.2	1-2			
11	Feedwater temperature-Appendix K	°F	Note (2)		2	430.2	1-4			
C.	Alternate Operation Mode Parameters-[FWHOOS/FFWTR] (EPU)									
1	Core thermal power-Nominal	MWt	3952.0	Ref. 4		3952.0	1-2		3952.0	GE Note 23

Report: OPL4/5 eDRF: neDRF 0000-0015-4730, neDRF Section 0000-0015-4734, Rev. 1 RE: W.I. Roman

Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	Core thermal power-Appendix K	MWt or 102% of nominal	4031.0			4031.0	1-4		4031.0	
3	Vessel steam dome pressure-Nominal	psia	1045.0	Ref. 12		1045.0	1-2		1045.0	GE Note 23
4	Vessel steam dome pressure-Appendix K	psia	1060.0	Ref. 13		1060.0	1-2 and 1-4		1060.0	
5	Vessel steam output-Nominal	Mlbm/hr	Note (1)		1	Value to be consistent with Task 100 heat balance model at this condition.				
6	Vessel steam output-Appendix K	Mlbm/hr	Note (1)		1	=1.023*1.C.5	1-4			
7	Core flow	Mlbm/hr	100.0	Ref. 12		100.0			100.0	GE Note 23
8	Recirculation drive flow-Loop A	Mlbm/hr	16.500	Ref. 12		1.A.8 adjusted for reduced void fraction				

Report: OPL4/5 eDRF: neDRF 0000-0015-4730, neDRF Section 0000-0015-4734, Rev. 1 RE: W.I. Roman

Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
9	Recirculation drive flow-Loop B	Mlbm/hr	16.500	Ref. 12		1.A.9 adjusted for reduced void fraction				
10	Feedwater temperature-Nominal (1.A.10 - 50°F)	°F	Note (2)		2, 15	378.2				
11	Feedwater temperature-Appendix K	°F	Note (2)		2	380.2	1-4			
D.	Alternate Operation Mode Parameters-[SLO] (EPU)									
1	Core thermal power-Nominal (58.3% of 1.A.1)	MWt	2853.6	Ref. 7	3	2305		DTE Note 1A		
2	Core thermal power-Appendix K	MWt or 102% of SLO nominal	2910.6			2351.1		DTE Note 1A		
3	Vessel steam dome pressure-Nominal	psia	1045.0	Ref. 12		1045.0	1-2		1045.0	GE Note 23
4	Vessel steam dome pressure-Appendix K	psia	1060.0	Ref. 13		1060.0	1-2 and 1-4		1060.0	

Report: OPL4/5 eDRF: neDRF 0000-0015-4730, neDRF Section 0000-0015-4734, Rev. 1 RE: W.I. Roman

Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
5	Vessel steam output-Nominal	Mlbm/hr	Note (1)		1	Value to be consistent with Task 100 heat balance model at this condition.				
6	Vessel steam output-Appendix K	Mlbm/hr	Note (1)		1	=1.023*1.D.5	1-4			
7	Core flow (48% of 1.A.7)	Mlbm/hr	60.0	Ref. 7	3	DTE Note 1A				
8	Recirculation drive flow-Loop A (48.0% of 1.A.8)	Mlbm/hr	9.900			7.84		DTE Note 1A		
9	Recirculation drive flow-Loop B	Mlbm/hr	0			0		Definition of SLO Mode	0	
10	Feedwater temperature-Nominal	°F	Note (2)		2	Value to be consistent with Task 100 heat balance model at this condition.				

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1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
11	Feedwater temperature-Appendix K	°F	Note (2)		2	=1.D.10+2	1-4			
E.	Alternate Operation Mode Parameters-[ICF] (EPU)									
1	Core thermal power-Nominal	MWt	3952.0	Ref. 4		3952.0	1-2		3952.0	GE Note 23
2	Core thermal power-Appendix K	MWt or 102% of nominal	4031.0			4031.0	1-4		4031.0	GE Note 23
3	Vessel steam dome pressure-Nominal	psia	1045.0	Ref. 12		1045.0	1-2		1045.0	GE Note 23
4	Vessel steam dome pressure-Appendix K	psia	1060.0	Ref. 13		1060.0	1-2 and 1-4		1060.0	GE Note 23
5	Vessel steam output-Nominal	Mlbm/hr	Note (1)		1	Value to be consistent with Task 100 heat balance model at this condition.				
6	Vessel steam output-Appendix K	Mlbm/hr	Note (1)		1	=1.023*1.E.5	1-4			

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1 - Plant Operational Parameters

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
7	Core flow (105.0% of 1.A.7)	Mlbm/hr	110.0	Ref. 2 (A.f)		105.0		DTE Note1B		
8	Recirculation drive flow-Loop A (105.0% of 1.A.8)	Mlbm/hr	18.150			17.160		DTE Note1B		
9	Recirculation drive flow-Loop B (105.0% of 1.A.9)	Mlbm/hr	18.150			17.160		DTE Note1B		
10	Feedwater temperature-Nominal	°F	Note (2)		2	428.2	1-2			
11	Feedwater temperature-Appendix K	°F	Note (2)		2	430.2	1-4			

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2. Emergency Diesel Generators (EDGs)										
No.	**Parameter**	**Units**	**Proposed by GE**	**GE Ref**	**GE Notes**	**Proposed by Customer**	**Cust. Ref.**	**Cust. Notes**	**Resolved for Analysis**	**Resol. Notes**
A.	Initiating signals									
1	Low water level	Level#	1	Ref. 2 (B.1d.ii) & Ref. 8	See 11.B.6	1	DTE Ref. 2-1	DTE Note 2A and OPL 4A Note 11B	1	See 11.B.6
2	High drywell pressure	Yes/No	Yes	Ref. 2 (B.1d.i) & Ref. 8		Yes	DTE Ref. 2-2		Yes	
B.	Delay time to process initiation signal (T_{SPD} on Fig. 1, 2)	seconds	1	Ref. 2 (B.1.g, B.2.g)		1	GE Ref. 2	DTE Note 3B	1	DTE Note 3B
C.	Maximum delay time from EDG start signal until bus is at rated voltage (T_{DG} on Fig. 1, 2)	seconds	13	Ref. 2 (D.a)		25 - LPCI 25 - CS	DTE Ref. 2C		25 - LPCI 25 - CS	DTE Ref 2C

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3. Low Pressure Coolant Injection (LPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Initiating signals									
1	Low water level	Level#	1	Ref. 2 (B.1d.ii) & Ref. 8	See 11.B.6	1	DTE Ref. 2-1	OPL 4A Note 11B	1	See 11.B.6
2	High drywell pressure	Yes/No	Yes	Ref. 2 (B.1d.i) & Ref. 8		Yes	DTE Ref. 3-1		Yes	
3	Low vessel pressure permissive	psig	350	Ref. 2 (B.1.n)		350	GE Ref. 2	DTE Note 3B	350	DTE Note 3B
4	Timer delay for sustained low water level (T_{SLL} on Fig. 1)		Customer to provide			None	DTE Ref. 3-9		None	
B.	Delay time to process initiation signal (T_{SPD} on Fig. 1, 2)	seconds	1	Ref. 2 (B.1.g)		1	GE Ref. 2		1	
C.	Maximum vessel pressure at which pumps can inject flow (pressure associated with T_{CIPH} on Fig. 1)	psid (vessel to drywell)	295	Ref. 2 (B.1.a)		295 psig	DTE Ref. 3-2		295 psig	
D.	Minimum flow delivered to vessel									
1	Vessel pressure at which flow rates listed below are quoted	psid (vessel to drywell)	20	Ref. 2 (B.1.b.i)		20	DTE Ref. 3-3		20	

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3. Low Pressure Coolant Injection (LPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	For one LPCI pump injecting into one recirculation loop	gpm	N/A			N/A			N/A	
3	For two LPCI pumps injecting into one recirculation loop	gpm	22050	Ref. 2 (B.1.b.ii)	4	22050	DTE Ref. 3-3 & 3-4		22050	GE Note 4
4	For three LPCI pumps injecting into one recirculation loop	gpm	26460	Ref. 2 (B.1.b.iii)	5	26460	DTE Ref. 3-3 & 3-4		26460	GE Note 5
5	For four LPCI pumps injecting into one recirculation loop	gpm	27625	Ref. 2 (B.1.b.iv)	6	27625	DTE Ref. 3-3 & 3-4		27625	GE Note 5
6	One LPCI pump into shroud	gpm	N/A			N/A			N/A	
E.	Minimum flow at 0 psid (vessel-to-drywell)									
1	For one LPCI pump injecting into one recirculation loop	gpm	N/A			N/A			N/A	
2	For two LPCI pumps injecting into one recirculation loop	gpm	22752	Ref. 2 (B.1.c.i)		22752	GE Ref. 2	DTE Note 3B & 3D	22752	DTE Notes 3B & 3D
3	For three LPCI pumps injecting into one recirculation loop	gpm	27257	Ref. 2 (B.1.c.ii)		27257	GE Ref. 2	DTE Note 3B & 3D	27257	DTE Notes 3B & 3D

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3. Low Pressure Coolant Injection (LPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
4	For four LPCI pumps injecting into one recirculation loop	gpm	28444	Ref. 2 (B.1.c.iii)		28444	GE Ref. 2	DTE Note 3B & 3D	28444	DTE Notes 3B & 3D
5	One LPCI pump into shroud	gpm	N/A			N/A			N/A	
F.	Maximum delay time from bus at rated voltage until power available for pump start. (T_{CIPA} on Fig. 1)	seconds	0	Ref. 2 (B.1.i)		0	GE Ref. 2		0	
G.	Maximum delay time from pump start until pump is at rated speed (T_{CIPR} on Fig. 1)	seconds	5	Ref. 2 (B.1.k)		5	GE Ref. 2	DTE Note 3B	5	DTE Note 3B
H.	LPCI Injection Valves									
1	Maximum delay time from bus at rated voltage until power available at injection valve (T_{CIPV} on Fig. 1)	seconds	6	Ref. 2 (B.1.j)		6	GE Ref. 2	DTE Note 3B	6	DTE Note 3B
2	Pressure at which injection valve may open (pressure permissive associated with T_{CIPP} on Fig. 1)	psig (vessel)	350	Ref. 2 (B.1.n)		350	GE Ref. 2	DTE Note 3B	350	DTE Note 3B
3	Maximum injection valve stroke time – opening (T_{CIIV} on Fig. 1)	seconds	30	Ref. 2 (B.1.l)		30	DTE Ref. 4-5	DTE Note 3A	30	DTE Note 3B
I.	Recirculation discharge valves									

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3. Low Pressure Coolant Injection (LPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
1	Maximum delay time from bus at rated voltage until power available at discharge valve (T_{CIPV} on Fig. 1)	seconds	6	Ref. 2 (B.1.j)		6	GE Ref. 2	DTE Note 3B	6	DTE Note 3B
2	Pressure at which discharge valve may close (pressure associated with T_{CIPP} on Fig. 1)	psig (vessel)	Any	Ref. 2 (B.1.s)		Any	GE Ref. 2	DTE Note 3B	Any	DTE Note 3B
3	Discharge valve stroke time – closing (T_{DV} on Fig. 1)	seconds	45	Ref. 2 (B.1.r)		45	DTE Ref. 3-6		45	
4	Discharge bypass valve stroke time – closing (not shown on Fig. 1)	seconds	Customer to provide			No Discharge Bypass valve	DTE Ref. 3-7		No Discharge Bypass valve	
J.	Minimum flow bypass (MFB) valve									
1	Normal position of MFB valve at system startup	Open/Closed	Customer to provide			Open	DTE Ref. 3-1 & 3-8		Open	GE Note 20
2	System flow at which MFB valve is signaled to close	gpm	Customer to provide			500	DTE Ref. 3-1		500	GE Note 20
3	MFB valve stroke time	seconds	Customer to provide			20	DTE Ref. 3-1	DTE Note 3C	20	GE Note 20

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3. Low Pressure Coolant Injection (LPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
4	MFB flow rate	gpm	Customer to provide			481 (A/C), 480 (B/D)	DTE Ref. 3-1		481 (A/C), 480 (B/D)	GE Note 20
K.	Minimum detectable break size for Loop Selection Logic	ft^2	0.15	Ref. 2 (D.e)		0.15	GE Ref. 2	DTE Note 3B	0.15	~~GE Note 20~~

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4. Core Spray (CS)/Low Pressure Core Spray (LPCS) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Initiating signals									
1	Low water level	Level#	1	Ref. 2 (B.2.d.ii) & Ref. 8	See 11.B.6	1	DTE Ref. 2-1	OPL 4A Note 11B	1	See 11.B.6
2	High drywell pressure	Yes/No	Yes	Ref. 2 (B.2.d.i) & Ref. 8		Yes	DTE Ref. 4-1		Yes	
3	Low vessel pressure permissive	psig	350	Ref. 2 (B.2.n)		350	GE Ref. 2	DTE Note 3B	350	
4	Timer delay for sustained low water level (T_{SLL} on Fig. 2)	minutes	Customer to provide			None	DTE Ref. 4-1 &4C	DTE Note 4C	None	DTE Note 4C
B.	Delay time to process initiation signal (T_{SPD} on Fig. 2)	seconds	1	Ref. 2 (B.2.g)		1	GE Ref. 2	DTE Note 3B	1	DTE Note 4C
C.	Maximum vessel pressure at which pumps can inject flow (pressure associated with T_{CSPH} on Fig. 2)	psid (vessel to drywell)	280	Ref. 2 (B.2.a)		280	DTE Ref. 4-1		280	
D.	Minimum flow delivered to vessel									
1	Vessel pressure at which flow rates listed below are quoted	psid (vessel to drywell)	100	Ref. 2 (B.2.b.i)		100	DTE Ref. 4-2		100	

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4. Core Spray (CS)/Low Pressure Core Spray (LPCS) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	Minimum flow at vessel pressure	gpm	5625	Ref. 2 (B.2.b.ii)	7	5625	GE Ref. 2	DTE Note 3B	5625	GE Note 7 and DTE Note 3B
E.	Minimum flow at 0 psid (vessel-to-drywell)	gpm	7013	Ref. 2 (B.2.c.i)		7013	GE Ref. 2	DTE Note 4A	7013	DTE Note 4A
F.	Maximum delay time from bus at rated voltage until power available for pump start. (T_{CSPA} on Fig. 2)	seconds	6	Ref. 2 (B.2.i)		6	GE Ref. 2	DTE Note 3B	6	DTE Note 3B
G.	Maximum delay time from pump start until pump is at rated speed (T_{CSPR} on Fig. 2)	seconds	5	Ref. 2 (B.2.k)		5	GE Ref. 2	DTE Note 3B	5	DTE Note 3B
H.	CS/LPCS Injection Valve(s)									
1	Maximum delay time from bus at rated voltage until power available at injection valve (T_{CSPV} on Fig. 2)	seconds	6	Ref. 2 (B.2.j)		6	GE Ref. 2	DTE Note 3B	6	DTE Note 3B
2	Pressure at which injection valve may open (pressure permissive associated with T_{CSPP} on Fig. 2)	psig (vessel)	350	Ref. 2 (B.2.n)		350	GE Ref. 2	DTE Note 3B	350	DTE Note 3B

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4. Core Spray (CS)/Low Pressure Core Spray (LPCS) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
3	Maximum injection valve stroke time – opening (T_{CSIV} on Fig. 2)	seconds	15	Ref. 2 (B.2.I)		15	GE Ref. 2	DTE Note 3B	15	DTE Note 3B
I.	Minimum flow bypass (MFB) valve									
1	Normal position of MFB valve at system startup	Open/Closed	Customer to provide			Open	DTE Ref. 4-1		Open	GE Note 20
2	System flow at which MFB valve is signaled to close	gpm	Customer to provide			320	DTE Ref. 4-1		320	GE Note 20
3	MFB valve stroke time	seconds	Customer to provide			15	DTE Ref. 4-1	DTE Note 4B	15	GE Note 20
4	MFB flow rate	gpm	Customer to provide			N/A	DTE Ref. 4-1	DTE Note 4D	N/A	GE Note 20 and DTE Note 4D

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5. High Pressure Core Spray (HPCS) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Initiating signals		Not Applicable			Not Applicable			Not Applicable	
1	Low water level	Level#	Not Applicable			Not Applicable			Not Applicable	
2	High drywell pressure	Yes/No	Not Applicable			Not Applicable			Not Applicable	
B.	Delay time to process initiation signal (T_{SPD})	seconds	Not Applicable			N/A			Not Applicable	
C.	Maximum vessel pressure at which pumps can inject flow (pressure associated with T_{CSPH})	psid (vessel to drywell)	Not Applicable			Not Applicable			Not Applicable	
D.	Minimum flow delivered to vessel									
1	Vessel pressure at which flow rates listed below are quoted	psid (vessel to drywell)	Not Applicable			Not Applicable			Not Applicable	
2	Minimum flows at vessel pressure	gpm	Not Applicable			Not Applicable			Not Applicable	
E.	Minimum flow at 0 psid (vessel-to-source)	gpm	Not Applicable			Not Applicable			Not Applicable	

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5. High Pressure Core Spray (HPCS) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
F.	Maximum delay time from bus at rated voltage until power available for pump start. (T_{CSPA})	seconds	Not Applicable			Not Applicable			Not Applicable	
G.	Maximum delay time from pump start until pump is at rated speed (T_{CSPR})	seconds	Not Applicable			Not Applicable			Not Applicable	
H.	HPCS Injection Valve									
1	Maximum delay time from bus at rated voltage until power available at injection valve (T_{CSPV})	seconds	Not Applicable			Not Applicable			Not Applicable	
2	Maximum injection valve stroke time – opening (T_{CSIV} on Fig. 2)	seconds	Not Applicable			Not Applicable			Not Applicable	
I.	Minimum flow bypass (MFB) valve									
1	Normal position of MFB valve at system startup	Open/Closed	Not Applicable			Not Applicable			Not Applicable	
2	System flow at which MFB valve is signaled to close	gpm	Not Applicable			Not Applicable			Not Applicable	
3	MFB valve stroke time	seconds	Not Applicable			Not Applicable			Not Applicable	

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5. High Pressure Core Spray (HPCS) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
4	MFB flow rate	gpm	Not Applicable			Not Applicable			Not Applicable	

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6. High Pressure Coolant Injection (HPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Initiating signals									
1	Low water level	Level#	2	Ref. 2 (B.3.e.ii) & Ref. 8	See 11.B.5	2	DTE Ref. 2-1		2	See 11.B.5
2	High drywell pressure	Yes/No	Yes	Ref. 2 (B.3.e.i) & Ref. 8		Yes	DTE Ref. 6-1		Yes	
B.	Delay time to process initiating signal (T_{SPD})	seconds	1	Ref. 2 (B.1.g, B.2.g)		No value	DTE Ref. 6-2	DTE Note 6A	No value	DTE Note 6A
C.	Operating pressure range									
1	Maximum	psia	1135.0	Ref. 2 (B.3.b.i)		1184 psia/ 1169 psig	DTE Ref. 6-3	Response in OPL4A	1135.0	GE Note 22
2	Minimum	psia	165.0	Ref. 2 (B.3.b.ii)		165 psia/ 150 psig		Response in OPL4A	165.0	
D.	Minimum flow over pressure range in Item C	gpm	5000.0	Ref. 2 (B.3.a)		5000			5000.0	

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6. High Pressure Coolant Injection (HPCI) System

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
E.	Maximum allowed delay time from initiating signal to pump at rated flow, injection valve wide open and bypass valve closed	seconds	60.0	Ref. 2 (B.3.f)		60	DTE Ref. 6-2	DTE Note 6A	60.0	DTE Note 6A
F.	Steam flow over operating pressure range							~~DTE Note 6B~~		
1	Maximum	lbm/hr	173500.0	Ref. 14	16	173500		Response in OPL4A	173500	GE Note 16
2	Minimum	lbm/hr	75000.0	Ref. 14	17	75000		Response in OPL4A	75000	GE Note 17
G.	Maximum time delay from initiating signal to start of steam supply valve opening	seconds	Customer to provide			60	DTE Ref. 6-2	DTE Note 6A	60	DTE Note 6A
H.	Steam supply valve opening stroke time	seconds	Customer to provide			60	DTE Ref. 6-2	DTE Note 6A	60	DTE Note 6A
I.	HPCI flow at minimum operating pressure diverted to core spray (BWR 4 1/2 only)	gpm	Not Applicable			N/A			N/A	

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7. Reactor Core Isolation Cooling (RCIC) System (Not needed in ECCS-LOCA Calculations)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Initiating signals									
1	Low water level	Level#				2	DTE Ref. 2-1		2	
B.	Delay time to process initiating signal (T_{SPD})	seconds				no value		See Item G Below	no value	See Item G Below
C.	Operating pressure range									
1	Maximum	psia				1184 psia/ 1169 psig	Response in OPL4A		1184	
2	Minimum	psia				77 psia/ 62 psig	Response in OPL4A		77	
D.	Minimum flow over pressure range in Item C	gpm				600		DTE Note 7A	600	DTE Note 7A
E.	Maximum allowed delay time from initiating signal to pump at rated flow, injection valve wide open and bypass valve closed	seconds				50	Response in OPL4A		50	
F.	Steam flow over operating pressure range	seconds						DTE Note 6B		DTE Note 6B
1	Maximum	lbm/hr				27,800 lb/hr	DTE Ref. 7-1	DTE Note 7B	27,800	DTE Note 7B

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7. Reactor Core Isolation Cooling (RCIC) System (Not needed in ECCS-LOCA Calculations)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	Minimum	lbm/hr				9,300	DTE Ref. 7-1	DTE Note 7B	9,300	DTE Note 7B
G.	Maximum time delay from initiating signal to start of steam supply valve opening	seconds				50	Response in OPL4A		50	
H.	Steam supply valve opening stroke time	seconds				45	DTE Ref. 7-2		45	

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Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

8. Isolation/Emergency Condensers (IC/EC)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Total number of condensers		Not Applicable			Not Applicable			Not Applicable	
B.	Initiating signals									
1	Low water level	Level#	Not Applicable			Not Applicable			Not Applicable	
2	High vessel pressure	Yes/No	Not Applicable			Not Applicable			Not Applicable	
3	Bypass timer delay for sustained low water level or sustained high vessel pressure	seconds	Not Applicable			Not Applicable			Not Applicable	
C.	Delay time to process initiation signal	seconds	Not Applicable			Not Applicable			Not Applicable	
D.	Maximum time to process initiation signal	seconds	Not Applicable			Not Applicable			Not Applicable	
E.	Maximuim operating pressure	psig (vessel)	Not Applicable			Not Applicable			Not Applicable	
F.	Initial operating temperature on shell side of condenser	°F	Not Applicable			Not Applicable			Not Applicable	
G.	Initial water mass on shell side of condenser	gallons	Not Applicable			Not Applicable			Not Applicable	
H.	Surface heat transfer area of condenser	ft^2	Not Applicable			Not Applicable			Not Applicable	

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8. Isolation/Emergency Condensers (IC/EC)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
I.	Elevation difference between recirculation loop suction nozzle to IC condensate return line connection. (BWR/2s only)	ft	Not Applicable			Not Applicable			Not Applicable	
J.	Minimum inner diameter of IC steam line	ft	Not Applicable			Not Applicable			Not Applicable	
K.	Minimum inner diameter of IC condensate return line	ft	Not Applicable			Not Applicable			Not Applicable	
L.	Minimum inner diameter of recirculation suction line	ft	Not Applicable			Not Applicable			Not Applicable	
M.	Elevation difference between condenser and main steam line nozzle	ft	Not Applicable			Not Applicable			Not Applicable	
N.	Elevation of condenser above recirculation loop connection (BWR/2s) or recirculation loop suction nozzle (BWR/3s)	ft	Not Applicable			Not Applicable			Not Applicable	
O.	Overall FL/D									
1	Steam side		Not Applicable			Not Applicable			Not Applicable	
2	Return side		Not Applicable			Not Applicable			Not Applicable	

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Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

8. Isolation/Emergency Condensers (IC/EC)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
P.	Condenser heat transfer coefficients									
1	C1	Btu/sec-ft^2-°F	Not Applicable			Not Applicable			Not Applicable	
2	C2	Btu/sec-ft^2-°F	Not Applicable			Not Applicable			Not Applicable	
3	C3		Not Applicable			Not Applicable			Not Applicable	

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9. Automatic Depressurization System (ADS)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Initiating signals									
1	Low water level	Level#	1	Ref. 2 (B.4.g.i.A) & Ref. 8	See 11.B.6	1	DTE Ref. 2-1	Permissive at L3	1	See 11.B.6
2	High vessel pressure	Yes/No	Yes	Ref. 2 (B.4.g.i.B) & Ref. 8		Yes	DTE Ref. 9-1	DTE Note 9C	Yes	
3	High drywell pressure bypass timer delay for sustained low water level (TBT on Fig. 3)	minutes	8.0	Ref. 2 (B.4.g.ii.A) & Ref. 8		8.0	GE Ref. 2 & 8		8.0	
4	ECCS ready permissive	Yes/No	Yes			Yes	DTE Ref. 9-1		Yes	
B.	Delay time to process initiating signal (TSPD on Fig. 3)	seconds	1	Ref. 2 (B.1.g, B.2.g)		1	GE Ref. 2	DTE Note 3B	1	DTE Note 3B
C.	Total number of relief valves with ADS function		5	Ref. 2 (B.4.a)		5	GE Ref. 2		5	
D.	Total number of relief valves with ADS function assumed in analysis		4	Ref. 2 (B.4.d)		4	GE Ref. 2		4	

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9. Automatic Depressurization System (ADS)

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
E.	Pressure at which flow capacity listed below is quoted	psig (vessel)	1090.0	Ref. 2 (B.4.e)		1190	GE Ref. 2		1190.0	GE Note 21
F.	Minimum flow rate for one valve open at above listed pressure	lbm/hr	3.480E+06	Ref. 2 (B.4.f)		870,000	GE Ref. 2	DTE Note 9A	870,000	DTE Note 9A
G.	ADS timer delay from initiating signal completed to the time valves are opened (T_{ST} on Fig. 3)	seconds	120	Ref. 2 (B.4.h)		120	DTE Ref. 9-1		120	
H.	Valve pressure setpoints									
1	ADS close on vessel pressure	psig	<50.0	Ref. 10		<50.0	DTE Ref. 9-2	DTE Note 9B	<50.0	DTE Note 9B
2	ADS reopen on vessel pressure	psig	>100.0	Ref. 10		>100.0	DTE Ref. 9-2	DTE Note 9B	>100.0	DTE Note 9B
3	ADS reclose on vessel pressure	psig	<50.0	Ref. 10		<50.0	DTE Ref. 9-2	DTE Note 9B	<50.0	DTE Note 9B

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Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

10. In-Vessel Leakage Rates

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	LPCI leakage (principally around jet pump joints)									
1	Leakage flow	gpm	0	3.D.3, 3.D.4, 3.D.5	13			DTE Note 10B	0	GE Note 13
2	Pressure at which leakage flow is defined	psid	20	3.D.1	13	20	3.D.1		20	GE Note 13
B.	CS leakage (principally through vent hole of T-joint)									
1	Leakage flow	gpm	0	4.D.2	14	4.D.2		DTE Note 10B	0	GE Note 14
2	Pressure at which leakage flow is defined (CS/LPCS)	psid	100	4.D.1	14	100	4.D.1		100	GE Note 14
3	Pressure at which leakage flow is defined (HPCS)	psid	Not Applicable			Not Applicable			Not Applicable	
C.	Leakage allowance for shroud cracks									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	

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Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

10. In-Vessel Leakage Rates

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	Core flow at which leakage flow is defined	% of rated	Not Applicable			Not Applicable			Not Applicable	
3	Elevation of core shroud cracks	inches AVZ	Not Applicable			Not Applicable			Not Applicable	
D.	Leakage allowance for access hole cover cracks									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	
2	Core flow at which leakage flow is defined	% of rated	Not Applicable			Not Applicable			Not Applicable	
E.	Leakage allowance for LPCI-related cracks									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	
2	Pressure at which leakage flow is defined	psid	Not Applicable			Not Applicable			Not Applicable	
F.	Leakage allowance for CS header and riser cracks									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	

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10. In-Vessel Leakage Rates

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	Pressure at which leakage flow is defined	psid	Not Applicable			Not Applicable			Not Applicable	
G.	Leakage allowance for internal modifications and shroud repairs									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	
2	Core flow at which leakage flow is defined	% of rated	Not Applicable			Not Applicable			Not Applicable	
3	Elevation of leakage path	inches AVZ	Not Applicable			Not Applicable			Not Applicable	
H.	Leakage allowance for access hole cover repairs									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	
2	Core flow at which leakage flow is defined	% of rated	Not Applicable			Not Applicable			Not Applicable	
I.	Leakage allowance for LPCI-related repairs									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	

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Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

10. In-Vessel Leakage Rates

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
2	Pressure at which leakage flow is defined	psid	Not Applicable			Not Applicable			Not Applicable	
J.	Leakage allowance CS repairs									
1	Leakage flow	gpm	Not Applicable			Not Applicable			Not Applicable	
2	Pressure at which leakage flow is defined	psid	Not Applicable			Not Applicable			Not Applicable	

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Project: Ferm-2 Extended Power Uprate/MELLLA + ECCS-LOCA SAFER/GESTR (T0407) Plant: Fermi-2 Date: August 15, 2003

11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
A.	Normal water level at rated power (indicated level)	inches AVZ	563.5	Ref.2 (D.b)		563.5	DTE Ref. 2-1	DTE Note 11A	563.5	DTE Note 11A
B.	Water level setpoints									
1	Level 8-High Level	inches AVZ	585.31	Ref. 8		588.31		DTE Note 11B Revised	588.31	DTE Note 11B
2	Level 7-High Level Alarm (indicated level)	inches AVZ	Customer to provide			N/A		DTE Note 11B	N/A	DTE Note 11B
3	Level 4-Low Level Alarm (indicated level)	inches AVZ	Customer to provide			N/A		DTE Note 11B	N/A	DTE Note 11B
4	Level 3-Low Level (indicated level)	inches AVZ	515	Ref. 2 (D.c)		515		DTE Note 11L	515	DTE Note 11L
5	Level 2-Low Low Level	inches AVZ	457.5	Ref. 2 (D.d)		457.5		DTE Note 11B	457.5	DTE Note 11B
6	Level 1-Low Low Low Level	inches AVZ	378.51	Ref. 8	9	DTE Note 11B		DTE Note 11B	378.51	DTE Note 11B
C.	Steam dryer pressure drop	psid	Note (18)		18	Concur with Note 18			GE Note 18	GE Note 18

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11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
D.	MSIV isolation-initiation signal									
1	Low water level	Level #	1	Ref. 8		1	DTE Ref. 2-1		1	
2	Low steam line pressure	psig	Customer to provide			736 psig	DTE Ref. 11-6	DTE Note 11K	736	DTE Note 11K
3	High steam line flow	% of rated	Customer to provide			140%	DTE Ref. 11-5		140%	
E.	MSIV signal delay (from initiating event to start of valve motion)	seconds	0.5	AG-0019, Sec. 6, Item # 11.E		0.5	DTE Ref. 11-3		0.5	
F.	MSIV closure time									
1	Minimum closing time	seconds	3	AG-0019, Sec. 6, Item # 11.F		3	DTE Ref. 11-3		3	
2	Maximum closing time	seconds	10	Ref. 2 (D.f)		10	GE Ref.2		10	

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11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
G.	Feedwater pump coastdown (from initial value to zero flow)	seconds	5	AG-0019, Sec. 6, Item # 11.G & Ref. 9	10	5	GE Note 10	DTE Note 11J	5	GE Note 10
H.	Time constant for recirculation pump coastdown	seconds	5	AG-0019, Sec. 6, Item # 11.H & Ref. 9	11	5	DTE Ref. 11-4		5	GE Note 11
I.	Number of pilot-actuated Safety/Relief Valves (SRVs) in group									
1	Group A		5	Ref. 5 (1.4)		5		DTE Note 11C	5	DTE Note 11C
2	Group B		5	Ref. 5 (1.4)		5		DTE Note 11C	5	DTE Note 11C
3	Group C		5	Ref. 5 (1.4)		5		DTE Note 11C	5	DTE Note 11C

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11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
J.	Opening/closing setpoints of pilot-actuated SRVs									
1	Group A	psig	1165 / 1087	Ref. 2 (D.g) / Ref. 11		1135 / 1100.9	11-1 and 11-9			
2	Group B	psig	1175 / 1097	Ref. 2 (D.g) / Ref. 11		1145 / 1110.7	11-1 and 11-9			
3	Group C	psig	1185 / 1107	Ref. 2 (D.g) / Ref. 11		1155 / 1120.4	11-1 and 11-9			
K.	Number of low-low set SRVs in Group									
1	Group A		1	Ref. 5 (1.4)		1	DTE Ref. 11-1	DTE Note 11F	1	DTE Note 11F
2	Group B		1	Ref. 5 (1.4)		1	DTE Ref. 11-1	DTE Note 11F	1	DTE Note 11F
3	Group C		Not Applicable			Not Applicable			Not Applicable	
L.	Opening/closing pressure setpoints of low-low set SRVs									

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11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
1	Group A	psig	1017 / 905	Ref. 2 (D.h)		1017 / 905			1017 / 905	
2	Group B	psig	1047 / 935	Ref. 2 (D.h)		1047 / 935			1047 / 935	
3	Group C	psig								
M.	Low-low set logic		Yes			Yes			Yes	
N.	Pilot-actuated SRV capacity									
1	SRV capacity at (100+ACC)% of popping pressure	lbm/hr	870000	Ref. 5 (1.4)		870000	DTE Ref. 11-1		870000	
2	Popping pressure	psig	1090	Ref. 5 (1.4)		1090	DTE Ref. 11-1		1090	
3	Overpressure Accumulation Factor (ACC)	%	3	Ref. 5 (1.4)		3	DTE Ref. 11-1		3	
O.	Additional Pilot-actuated SRV opening/closing parameters									
1	Time delay before opening of pilot-actuated SRVs	seconds	0.4	Ref. 5 (1.4A) & Ref. 11		0.4	DTE Ref. 11-1		0.4	
2	Time constant of SRV opening/closing	seconds	Customer to provide			0.1 sec	DTE Ref. 11-7	DTE Note 11M	0.1 sec	DTE Note 11M

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11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
P.	Number of Spring Safety Valves (SSVs)									
1	Group A		Not Applicable			Not Applicable			Not Applicable	
2	Group B		Not Applicable			Not Applicable			Not Applicable	
3	Group C		Not Applicable			Not Applicable			Not Applicable	
4	Group D		Not Applicable			Not Applicable			Not Applicable	
Q.	Opening/closing setpoint of SSVs									
1	Group A	psig	Not Applicable			Not Applicable			Not Applicable	
2	Group B	psig	Not Applicable			Not Applicable			Not Applicable	
3	Group C	psig	Not Applicable			Not Applicable			Not Applicable	
4	Group D	psig	Not Applicable			Not Applicable			Not Applicable	
R.	SSV capacity at opening setpoint									
1	Group A	lbm/hr	Not Applicable			Not Applicable			Not Applicable	
2	Group B	lbm/hr	Not Applicable			Not Applicable			Not Applicable	

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11. Miscellaneous Inputs

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes
3	Group C	lbm/hr	Not Applicable			Not Applicable			Not Applicable	
4	Group D	lbm/hr	Not Applicable			Not Applicable			Not Applicable	
S.	ECCS make-up water temperature	°F	120.0	AG-0019, Sec. 6, Item # 11.S & Ref. 9	12	120		DTE Note 11G	120.0	GE Note 12 and DTE Note 11G
T.	Operator action time	seconds	Customer to provide			600	DTE Ref. 11-2		600	
U.	High drywell pressure setpoint	psig	2.0	Ref. 2 (B.1.i)		2		DTE Note 11E	2.0	

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12 - Others

No.	Parameter	Units	Proposed by GE	GE Ref	GE Notes	Proposed by Customer	Cust. Ref.	Cust. Notes	Resolved for Analysis	Resol. Notes

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R1 - GE References

No.	Reference
1	Letter, C.O. Thomas (NRC) to J.F. Quirk (GE), "Acceptance for Referencing of Licensing Topical Report NEDE-23785, Revision 1, Volume III (P), The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident," June 1, 1984.
2	DC-6034, "Significant Input Parameter for SAFER/GESTR LOCA Analysis, OPL-4 Form," June 9, 2000.
3	NEDC-31982P, Fermi-2 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis, July 1991 and E&A No. 1, April 1992.
4	Detroit Edison Fermi-2 Energy Center AEP Project-Specific Project Work Plan, April 2003
5	neDRF 0000-0008-5385, Fermi-2 Cycle 10 Reload Transient Analysis (neDRFSection 0000-0008-5390, Fermi-2 Cycle 10 OPL-3)
6	neDRF 0000-0013-6785, Fermi-2 EPU/MELLLA+ Power/Flow Map (T0201) (neDRFSection 0000-0013-6790, EPU-Draft Report)
7	neDRF J11-03346-09, FERMI 2 R6/C7 RELOAD LIC. - ECCS/LOCA (neFile J11-03346-09 SECTION 5 SH 0001)
8	neDrawing 22A2919AB, NUCLEAR BOILER SYSTEM DES, Rev. 13
9	neDRF 0000-0002-7678, TDP-0106, "SAFER/GESTR-LOCA ECCS ANALYSIS," Rev. 3, February 2003.
10	GENE Engineering Data Bank: BWREDB_PLANT:[KH1.SAFER04.PUP1]ADS.BDK
11	GENE Engineering Data Bank: BWREDB_PLANT:[KH1.SAFER04.PUP1]SAFER04.BDK

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R1 - GE References	
12	neDRF Section 0000-0015-3465, Rev. 1, Project Task Report, "DTE Energy Dermi-2 Energy Center Extended Power Uprate Task T100: Reactor Heat Balance," GE-NE-0000-0015-3466-R1, Rev. 1, July 2003
13	Fermi Tech Spec LCO 3.4.11
14	neDRF 0000-0014-0253, "Fermi 2 EPU/MELLLA+ HPCI System (T0404)," neDRF Section 0000-0014-0255. (Detroit Edison Drawing 6M721-5860, Rev. D, Process Diagram HPCI System.)

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N1 - GE Notes

No.	Note
1	Rated Nominal value to be consistent with Task 100 heat balance parameters at this condition. Appendix-K and off-rated power nominal cases calculated using Task 100 model at the case corresponding power and pressure.
2	Feedwater temperature to be determined consistent with the heat balance calculations at this condition.
3	The SLO power axis scaled based on EPU=100% rated power. The SLO core flow is ~~60%~~ 48% of the rated core flow in Item 1.A.7 (Reference 7).
4	The 2 LPCI pump flow value selected for the analysis is conservative relative to the 2 LPCI pump specification of 25860 gpm. The analytical value includes a leakage flow reduction of 600 gpm and additional flow reduction for conservatism. (Reference 2)
5	The 3 LPCI pump flow value selected for the analysis is conservative relative to the 3 LPCI pump specification of 30000 gpm. The analytical value includes a leakage flow reduction of 600 gpm and additional flow reduction for conservatism. (Reference 2)
6	The 4 LPCI pump is assumed to deliver at least as much as 3 pumps. Therefore, the analytical value selected is conservative relative to the 3 LPCI pump flow obtained after subtracting 600 gpm assumed in LPCI leakages (I.e. 30000 - 600 = 29400). (Reference 2)
7	The core spray one loop flow value selected for the analysis is conservative relative to the one loop flow specification of 6350 gpm. The analytical value includes a leakage flow reduction of 100 gpm and additional flow reduction for conservatism. (Reference 2)
8	Per Reference 8, Level 8=219 in and reference instrument zero = 366.31 in. Therefore, 366.31 in + 219 in =585.31 in above vessel zero.
9	Per Reference 8, Level 1=12.2 in and reference instrument zero = 366.31 in. Therefore, 366.31 in + 12.2 in =378.51 in above vessel zero.
10	The feedwater pumps are assumed to trip at the beginning of the event. The feedwater pumps are conservatively assumed to linearly coast down from the initial value to zero in 5 seconds. The feedwater flow coastdown has little effect on the results for the limiting break because the feedwater is injected into the downcomer where it then flows out the break. The feedwater flow is stopped immediately (no coastdown) for a feedwater line break. (Reference 9, Sec. 5.1.3)

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N1 - GE Notes	
11	The reactor recirculation pumps are assumed to be tripped at the beginning of the event. This assumption results in a rapid decrease in the core flow and results in a conservatively early boiling transition time for the fuel. Unless otherwise specified by the customer, a time constant of 5 seconds is assumed for the pump coastdown in the Short-Term Thermal Hydraulic Model (LAMB) for BWR/4 plants. (Reference 9, Sec. 5.1.3)
12	An ECCS water temperature of 120°F is used for all calculations. This assumption decouples the SAFER/GESTR-LOCA analysis from the containment response. (Reference 9, Sec. 5.1.3)
13	LPCI leakage included in LPCI flows in Items 3.D.3, 3.D.4 and 3.D.5. See also notes 4, 5 and 6. Therefore, no additional leakage will be assumed in the analysis
14	LPCS leakage included in LPCS flows in Item 4.D. See also note 7. Therefore, no additional leakage will be assumed in the analysis
15	A 100°F temperature reduction is assumed per Reference 5, Item 1.1.G
16	Steam flow from HPCI Process Diagram (Ref. 14), "Mode C", Point 9, RPV at high pressure and suppression pool at low pressure.
17	Steam flow from HPCI Process Diagram (Ref. 14), "Mode D", Point 9, RPV at low pressure and suppression pool at low pressure.
18	To be calculated in the analysis.
19	Deleted
20	In the ECCS LOCA analysis, the minimum flow bypass (MFB) valves are assumed to be closed at the time of ECCS injection and the ECCS injection valves fully open. Therefore, the ECCS LOCA analysis does not account for flow through the MFB valves.
21	DTE's proposed response is a typo. DTE's acknowledgement in the following note from P. Tutton (DTE) to W. Roman (GE) (email sent on 8/12/03): "The correct value for OPL4 Item 8.E. is 1090 PSIG, which Item B.4.b of GE Ref. 2, DTE Calculation DC-6-34."
22	The resolved value is consistent with the previous Fermi SAFER/GESTR-LOCA analysis and the previous OPL-4, items B.3.b.I (Reference 2). Per AG-0019, App-20, it is more conservative to use a lower pressure for the "Maximum" pressure parameter in Item 6.c.1. Therefore, a 1135 Psia for the maximum pressure is conservative over the 1189 Psia proposed by DTE.

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N1 - GE Notes	
23	The Fermi Task 100 Final Report has been issued with no changes to the referenced value. Reference 12 has been updated to reflect the Task 100 FTR.

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R2 - Customer References

No.	Reference
1-1	Fermi 2 DTR T0201
1-2	Fermi-2 FTR T0100
1-3	Cycle 10 Startup Test 56.000.02, "Core Flow Calibration", Attachment 4, performed 5/15/03, DTC:VSPERF, DSN:56.000.02.030515
1-4	GNF Technical Design Procedure TDP-0087 Appendix 50
2-1	DTE Drawing 6M721-5538, Rev. L, Nuclear Boiler System Instrument Information Table
2-2	Fermi 2 DBD R30-00 Rev. B, Emergency Diesel Generators, Section 2.0
2-3	Fermi 2 DBD R30-00 Rev. B, Emergency Diesel Generators, Section 4.1.2.2 & Tech Specs B 3.3.5.1
2-4	Fermi 2 Tech Specs B 3.3.5.1
2-5	GE-NE-B13-01920-12: The value for TDG should be 25 sec for CS and 20 sec for LPCI. The current SAFER/GESTR-LOCA analysis uses 25 sec for CS. However, for LPCI, the value of TDG was reduced from 25 sec to 20 sec because the recirc valve discharge valve stroke time was increased from 40 sec to 45 sec. The total response time for CS is 47 sec and for LPCI is 72 sec.
3-1	Fermi 2 DBD E11-00 Rev. A RHR
3-2	T0310 DIR Item 4.1.3
3-3	DTE Drawings 6M721-5857, Rev. 0 Process Diagram RHR and 6M721-5690, Rev. E Process Schedules RHR
3-4	T0310 DIR Item 4.1.5
3-5	T0310 DIR Item 4.1.4
3-5	T0310 DIR Item 4.1.8
3-6	Fermi 2 DBD B31-00, Rev. A, Recirculation System
3-7	P&ID M-2833, Rev. AE Recirculation System
3-8	P&ID M-2083, Rev. BE RHR

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R2 - Customer References	
4-1	Fermi 2 DBD E21-00 Rev. A Core Spray
4-2	Fermi 2 Drawing M-5861, Rev. A Core Spray Process Diagram
4-3	Ferni 2 Drawing No. 6I721-2210-01 Core Spray System Logic Diagram
6-1	Fermi 2 DBD E41-00 Rev. C HPCI
6-2	T0404 DIR Item 4.1.1
6-3	T0404 DIR Item 4.1.3
7-1	Fermi 2 Drawing 6M721-5859, Rev. D RCIC Process Diagram
7-2	Fermi 2 DBD E51-00 Rev. C RCIC Sec 4.2.3.21
9-1	Fermi 2 DBD B-21-04 Rev. B
9-2	GE Specification 22A2919AB Nuclear Boiler System Design Specification Data Sheet, paragraph 4.3.g
11-1	Fermi 2 calculation DC--5134 Rev. F, OPL 3 Cycle 10
11-2	Fermi 2 UFSAR 15.0.3.2.1
11-3	T0400 OPL 4A
11-4	Fermi 2 DBD B31-00, Rev. A
11-5	T0300 DIR
11-6	Fermi 2 Tech Specs
11-7	GE Specification 22A2919AB Nuclear Boiler System Design Specification Data Sheet, paragraph 4.3.e
11-8	AG-0019, Sec. 6, Item # 11.S
11-9	AG-0019, Rev. 0 Page 36
	issue resolved

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N2 - Customer Notes

No.	Note
1A	NEDC-32313P, September 1994; The nominal core thermal power for SLO of 2470 mwth (62.5% of LPU) is not the correct initial power level to be assuming for the EPU SLO LOCA Analysis. 2470 mwth was a conservative initial condition assumption for the original Fermi2 SLO analysis transient analysis (MDE-56-0386), which has since been superseded by SLO analysis NEDC-32313P. Tech Spec 3.4.1 only allows SLO operation up to 67.2% of CLTP (2305 mwth). Therefore, the nominal core thermal power for EPU SLO should be 58.3% of LPU. Also, the 60% core flow assumption for SLO is incorrect. The single operating Recirc pump would have to operate at 100% speed to attain this core flow. The SLO analysis limits the speed of the single operating recirc pump to 75%, which translates to a core flow of approximately 48% of rated on the MELLL.
1B	EPU is being licensed with a maximum core flow of 105% so analysis at 110% is not necessary.
1C	Per Task T0307, Recirc Loop Flow at 100% core flow increases by 0.35 Mlb/hr from CLTP to LPU. Per T0307 Section 3.3.3 Item 1, the BILBO calculated difference in drive flow is used with current operational data to determine the drive flow requirements at LPU conditions. Per Reference 1-3, the Total Rated Drive Flow at the beginning of the current operating cycle was empirically determined to be 31.973 Mlb/hr, or 15.99 Mlb/hr per pump. 15.99+0.35=16.34 Mlb/hr.
2A	OPL 4A Note 11B discusses the use of specific instrument values.
2B	Deleted
2C	LPCI and CS EDG delay times adjusted to 25 seconds for each system. This will recover the 5 seconds reassigned from the EDH delay to recirc valve stroke for LPCI as documented in GE-NE-B13-01920-12. This wiill result in CS total delay time to be 47 seconds amd LPCI total delay time to be 77 seconds.
3A	Total Response time = 30 sec, Maximum valve stroke time = 24 sec.
3B	Per GE Ref. 2, this number is conservative engineering judgment not backed by specific data.

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N2 - Customer Notes	
3C	A specific stroke time is not required for this valve. The GE standard for a gate valve is 12"/minute which would correspond to 20 seconds for a 4 inch valve.
3D	Per DTE Drawings 6M721-5857, Rev. 0 Process Diagram RHR and 6M721-5690, Rev. E Process Schedules RHR, Mode G gives a two pump accident flow of 26,000 gpm
4A	Fermi 2 Drawing M-5861, Rev. A Core Spray Process Diagram gives a Mode "runout' condition which is cited in GE Ref. 2 and a Mode D "Accident System Injection at Rated Core Spray (long term). The Mode D gives a lower flow of 6350 gpm.
4B	A specific stroke time is not required for this valve. The GE standard for a gate valve is 12"/minute which would correspond to 15 seconds for a 3 inch valve.
4C	Per DTE Ref. 4-1 & 4-3 there is a 5 second delay in the start of the Core Spray Pumps to sequence power to the motors. This is not related to reactor pressure vessel level.
4D	The Core Spray System minimum flow valves would be closed during normal high flow core spray injection and therefore would not affect the LOCA model.
6A	Per DTE Ref. 6-1 the system response time is 60 seconds with a 5 second allowance for instrument uncertainty.
6B	The word "seconds" is acknowledged as a typo and is removed, the issue is resolved.
7A	Design flow rate.
7B	The RCIC High and Low Steam Flow values taken from Fermi 2 drawing 6M721-5859, Rev. D, DTE Ref. 7-1. These values correspond to Modes A & B, which are for flow to the RPV with suction from the CST for high reactor pressure and low reactor pressure respectively. There is a lower steam flow of 8,400 lb/hr provided for Mode D, low reactor pressure injection from the suppression pool.
9A	Per GE Ref. 2 - B.4.f, 3.48E6 is the value for four valves open, the value for one valve open is 870,000.
9B	Alternate reference provided to DTE, see DTE Ref. 9-2. Issue resolved.
9C	The GE requested parameter should read "High Drywell Pressure". The error was acknowledged and correction made.
10A	All of the GE references on this sheet should be noted as Ref. 2 and then the subreference.

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N2 - Customer Notes

10B	The GE notes and references do not lead to the 0 leakage value. This issue is resolved by GE's revised notes 13 & 14.
11A	Per Operating Procedure 23.107 the reactor water level is maintained between L4 (599.01 AVZ) and L7 (568.21 AVZ) The GE Proposed Value of 563.5 AVZ is approximately midway between these two points and is therefore acceptable.
11B	This issue has been corrected, the following note is retained for record purposes. "The GE proposed values in 11B are an inconsistent combination of Nominal Trip Set Points (NTSP), Allowable Values (AV) and Anayltical Limits (Alim). The heading of the section calls for "Set Points". The table below provided all of the values for levels 1 through 8 for GE's use. All values are above vessel zero (AVZ). The Alim values come from GE Ref. 2 Sub reference 38 (22A2919AB). The NTSP Values come from Reference 2-1 and the AV values come from various Fermi 2 Instrument Calcs. It is essential that GE assure that the proper value and consistent values are used for this evaluation"

	NTSP	AV	Alim	
Level 8	580.31	585.31	588.31	
Level 7	568.21			Levels 4 and 7 are nominal alarm set points which do not have AV
Level 4	559.01			and Alim values
Level 3	540.01	538.21	535.01	
Level 2	477.41	470.11	457.51	
Level 1	398.11	391.11	378.51	

11C	DTE has no access to Ref.. 5. Per OPL-3, there are 5 SRV's in each of the three subsets corresponding to opening pressures in 11.J 1,2 &3
11D	Ref. 11 has been provided to DTE by GE email on 7/29/03.
11E	The GE references is incorrectly stated, it should be Ref. 2 B.1.d.I. [Corrected by GE. WIR-8/11/2003]
11F	Per DTE Ref. 11-1 there are a total of 2 SRV's with low-low set; it is assumed that this is one from each group as defined in the question.
11G	Per Task T0400 OPL 4A the maximum suppression pool temperature is 95F. Per DTE Ref. 11-8 120F is used as a conservatism.
11H	blank
11J	Use value per GE note. GE note should say that the feedwater flows into the downcomer region, not the downcomers.
11K	This value is the Allowable Value (AV) for CLTP

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N2 - Customer Notes	
11L	This value is the Allowable Limit (Alim) minus 20 inches for conservatism.
11M	Per GE guidance, this value correponds to the response time in DTE Ref. 11-7, 4.3.e, and has been used in previous analyses.
	Issue resolved

SINGLE FAILURE EVALUATION FOR SAFER/GESTR ANALYSIS[1]

The table below shows the various combinations of Automatic Depressurization System (ADS), High Pressure Coolant Injection (HPCI) System, Core Spray (CS) System, and Low Pressure Coolant Injection (LPCI) System which might be operable in an assumed design basis accident situation. In performing the ECCS performance analysis with SAFER/GESTR, GE will assume that no postulated single active component will result in less than certain minimum combinations of systems remaining operable. The utility is requested to verify this assumption. The consequences of all possible single active electrical and mechanical failures an DC power source failures have been considered and have been found to have as a minimum one of the above combinations of systems remaining operable.

The following single, active failures will be considered in the ECCS performance evaluation:

Assumed Failure [1]	Recirculation Line Break Systems Remaining[2]
Division I DC Power Source (Div I Battery)	HPCI, 2 LPCI, 1 LPCS
Division II DC Power Source (Div II Battery)	4 ADS, 2 LPCI, 1 LPCS [3] [4]
LPCI Injection Valve	4 ADS, HPCI, 2 LPCS [3]
Diesel Generator (D/G)	4 ADS, HPCI, 2 LPCI, 1 LPCS [3]
HPCI	4 ADS, 4 LPCI, 2 LPCS [3] [4]
One ADS Valve	4 ADS, 4 LPCI, HPCI, 2 LPCS

Notes for OPL-5

(1) Other postulated failures are not specifically considered because they all result in at least as much ECCS capacity as one of the above assumed failures.

(2) Systems remaining, as identified in this table, are with the concurrent loss of off-site power and are applicable to all non-ECCS line breaks. For a LOCA from an ECCS line break, the systems remaining are those listed, less the ECCS system in which the break is assumed.

(3) The analysis conservatively assumes 4 ADS valves available.

(4) The HPCI failure small break analysis (SBA) case is analyzed with 4 ADS valves available, if SBA PCT > than DBA this case will be reported as a sensitivity study and a case with all ADS valves operable (5 ADS valves) will also be evaluated.

Legend:

ADS= Automatic Depressurization System
LPCI = Low Pressure Coolant Injection System
LPCS = Core Spray (CS)/Low Pressure Core Spray System
HPCI = High Pressure Coolant Injection System