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GENERAL ELECTRIC

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TITLE LOCA Analysis Report for Duane Arnold Energy Center (Lead Plant)

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DATE June 1982

NOTE: Correct all copies of the applicable publication as specified below.

ITEM	REFERENCES (SECTION, PAGE PARAGRAPH, LINE)	INSTRUCTIONS (CORRECTIONS AND ADDITIONS)
01	Page iv	Replace with new page iv.
02	Page A-7	Replace with new page A-7.
03	Page A-19	Replace with new page A-19.
04	Page A-24a	Replace with new page A-24a.
05	Page A-24b	Insert new page A-24b.
		(Change bars in right-hand margin indicate areas where report has been revised.)

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The CHASTE results presented are:

- Peak Cladding Temperature versus time
- Peak Cladding Temperature versus Break Area
- Peak Cladding Temperature and Peak Local Oxidation versus Planar Average Exposure for the most limiting break size
- Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) versus Planar Average Exposure for the most limiting break size
- Rod Perforation Time and Temperature
- Hot Rod Location

A summary of the analytical results is given in Table 3. Table 4 lists the figures provided for this analysis. The MAPLHGR values for each fuel type presently in the DAEC core are presented in Tables 5a through 5h.

A.4.6 Methods

In the following sections, it will be useful to refer to the methods used to analyze DBA, large breaks, and small breaks. For jet-pump reactors, these are defined as follows.

a. DBA Methods. LAMB/SCAT/SAFE/DBA-REFLOOD/CHASTE.
Break size: DBA.

b. Large Break Methods (LBM). LAMB/SCAT/SAFE/ non-DBA REFLOOD/CHASTE,
Break sizes: 1.0 $ft.^2 \leq A < DBA$.

c. Small Break Methods (SBM). SAFE/non-DBA REFLOOD,
Heat transfer coefficients: nucleate boiling prior to core uncovery, 25 Btu/hr-ft^2-^oF after recovery, core spray when appropriate. Peak cladding temperature and peak local oxidation are calculated in non-DBA-REFLOOD.
Break sizes: $A \leq 1.0\ ft^2$.

Table 2

SIGNIFICANT INPUT PARAMETERS TO THE LOSS-OF-COOLANT ACCIDENT ANALYSIS

PLANT PARAMETERS:

Core Thermal Power	1655 MWt, which corresponds to 105% of rated steam flow
Vessel Steam Output	7.16 lbm/h, which corresponds to 105% of rated steam flow
Vessel Steam Dome Pressure	1055 psia
Recirculation Line Break Area for Large Breaks	(DBA) 2.51 ft^2, 1.0 ft^2
Recirculation Line Break Area for Small Breaks	1.0 ft^2, 0.8 ft^2, 0.05 ft^2
Number of Drilled Bundles	200

FUEL PARAMETERS:

	Fuel Type	Fuel Bundle Geometry	Peak Technical Specification Linear Heat Generation Rate (kW/ft)	Design Axial Peaking Factor	Initial Minimum Critical Power Ratio
A.	Initial - Type 2	7x7	18.5	1.5	1.2
B.	Initial - Type 3	7x7	18.5	1.5	1.2
C.	7D230	7x7	18.5	1.5	1.2
D.	8D274L	8x8	13.4	1.4	1.2
E.	8D274H	8x8	13.4	1.4	1.2
F.	P8DPB289	8x8	13.4	1.4	1.2
G.	P8DRB299	8x8	13.4	1.4	1.2
H.	P8DRB284H	8x8	13.4	1.4	1.2

Table 5g

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE

PLANT: Duane Arnold FUEL TYPE: P8DRB299

Average Planar Exposure (MWd/t)	MAPLHGR (kW/ft)	PCT (°F)	Oxidation Fraction
200	10.9	2080	0.023
1000	11.0	2082	0.023
5000	11.5	2114	0.025
10000	12.2	2191	0.031
15000	12.2	2198	0.032
20000	12.1	2199	0.032
25000	11.8	2153	0.027
30000	11.3	2118	0.059
35000	10.9	2048	0.047
40000	10.5	1978	0.037
45000	10.0	1911	0.028

Table 5h

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE

PLANT: Duane Arnold FUEL TYPE: P8DRB284H

Average Planar Exposure (MWd/t)	MAPLHGR (kW/ft)	PCT (°F)	Oxidation Fraction
200	11.2	2119	0.026
1000	11.2	2115	0.026
5000	11.7	2148	0.028
10000	12.0	2177	0.030
15000	12.0	2182	0.030
20000	11.9	2176	0.030
25000	11.3	2098	0.023
30000	10.8	2034	0.044
35000	10.4	1963	0.034
40000	10.0	1894	0.026
45000	9.5	1827	0.018

Table 6

SINGLE-FAILURE EVALUATION

The following table shows the single, active failures considered in the ECCS performance evaluation.

Assumed Failure	Suction Break Systems Remaining
LPCI Injection Valve	All ADS, 2 CS, HPCI
Diesel Generator (D/G)	All ADS, 1 CS, HPCI, 2 LPCI
HPCI	All ADS, 2 CS, 4 LPCI
One ADS Valve	All ADS minus one, 2 CS, HPCI, 4 LPCI

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

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