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November 30, 1979

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Attn: A. Schwencer, Chief
Operating Reactors Branch No. 1
Division of Operating Reactors
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334
Auxiliary Feedwater/Containment Pressure Analysis

Gentlemen:

Enclosed are six (6) copies of the results of an analysis of the response of containment pressure to a steam break accident inside containment with extended auxiliary feedwater flow to the affected steam generator.

This analysis was performed as a result of questions asked by members of your staff during the month of September, 1979.

The results of this analysis indicate that the postulated event will not result in a containment pressure greater than that for which the structure has been designed.

Very truly yours,

C. N. Dunn
C. N. Dunn
Vice President, Operations

Enclosures

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Copies to:
 CGRobertson(enc)
 BFJones(enc)
 WLDrotleff(enc)
 SBJacobs(enc)
 EAWarman(enc)
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 LEMiczek(enc)
 BFDodson(enc)
 JThompson(enc)
 SBurke/job book
 JCarey(enc)

POOR ORIGINAL

Mr. Gilbert W. Moore
 Duquesne Light Company
 435 Sixth Avenue
 Pittsburgh, PA 15219

November 7, 1979

J.O. NO. 13352.03
 DLS- 15169

Dear Sir:

BEAVER VALLEY POWER STATION - UNIT NO. 1
 J.O. NO. 13352.03
AUXILIARY FEEDWATER/CONTAINMENT PRESSURE ANALYSIS

This transmittal completes a Stone & Webster analysis effort relative to the effects of a main steamline break (MSLB) on containment pressure considering unisolated auxiliary feedwater system (AFS) flows for up to thirty (30) minutes after initiation, as requested by the NRC staff in a recent meeting.

At Duquesne's request, S&W attended an NRC meeting on the above subject in Bethesda on 9/21/79. In addition to S&W and Duquesne, VEPCO representatives were in attendance. As a result of the 9/21/79 meeting, S&W has completed analyses that demonstrate the acceptability of the existing BV-1 AFS with respect to a MSLB and the resulting containment pressure transients.

The results of the completed analyses are presented in Attachment 1. These results are similar to the preliminary results telecopied by S&W to the NRC on 10/1/79 and supplemented by additional information concerning analysis parameters on 10/3/79. Both of the telecopied transmittals are included as Attachment 2. The final results (Attachment 1) show a lower peak containment pressure than the preliminary results (Attachment 2). This reduction is due to the elimination of mass and energy blowdown that was added to containment from the two intact steam generators in the preliminary analysis.

Attachment 2 also contains the important assumptions used in the analyses. Attachment 3 presents the more significant plant parameters for BV-1 that might be useful as a basis to judge the applicability of the BV-1 analysis to similar plants. Attachment 4 shows a simplified sketch of the Auxiliary Feedwater system functional arrangement.

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The final results shown in Attachment 1 demonstrate that the containment design pressure (45 psig) is not exceeded by the continued unisolated AFS flow for more than 30 min. assuming that the effluent discharged to the containment is steam. The analysis also demonstrates that for the 4.9 ft² break, the peak pressures are reached as a result of the initial blowdown. For the 1.4 ft² break, the initial peak pressure that occurs a few minutes after the break occurs is considered to be the limiting peak pressure reached for this accident, however the analysis was continued out to 30 minutes at the request of the NRC staff.

The terminations of the pressure transients shown in Attachment² curves result from two different calculational mechanisms. The 4.9 ft² break analysis calculates the decrease in heat sources available (heat transfer coefficient assumed constant) until AFS temperature is reached. This results in an abrupt decrease of steam flow to the containment. The 1.4 ft² break analysis assumed AFS isolation at 30 min. also resulting in an abrupt decrease in steam flow to the containment.

It should be emphasized that containment pressures predicted at 30 min. are unrealistically high for the 1.4 ft² break since it was assumed that the available energy in the primary system remains nearly constant with time. Therefore, the steam flow to the containment equivalent to the AFS flow rate to the affected steam generator results in more steam being generated than the system can provide results in more steam being generated than the system can provide over a 30 min. time period. Based on the analysis evaluation, isolation of the auxiliary feedwater system is not necessary in order to preclude containment overpressurization.

S&W requests DLC approval to forward Attachment 3 to VEPCO for use as part of their activities related to this same concern for the Surry plants. A comparison of EV-1 and Surry 1 & 2 parameters was requested by NRC at the 9/21/79 meeting attended by Duquesne and VEPCO.

Following telephone conversation with Mr. J. Carey of Duquesne Light Co., S&W has re-evaluated the unisolated feedwater piping volume and the feedwater control valve closure time used in the preliminary analysis and the appropriateness of both parameters to Beaver Valley Unit 1. S&W utilized a feedwater control valve closure time corresponding to greater than the average of the Beaver Valley 1 test results. However, main feed flows consistent with a depressurized steam generator were assumed. Thus, the mass of main feedwater entering the affected generator has been enveloped in the analysis.

If you have any questions, do not hesitate to call us.

Very truly yours,

R-M. Stark
R.M. Stark

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Summary of Final Results of Beaver Valley 1 Containment Pressure Analyses

S.G. Blowdown Data	Steamline Break (ft ²)	Reactor Power (%)	Initial Peak Pressure (PSIG)	Time of Initial Peak (sec.)	Pressure @ 1800 sec (PSIG)
Westinghouse	1.4	102 (1)	28.4	330	35.3
		30 (1)	34.3	650	38.9
		0 (1)	--	--	41.1
S&W - LOCTIC	4.9	102 (1)	29.9	70	16.2
		30 (1)	36.0	75	18.9
		0 (1)	36.2	72.5	20.3
		0 (2)	38.2	73.5	16.3

(1) Initial Conditions - 10.4 PSIA, Service Water T = 86°F, T_c = 105° (SAT)

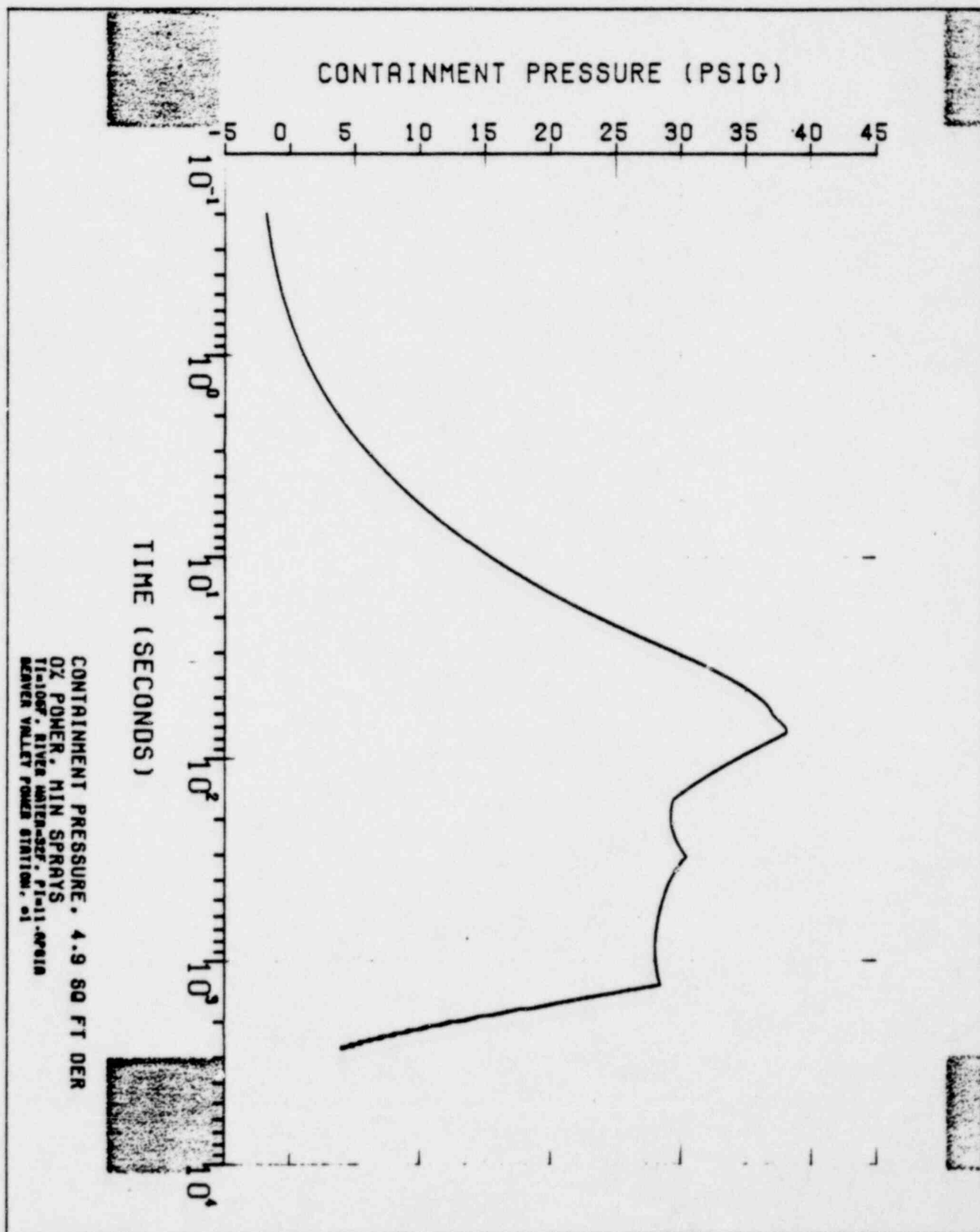
(2) Initial Conditions - 11.0 PSIA, Service Water T = 32°F, T_c = 105° (SAT)

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REFLO 29 OCT 1979 16:24:37
LOAD MODULE CREATED 78.191 14:01:48REFLO REV00.1LEV0
INU-140R244.7060 FILL DER, 0 PCT POWER, MINESF, DRY STEAM, BUPS1, REFLO RUN 2447060
5 & H ENGR CORP HSLB RELEASE COMPUTATION PROGRAM

POOR ORIGINAL

FORWARD FLOW				REVERSE FLOW				TOTAL FLOW			
TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)
0.0	0.2966E+04	0.3536E+07	0.0	0.5509E+04	0.4560E+07	0.0	0.8475E+04	0.1010E+08	0.0	0.8475E+04	0.1010E+08
0.0	0.2966E+04	0.3536E+07	0.0	0.5509E+04	0.4560E+07	0.0	0.8475E+04	0.1010E+08	0.0	0.8475E+04	0.1010E+08
0.0	0.2966E+04	0.3536E+07	0.0	0.5509E+04	0.4560E+07	0.0	0.8475E+04	0.1010E+08	0.0	0.8475E+04	0.1010E+08
0.8202	0.2789E+04	0.3335E+07	0.8202	0.0	0.0	0.8202	0.2789E+04	0.3335E+07	0.8202	0.2789E+04	0.3335E+07
1.0000	0.2750E+04	0.3291E+07	0.0	0.0	0.0	1.0000	0.2750E+04	0.3291E+07	1.0000	0.2750E+04	0.3291E+07
2.0000	0.2391E+04	0.2869E+07	0.0	0.0	0.0	2.0000	0.2391E+04	0.2869E+07	2.0000	0.2391E+04	0.2869E+07
3.0000	0.2114E+04	0.2541E+07	0.0	0.0	0.0	3.0000	0.2114E+04	0.2541E+07	3.0000	0.2114E+04	0.2541E+07
4.0000	0.1850E+04	0.2275E+07	0.0	0.0	0.0	4.0000	0.1850E+04	0.2275E+07	4.0000	0.1850E+04	0.2275E+07
5.0000	0.1705E+04	0.2053E+07	0.0	0.0	0.0	5.0000	0.1705E+04	0.2053E+07	5.0000	0.1705E+04	0.2053E+07
6.0000	0.1551E+04	0.1868E+07	0.0	0.0	0.0	6.0000	0.1551E+04	0.1868E+07	6.0000	0.1551E+04	0.1868E+07
7.0000	0.1421E+04	0.1712E+07	0.0	0.0	0.0	7.0000	0.1421E+04	0.1712E+07	7.0000	0.1421E+04	0.1712E+07
8.0000	0.1311E+04	0.1580E+07	0.0	0.0	0.0	8.0000	0.1311E+04	0.1580E+07	8.0000	0.1311E+04	0.1580E+07
9.0000	0.1218E+04	0.1467E+07	0.0	0.0	0.0	9.0000	0.1218E+04	0.1467E+07	9.0000	0.1218E+04	0.1467E+07
10.0000	0.1137E+04	0.1370E+07	0.0	0.0	0.0	10.0000	0.1137E+04	0.1370E+07	10.0000	0.1137E+04	0.1370E+07
11.0000	0.1067E+04	0.1285E+07	0.0	0.0	0.0	11.0000	0.1067E+04	0.1285E+07	11.0000	0.1067E+04	0.1285E+07
12.0000	0.1036E+04	0.1247E+07	0.0	0.0	0.0	12.0000	0.1036E+04	0.1247E+07	12.0000	0.1036E+04	0.1247E+07
13.0000	0.1033E+04	0.1244E+07	0.0	0.0	0.0	13.0000	0.1033E+04	0.1244E+07	13.0000	0.1033E+04	0.1244E+07
14.0000	0.1020E+04	0.1230E+07	0.0	0.0	0.0	14.0000	0.1020E+04	0.1230E+07	14.0000	0.1020E+04	0.1230E+07
15.0000	0.1020E+04	0.1229E+07	0.0	0.0	0.0	15.0000	0.1020E+04	0.1229E+07	15.0000	0.1020E+04	0.1229E+07
17.5000	0.9934E+03	0.1196E+07	0.0	0.0	0.0	17.5000	0.9934E+03	0.1196E+07	17.5000	0.9934E+03	0.1196E+07
20.0000	0.9502E+03	0.1153E+07	0.0	0.0	0.0	20.0000	0.9502E+03	0.1153E+07	20.0000	0.9502E+03	0.1153E+07
22.5000	0.9197E+03	0.1107E+07	0.0	0.0	0.0	22.5000	0.9197E+03	0.1107E+07	22.5000	0.9197E+03	0.1107E+07
25.0000	0.8029E+03	0.1062E+07	0.0	0.0	0.0	25.0000	0.8029E+03	0.1062E+07	25.0000	0.8029E+03	0.1062E+07
27.5000	0.8497E+03	0.1022E+07	0.0	0.0	0.0	27.5000	0.8497E+03	0.1022E+07	27.5000	0.8497E+03	0.1022E+07
30.0000	0.8197E+03	0.9856E+06	0.0	0.0	0.0	30.0000	0.8197E+03	0.9856E+06	30.0000	0.8197E+03	0.9856E+06
35.0000	0.7681E+03	0.9231E+06	0.0	0.0	0.0	35.0000	0.7681E+03	0.9231E+06	35.0000	0.7681E+03	0.9231E+06
40.0000	0.7265E+03	0.8727E+06	0.0	0.0	0.0	40.0000	0.7265E+03	0.8727E+06	40.0000	0.7265E+03	0.8727E+06
45.0000	0.6935E+03	0.8327E+06	0.0	0.0	0.0	45.0000	0.6935E+03	0.8327E+06	45.0000	0.6935E+03	0.8327E+06
50.0000	0.6671E+03	0.8006E+06	0.0	0.0	0.0	50.0000	0.6671E+03	0.8006E+06	50.0000	0.6671E+03	0.8006E+06
60.0000	0.6206E+03	0.7540E+06	0.0	0.0	0.0	60.0000	0.6206E+03	0.7540E+06	60.0000	0.6206E+03	0.7540E+06
70.0000	0.6000E+03	0.7193E+06	0.0	0.0	0.0	70.0000	0.6000E+03	0.7193E+06	70.0000	0.6000E+03	0.7193E+06
80.0000	0.5747E+03	0.6886E+06	0.0	0.0	0.0	80.0000	0.5747E+03	0.6886E+06	80.0000	0.5747E+03	0.6886E+06
90.0000	0.5517E+03	0.6608E+06	0.0	0.0	0.0	90.0000	0.5517E+03	0.6608E+06	90.0000	0.5517E+03	0.6608E+06
100.0000	0.5303E+03	0.6348E+06	0.0	0.0	0.0	100.0000	0.5303E+03	0.6348E+06	100.0000	0.5303E+03	0.6348E+06
120.0000	0.4927E+03	0.5892E+06	0.0	0.0	0.0	120.0000	0.4927E+03	0.5892E+06	120.0000	0.4927E+03	0.5892E+06
140.0000	0.4504E+03	0.5477E+06	0.0	0.0	0.0	140.0000	0.4504E+03	0.5477E+06	140.0000	0.4504E+03	0.5477E+06
160.0000	0.4270E+03	0.5097E+06	0.0	0.0	0.0	160.0000	0.4270E+03	0.5097E+06	160.0000	0.4270E+03	0.5097E+06
180.0000	0.3901E+03	0.4747E+06	0.0	0.0	0.0	180.0000	0.3901E+03	0.4747E+06	180.0000	0.3901E+03	0.4747E+06
200.0000	0.3710E+03	0.4419E+06	0.0	0.0	0.0	200.0000	0.3710E+03	0.4419E+06	200.0000	0.3710E+03	0.4419E+06
250.0000	0.3124E+03	0.3712E+06	0.0	0.0	0.0	250.0000	0.3124E+03	0.3712E+06	250.0000	0.3124E+03	0.3712E+06
300.0000	0.2672E+03	0.3168E+06	0.0	0.0	0.0	300.0000	0.2672E+03	0.3168E+06	300.0000	0.2672E+03	0.3168E+06
1801.8494	0.2672E+03	0.3163E+06	0.0	0.0	0.0	1801.8494	0.2672E+03	0.3163E+06	1801.8494	0.2672E+03	0.3163E+06
1801.8591	0.0	0.0	0.0	0.0	0.0	1801.8591	0.0	0.0	1801.8591	0.0	0.0
10000.0000	0.0	0.0	0.0	0.0	0.0	10000.0000	0.0	0.0	10000.0000	0.0	0.0

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FORWARD FLOW				REVERSE FLOW				TOTAL FLOW			
TIME (SEC)	FLOW (LBH/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBH/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBH/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBH/SEC)	ENERGY (BTU/SEC)
0.0	0.2691E+04	0.3217E+07	0.0	0.4997E+04	0.5974E+07	0.0	0.7689E+04	0.9191E+07	0.0	0.7689E+04	0.9191E+07
0.0	0.2691E+04	0.3217E+07	0.0	0.4997E+04	0.5974E+07	0.0	0.7689E+04	0.9191E+07	0.0	0.7689E+04	0.9191E+07
0.0	0.2691E+04	0.3217E+07	0.0	0.4997E+04	0.5974E+07	0.0	0.7689E+04	0.9191E+07	0.0	0.7689E+04	0.9191E+07
0.8153	0.2571E+04	0.3080E+07	0.8153	0.0	0.0	0.8153	0.2571E+04	0.3080E+07	0.8153	0.2571E+04	0.3080E+07
1.0000	0.2544E+04	0.3040E+07	0.0	0.0	0.0	0.0	0.2544E+04	0.3040E+07	1.0000	0.2544E+04	0.3040E+07
2.0000	0.2308E+04	0.2770E+07	0.0	0.0	0.0	0.0	0.2308E+04	0.2770E+07	2.0000	0.2308E+04	0.2770E+07
3.0000	0.2117E+04	0.2544E+07	0.0	0.0	0.0	0.0	0.2117E+04	0.2544E+07	3.0000	0.2117E+04	0.2544E+07
4.0000	0.1961E+04	0.2358E+07	0.0	0.0	0.0	0.0	0.1961E+04	0.2358E+07	4.0000	0.1961E+04	0.2358E+07
5.0000	0.1830E+04	0.2202E+07	0.0	0.0	0.0	0.0	0.1830E+04	0.2202E+07	5.0000	0.1830E+04	0.2202E+07
6.0000	0.1726E+04	0.2077E+07	0.0	0.0	0.0	0.0	0.1726E+04	0.2077E+07	6.0000	0.1726E+04	0.2077E+07
7.0000	0.1641E+04	0.1976E+07	0.0	0.0	0.0	0.0	0.1641E+04	0.1976E+07	7.0000	0.1641E+04	0.1976E+07
8.0000	0.1560E+04	0.1886E+07	0.0	0.0	0.0	0.0	0.1560E+04	0.1886E+07	8.0000	0.1560E+04	0.1886E+07
9.0000	0.1503E+04	0.1811E+07	0.0	0.0	0.0	0.0	0.1503E+04	0.1811E+07	9.0000	0.1503E+04	0.1811E+07
10.0000	0.1445E+04	0.1741E+07	0.0	0.0	0.0	0.0	0.1445E+04	0.1741E+07	10.0000	0.1445E+04	0.1741E+07
11.0000	0.1393E+04	0.1670E+07	0.0	0.0	0.0	0.0	0.1393E+04	0.1670E+07	11.0000	0.1393E+04	0.1670E+07
12.0000	0.1350E+04	0.1637E+07	0.0	0.0	0.0	0.0	0.1350E+04	0.1637E+07	12.0000	0.1350E+04	0.1637E+07
13.0000	0.1337E+04	0.1610E+07	0.0	0.0	0.0	0.0	0.1337E+04	0.1610E+07	13.0000	0.1337E+04	0.1610E+07
14.0000	0.1314E+04	0.1583E+07	0.0	0.0	0.0	0.0	0.1314E+04	0.1583E+07	14.0000	0.1314E+04	0.1583E+07
15.0000	0.1290E+04	0.1554E+07	0.0	0.0	0.0	0.0	0.1290E+04	0.1554E+07	15.0000	0.1290E+04	0.1554E+07
17.5000	0.1220E+04	0.1480E+07	0.0	0.0	0.0	0.0	0.1220E+04	0.1480E+07	17.5000	0.1220E+04	0.1480E+07
20.0000	0.1167E+04	0.1405E+07	0.0	0.0	0.0	0.0	0.1167E+04	0.1405E+07	20.0000	0.1167E+04	0.1405E+07
22.5000	0.1108E+04	0.1334E+07	0.0	0.0	0.0	0.0	0.1108E+04	0.1334E+07	22.5000	0.1108E+04	0.1334E+07
25.0000	0.1054E+04	0.1269E+07	0.0	0.0	0.0	0.0	0.1054E+04	0.1269E+07	25.0000	0.1054E+04	0.1269E+07
27.5000	0.1005E+04	0.1210E+07	0.0	0.0	0.0	0.0	0.1005E+04	0.1210E+07	27.5000	0.1005E+04	0.1210E+07
30.0000	0.9619E+03	0.1150E+07	0.0	0.0	0.0	0.0	0.9619E+03	0.1150E+07	30.0000	0.9619E+03	0.1150E+07
35.0000	0.8896E+03	0.1070E+07	0.0	0.0	0.0	0.0	0.8896E+03	0.1070E+07	35.0000	0.8896E+03	0.1070E+07
40.0000	0.8334E+03	0.1002E+07	0.0	0.0	0.0	0.0	0.8334E+03	0.1002E+07	40.0000	0.8334E+03	0.1002E+07
45.0000	0.7900E+03	0.9495E+06	0.0	0.0	0.0	0.0	0.7900E+03	0.9495E+06	45.0000	0.7900E+03	0.9495E+06
50.0000	0.7561E+03	0.9005E+06	0.0	0.0	0.0	0.0	0.7561E+03	0.9005E+06	50.0000	0.7561E+03	0.9005E+06
60.0000	0.7082E+03	0.8505E+06	0.0	0.0	0.0	0.0	0.7082E+03	0.8505E+06	60.0000	0.7082E+03	0.8505E+06
70.0000	0.6757E+03	0.8111E+06	0.0	0.0	0.0	0.0	0.6757E+03	0.8111E+06	70.0000	0.6757E+03	0.8111E+06
80.0000	0.6486E+03	0.7783E+06	0.0	0.0	0.0	0.0	0.6486E+03	0.7783E+06	80.0000	0.6486E+03	0.7783E+06
90.0000	0.6243E+03	0.7480E+06	0.0	0.0	0.0	0.0	0.6243E+03	0.7480E+06	90.0000	0.6243E+03	0.7480E+06
100.0000	0.6019E+03	0.7216E+06	0.0	0.0	0.0	0.0	0.6019E+03	0.7216E+06	100.0000	0.6019E+03	0.7216E+06
120.0000	0.5626E+03	0.6739E+06	0.0	0.0	0.0	0.0	0.5626E+03	0.6739E+06	120.0000	0.5626E+03	0.6739E+06
140.0000	0.5263E+03	0.6300E+06	0.0	0.0	0.0	0.0	0.5263E+03	0.6300E+06	140.0000	0.5263E+03	0.6300E+06
160.0000	0.4942E+03	0.5911E+06	0.0	0.0	0.0	0.0	0.4942E+03	0.5911E+06	160.0000	0.4942E+03	0.5911E+06
180.0000	0.4655E+03	0.5564E+06	0.0	0.0	0.0	0.0	0.4655E+03	0.5564E+06	180.0000	0.4655E+03	0.5564E+06
200.0000	0.4404E+03	0.5259E+06	0.0	0.0	0.0	0.0	0.4404E+03	0.5259E+06	200.0000	0.4404E+03	0.5259E+06
250.0000	0.3901E+03	0.4651E+06	0.0	0.0	0.0	0.0	0.3901E+03	0.4651E+06	250.0000	0.3901E+03	0.4651E+06
300.0000	0.3512E+03	0.4181E+06	0.0	0.0	0.0	0.0	0.3512E+03	0.4181E+06	300.0000	0.3512E+03	0.4181E+06
654.9066	0.3512E+03	0.4181E+06	0.0	0.0	0.0	0.0	0.3512E+03	0.4181E+06	654.9066	0.3512E+03	0.4181E+06
654.9963	0.2191E+03	0.2640E+06	0.0	0.0	0.0	0.0	0.2191E+03	0.2640E+06	654.9963	0.2191E+03	0.2640E+06
1800.0000	0.2191E+03	0.2640E+06	0.0	0.0	0.0	0.0	0.2191E+03	0.2640E+06	1800.0000	0.2191E+03	0.2640E+06
1800.0098	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1800.0098	0.0	0.0
10000.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10000.0000	0.0	0.0

14971.531

POOR ORIGINAL

FORWARD FLOW

TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBM/SEC)	ENERGY (BTU/SEC)
0.0	0.2256E+04	0.2706E+07	0.0	0.4191E+04	0.5029E+07	0.0	0.6447E+04	0.7735E+07	0.0	0.2167E+04	0.2603E+07
0.0	0.2256E+04	0.2706E+07	0.0	0.4191E+04	0.5029E+07	0.0	0.6447E+04	0.7735E+07	0.0	0.2167E+04	0.2603E+07
0.0	0.2256E+04	0.2706E+07	0.0	0.4191E+04	0.5029E+07	0.0	0.6447E+04	0.7735E+07	0.0	0.2167E+04	0.2603E+07
0.8072	0.2167E+04	0.2603E+07	0.8072	0.0	0.0	0.0	0.6447E+04	0.7735E+07	0.0	0.2167E+04	0.2603E+07
1.0000	0.2146E+04	0.2578E+07	0.0	0.0	0.0	0.0	0.2167E+04	0.2603E+07	0.8072	0.2167E+04	0.2603E+07
2.0000	0.1978E+04	0.2378E+07	0.0	0.0	0.0	0.0	0.2146E+04	0.2578E+07	1.0000	0.2146E+04	0.2578E+07
3.0000	0.1846E+04	0.2222E+07	0.0	0.0	0.0	0.0	0.1978E+04	0.2378E+07	2.0000	0.1978E+04	0.2378E+07
4.0000	0.1742E+04	0.2097E+07	0.0	0.0	0.0	0.0	0.1846E+04	0.2222E+07	3.0000	0.1846E+04	0.2222E+07
5.0000	0.1657E+04	0.1995E+07	0.0	0.0	0.0	0.0	0.1742E+04	0.2097E+07	4.0000	0.1742E+04	0.2097E+07
6.0000	0.1640E+04	0.1975E+07	0.0	0.0	0.0	0.0	0.1657E+04	0.1995E+07	5.0000	0.1657E+04	0.1995E+07
7.0000	0.1622E+04	0.1953E+07	0.0	0.0	0.0	0.0	0.1640E+04	0.1975E+07	6.0000	0.1640E+04	0.1975E+07
8.0000	0.1602E+04	0.1929E+07	0.0	0.0	0.0	0.0	0.1622E+04	0.1953E+07	7.0000	0.1622E+04	0.1953E+07
9.0000	0.1579E+04	0.1902E+07	0.0	0.0	0.0	0.0	0.1602E+04	0.1929E+07	8.0000	0.1602E+04	0.1929E+07
10.0000	0.1553E+04	0.1871E+07	0.0	0.0	0.0	0.0	0.1579E+04	0.1902E+07	9.0000	0.1579E+04	0.1902E+07
11.0000	0.1524E+04	0.1836E+07	0.0	0.0	0.0	0.0	0.1553E+04	0.1871E+07	10.0000	0.1553E+04	0.1871E+07
12.0000	0.1500E+04	0.1806E+07	0.0	0.0	0.0	0.0	0.1524E+04	0.1836E+07	11.0000	0.1524E+04	0.1836E+07
13.0000	0.1472E+04	0.1773E+07	0.0	0.0	0.0	0.0	0.1500E+04	0.1806E+07	12.0000	0.1500E+04	0.1806E+07
14.0000	0.1442E+04	0.1699E+07	0.0	0.0	0.0	0.0	0.1472E+04	0.1773E+07	13.0000	0.1472E+04	0.1773E+07
15.0000	0.1410E+04	0.1606E+07	0.0	0.0	0.0	0.0	0.1442E+04	0.1737E+07	14.0000	0.1442E+04	0.1737E+07
17.5000	0.1333E+04	0.1510E+07	0.0	0.0	0.0	0.0	0.1410E+04	0.1699E+07	15.0000	0.1410E+04	0.1699E+07
20.0000	0.1260E+04	0.1430E+07	0.0	0.0	0.0	0.0	0.1333E+04	0.1606E+07	17.5000	0.1333E+04	0.1606E+07
22.5000	0.1194E+04	0.1367E+07	0.0	0.0	0.0	0.0	0.1260E+04	0.1510E+07	20.0000	0.1260E+04	0.1510E+07
25.0000	0.1135E+04	0.1303E+07	0.0	0.0	0.0	0.0	0.1194E+04	0.1430E+07	22.5000	0.1194E+04	0.1430E+07
27.5000	0.1082E+04	0.1248E+07	0.0	0.0	0.0	0.0	0.1135E+04	0.1367E+07	25.0000	0.1135E+04	0.1367E+07
30.0000	0.1036E+04	0.1185E+07	0.0	0.0	0.0	0.0	0.1082E+04	0.1303E+07	27.5000	0.1082E+04	0.1303E+07
35.0000	0.9017E+03	0.1030E+07	0.0	0.0	0.0	0.0	0.1036E+04	0.1248E+07	30.0000	0.1036E+04	0.1248E+07
40.0000	0.8534E+03	0.9975E+06	0.0	0.0	0.0	0.0	0.9017E+03	0.1185E+07	35.0000	0.9017E+03	0.1185E+07
45.0000	0.8212E+03	0.9273E+06	0.0	0.0	0.0	0.0	0.8534E+03	0.1030E+07	40.0000	0.8534E+03	0.1030E+07
50.0000	0.7716E+03	0.8599E+06	0.0	0.0	0.0	0.0	0.8212E+03	0.9975E+06	45.0000	0.8212E+03	0.9975E+06
60.0000	0.7395E+03	0.8054E+06	0.0	0.0	0.0	0.0	0.7716E+03	0.9273E+06	50.0000	0.7716E+03	0.9273E+06
70.0000	0.7159E+03	0.7716E+06	0.0	0.0	0.0	0.0	0.7395E+03	0.8599E+06	60.0000	0.7395E+03	0.8599E+06
80.0000	0.6942E+03	0.6727E+06	0.0	0.0	0.0	0.0	0.7159E+03	0.8054E+06	70.0000	0.7159E+03	0.8054E+06
90.0000	0.6727E+03	0.6075E+06	0.0	0.0	0.0	0.0	0.6942E+03	0.7716E+06	80.0000	0.6942E+03	0.7716E+06
100.0000	0.6330E+03	0.5974E+06	0.0	0.0	0.0	0.0	0.6727E+03	0.6727E+06	90.0000	0.6727E+03	0.6727E+06
120.0000	0.5974E+03	0.5716E+06	0.0	0.0	0.0	0.0	0.6330E+03	0.6075E+06	100.0000	0.6330E+03	0.6075E+06
140.0000	0.5663E+03	0.5576E+06	0.0	0.0	0.0	0.0	0.5974E+03	0.5974E+06	120.0000	0.5974E+03	0.5974E+06
160.0000	0.5391E+03	0.5264E+06	0.0	0.0	0.0	0.0	0.5663E+03	0.5576E+06	140.0000	0.5663E+03	0.5576E+06
180.0000	0.5154E+03	0.5154E+06	0.0	0.0	0.0	0.0	0.5391E+03	0.5391E+06	160.0000	0.5391E+03	0.5391E+06
200.0000	0.4666E+03	0.4666E+06	0.0	0.0	0.0	0.0	0.5154E+03	0.5154E+06	180.0000	0.5154E+03	0.5154E+06
250.0000	0.4666E+03	0.5576E+06	0.0	0.0	0.0	0.0	0.4666E+03	0.4666E+06	200.0000	0.4666E+03	0.4666E+06
283.2390	0.4666E+03	0.5576E+06	0.0	0.0	0.0	0.0	0.4666E+03	0.5576E+06	250.0000	0.4666E+03	0.5576E+06
288.2488	0.2191E+03	0.2640E+06	0.0	0.0	0.0	0.0	0.4666E+03	0.5576E+06	283.2390	0.4666E+03	0.5576E+06
1800.0000	0.2191E+03	0.2640E+06	0.0	0.0	0.0	0.0	0.2191E+03	0.2640E+06	288.2488	0.2191E+03	0.2640E+06
1800.0099	0.0	0.0	0.0	0.0	0.0	0.0	1800.0000	0.2640E+06	1800.0000	0.2191E+03	0.2640E+06
10000.0000	0.0	0.0	0.0	0.0	0.0	0.0	1800.0099	0.0	1800.0099	0.0	0.0
			10000.0000				10000.0000	0.0	10000.0000		0.0

REVERSE FLOW

TOTAL FLOW

1497 332

NOTES OF TELEPHONE CONVERSATION

Date of Call: October 1, 1979

J.O.No. 13352.03

Subject: BV-1 MAIN STEAM BREAK ANALYSIS

Participants:

Duquesne Light Company -

Gil Moore
Clifford Dunn
Jack Carey

Nuclear Regulatory Commission -

David Wiggenton
Janice Kerrigan
Elinor Adensam
David Shum

Stone & Webster Engineering Corp. -

W. C. Drotleff
E. A. Warman
R. M. Stark
C. E. Ader
F. A. Elia, Jr.
E. A. Thomas
B. F. Jones

As requested by the NRC at their meeting, September 21, 1979, DLC and S&W reported the status of the BV-1 main steam line break (in the containment) analysis.

Assumptions used in the analysis and the preliminary results of the BV-1 analysis are attached.

Calculated auxiliary feedwater pump run-out flow for the broken loop is approximately 1600 gpm, for the two intact loops is approximately 200 gpm each, 900 gpm coming from the turbine driven pump and 550 gpm coming from each motor driven pump. A containment backpressure of 20 psig was included in the broken loop system resistance. In response to the NRC's question regarding the change in auxiliary feedwater pump-runout flow, S&W stated that 2800 gpm was based on pump characteristics, whereas the 2000 gpm was based on a more detailed analysis including calculated system resistance.

The NRC asked for a telecopy of the attached assumptions and tables which are to be marked preliminary information, not for docketing.

In addition, the NRC asked for a response to the following questions:

1. What main feedwater isolation valve closing time was used in the analysis?
2. What is the maximum main steam line volume between the broken steam generator and the nearest main steam line stop valve?
3. What is the maximum main steam line volume between the damaged steam generator stop valve and the other steam generator stop valves?
4. What is the total of 2 and 3 above?

1497 333

5. What is the maximum feedwater volume between the main feedwater isolation valve and the steam generator?
6. Provide Westinghouse furnished mass/energy release for the 1.1 sq ft break for all power levels available.

A copy of S&W's responses to the above questions is attached. The responses were sent to NRC, attention Elinor Adensam, 301-492-7617, telecopier number 7371, on October 3, 1979.

1497 334

TELECOPIED

TIME 11:45
DATE 10-1-79
TO 10-1-79

Assumptions:

1. Main steam non-return valve functions instantaneously to isolate the faulted steam generator break from reverse main steam flow.
2. Blowdown rate of the faulted steam generator is calculated by S&W/W, feedwater flow control valve goes to full open, zero pressure drop through the steam generator for 30% and 103% cases.
3. The two intact steam generators stay pressurized.
4. Steam generators are isolated by controls sensing the break.
5. Auxiliary feedwater flow is available within ten seconds, with run-out flow going preferentially to the faulted steam generator per system hydraulics.
6. Heat transfer coefficient is constant, heat transfer vs. time per computer code. (~ 1200 BTU/lb)
7. Containment backpressure is 20 psig for all cases.
8. Single active failure is one CIB resulting in minimum safeguards; i.e., failure of one-half of the containment sprays.
9. No operator action is assumed.
10. All auxiliary pumps operational.

Footnotes

- (1). Initial Conditions - 10.4 PSIA, Service Water T = 86°F, Tc = 105° (SAT)
- (2). Initial Conditions - 11.6 PSIA, Service Water T = 32°F, Tc = 105° (SAT)

1497 335

(PRELIMINARY INFORMATION -
NOT FOR DOCKETING)

STONE & WEBSTER

Answers to NRC Questions
on Preliminary Beaver Valley 1 Containment Pressure Analysis

1. What main feedwater isolation valve closing time was used in the analysis?

Answer: 7.5 sec.

2. What is the maximum main steam line volume between the broken steam generator and the nearest main steam line stop valve?

Answer: 985 ft³(Loop A)

3. What is the maximum main steam line volume between the damaged steam generator stop valve and the other steam generator stop valves?

Answer: 8,000 ft³(0 used in the analysis)

4. What is the total of 2 and 3 above?

Answer: 8,985 ft³(985 used in the analysis)

5. What is the maximum feedwater volume between the main feedwater isolation valve and the steam generator?

Answer: 283 ft³

6. Provide the Westinghouse furnished mass and energy release data for the 1.4 sq. ft. break for all power levels available.

Response:

Westinghouse data as inputted to our analysis are given in the attached sheets.

TELECOPY TO NRC (10/3/79)

ATTENTION: ELINOR G. ADENSAM

301-492-7617 x 7371

1497 336

PRELIMINARY

Summary of Results of B.V. 1 Cont. Pressure Analyses

S.G. Blowdown Data	Steamline Break (ft ²)	Reactor Power (%)	Initial Peak Pressure (PSIG)	Time of Initial Peak (sec.)	Pressure @ 1800 sec (PSIG)
Westinghouse	1.4	102 (1)	33.0	305	38.0
		30 (1)	39.1	650	42.4
		0 (1)	--	--	44.1
S&W - LOCTIC	4.9	102 (1)	34.3	56	32.8
		30 (1)	41.8	65	36.5
		0 (1)	42.2	63	36.7
		0 (2)	44.1	63	31.2

1497 537

(PRELIMINARY INFORMATION -
NOT FOR DOCKETING)

SHEET 2 OF 4
(PRELIMINARY INFORMATION -
NOT FOR DOCKETING)

LONG PRODUCT CREATED 78.191 14701:40

FORWARD FLOW

REVERSE FLOW

TOTAL FLOW

TIME (SEC)	FLOW (LCH/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LCH/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LCH/SEC)	ENERGY (BTU/SEC)
0.0	0.2691E+04	0.3217E+07	0.0	0.4997E+04	0.5974E+07	0.0	0.7689E+04	0.9191E+07
0.0	0.2691E+04	0.3217E+07	0.0	0.4997E+04	0.5974E+07	0.0	0.7689E+04	0.9191E+07
0.0100	0.2690E+04	0.3216E+07	0.0100	0.5030E+04	0.6435E+07	0.0100	0.7609E+04	0.9191E+07
1.0000	0.2540E+04	0.3040E+07	1.0000	0.5030E+04	0.6435E+07	1.0000	0.6073E+04	0.9650E+07
2.0000	0.2308E+04	0.2770E+07	2.0000	0.4315E+04	0.5539E+07	2.0000	0.7332E+04	0.9145E+07
3.0000	0.2117E+04	0.2544E+07	3.0000	0.4234E+04	0.5000E+07	3.0000	0.6922E+04	0.8308E+07
4.0000	0.1961E+04	0.2350E+07	4.0000	0.3921E+04	0.4716E+07	4.0000	0.8351E+04	0.7632E+07
5.0000	0.1830E+04	0.2202E+07	5.0000	0.3681E+04	0.4405E+07	5.0000	0.5892E+04	0.7074E+07
6.0000	0.1726E+04	0.2077E+07	6.0000	0.3454E+04	0.4158E+07	6.0000	0.5491E+04	0.6607E+07
7.0000	0.1641E+04	0.1974E+07	7.0000	0.3289E+04	0.3960E+07	7.0000	0.5100E+04	0.6236E+07
8.0000	0.1560E+04	0.1880E+07	8.0000	0.3147E+04	0.3791E+07	8.0000	0.4930E+04	0.5936E+07
8.7254	0.1521E+04	0.1832E+07	8.7254	0.0	0.0	8.7254	0.4715E+04	0.5679E+07
9.0000	0.1503E+04	0.1811E+07	9.0000	0.0	0.0	9.0000	0.1521E+04	0.1832E+07
10.0000	0.1445E+04	0.1741E+07	10.0000	0.0	0.0	10.0000	0.1503E+04	0.1811E+07
11.0000	0.1393E+04	0.1670E+07	11.0000	0.0	0.0	11.0000	0.1445E+04	0.1741E+07
12.0000	0.1359E+04	0.1637E+07	12.0000	0.0	0.0	12.0000	0.1393E+04	0.1670E+07
13.0000	0.1337E+04	0.1610E+07	13.0000	0.0	0.0	13.0000	0.1359E+04	0.1637E+07
14.0000	0.1314E+04	0.1593E+07	14.0000	0.0	0.0	14.0000	0.1337E+04	0.1610E+07
15.0000	0.1290E+04	0.1554E+07	15.0000	0.0	0.0	15.0000	0.1314E+04	0.1593E+07
17.5000	0.1220E+04	0.1480E+07	17.5000	0.0	0.0	17.5000	0.1290E+04	0.1554E+07
20.0000	0.1167E+04	0.1405E+07	20.0000	0.0	0.0	20.0000	0.1220E+04	0.1480E+07
22.5000	0.1105E+04	0.1330E+07	22.5000	0.0	0.0	22.5000	0.1167E+04	0.1405E+07
25.0000	0.1054E+04	0.1269E+07	25.0000	0.0	0.0	25.0000	0.1105E+04	0.1330E+07
27.5000	0.1005E+04	0.1210E+07	27.5000	0.0	0.0	27.5000	0.1054E+04	0.1269E+07
30.0000	0.9619E+03	0.1150E+07	30.0000	0.0	0.0	30.0000	0.1005E+04	0.1210E+07
35.0000	0.8696E+03	0.1070E+07	35.0000	0.0	0.0	35.0000	0.9619E+03	0.1150E+07
40.0000	0.8334E+03	0.1002E+07	40.0000	0.0	0.0	40.0000	0.8696E+03	0.1070E+07
45.0000	0.7900E+03	0.9476E+06	45.0000	0.0	0.0	45.0000	0.8334E+03	0.1002E+07
50.0000	0.7531E+03	0.9055E+06	50.0000	0.0	0.0	50.0000	0.7900E+03	0.9496E+06
60.0000	0.7062E+03	0.8505E+06	60.0000	0.0	0.0	60.0000	0.7561E+03	0.9005E+06
70.0000	0.6757E+03	0.8111E+06	70.0000	0.0	0.0	70.0000	0.7082E+03	0.8505E+06
80.0000	0.6426E+03	0.7783E+06	80.0000	0.0	0.0	80.0000	0.6757E+03	0.8111E+06
90.0000	0.6293E+03	0.7480E+06	90.0000	0.0	0.0	90.0000	0.6426E+03	0.7783E+06
100.0000	0.6019E+03	0.7216E+06	100.0000	0.0	0.0	100.0000	0.6293E+03	0.7480E+06
120.0000	0.5326E+03	0.6300E+06	120.0000	0.0	0.0	120.0000	0.6019E+03	0.7216E+06
140.0000	0.5263E+03	0.5911E+06	140.0000	0.0	0.0	140.0000	0.5626E+03	0.6739E+06
160.0000	0.4942E+03	0.5563E+06	160.0000	0.0	0.0	160.0000	0.5263E+03	0.6300E+06
180.0000	0.4655E+03	0.5259E+06	180.0000	0.0	0.0	180.0000	0.4942E+03	0.5911E+06
200.0000	0.4404E+03	0.4651E+06	200.0000	0.0	0.0	200.0000	0.4655E+03	0.5564E+06
250.0000	0.3512E+03	0.4181E+06	250.0000	0.0	0.0	250.0000	0.4404E+03	0.5259E+06
300.0000	0.3512E+03	0.4181E+06	300.0000	0.0	0.0	300.0000	0.3901E+03	0.4651E+06
654.9963	0.2191E+03	0.2640E+06	654.9963	0.0	0.0	654.9963	0.3512E+03	0.4181E+06
10799.9961	0.2191E+03	0.2640E+06	10799.9961	0.0	0.0	10799.9961	0.2191E+03	0.2640E+06
10600.0039	0.0	0.0	10600.0039	0.0	0.0	10600.0039	0.2191E+03	0.2640E+06
10000.0000	0.0	0.0	10000.0000	0.0	0.0	10000.0000	0.0	0.0

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SHEET 3 OF 4
(PRELIMINARY INFORMATION -
NOT FOR DOCKETING)

TIME (SEC)	FLOW (LPM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LPM/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LPM/SEC)	ENERGY (BTU/SEC)
0.0	0.2256E+04	0.2706E+07	0.0	0.4191E+04	0.5029E+07	0.0	0.6447E+04	0.7735E+07
0.0	0.2256E+04	0.2706E+07	0.0	0.4191E+04	0.5029E+07	0.0	0.6447E+04	0.7735E+07
0.0100	0.2256E+04	0.2706E+07	0.0100	0.4191E+04	0.5029E+07	0.0100	0.6447E+04	0.7735E+07
1.0000	0.2146E+04	0.2578E+07	1.0000	0.4292E+04	0.5157E+07	1.0000	0.6765E+04	0.8110E+07
2.0000	0.1978E+04	0.2378E+07	2.0000	0.3954E+04	0.4755E+07	2.0000	0.6438E+04	0.7735E+07
3.0000	0.1046E+04	0.2222E+07	3.0000	0.3692E+04	0.4442E+07	3.0000	0.5932E+04	0.7133E+07
4.0000	0.1742E+04	0.2097E+07	4.0000	0.3493E+04	0.4193E+07	4.0000	0.5530E+04	0.6666E+07
5.0000	0.1657E+04	0.1995E+07	5.0000	0.3316E+04	0.3990E+07	5.0000	0.5225E+04	0.6290E+07
6.0000	0.1630E+04	0.1975E+07	6.0000	0.3282E+04	0.3952E+07	6.0000	0.4971E+04	0.5904E+07
7.0000	0.1622E+04	0.1953E+07	7.0000	0.3249E+04	0.3913E+07	7.0000	0.4922E+04	0.5926E+07
7.5000	0.1612E+04	0.1941E+07	7.5000	0.3232E+04	0.3892E+07	7.5000	0.4871E+04	0.5866E+07
8.0000	0.1602E+04	0.1929E+07	8.2302	0.0	0.0	8.2302	0.4644E+04	0.5633E+07
8.2302	0.1597E+04	0.1923E+07	0.0	0.0	0.0	0.0	0.2645E+04	0.3185E+07
9.0000	0.1579E+04	0.1902E+07	0.0	0.0	0.0	8.2302	0.1597E+04	0.1923E+07
10.0000	0.1553E+04	0.1871E+07	0.0	0.0	0.0	9.0000	0.1579E+04	0.1902E+07
11.0000	0.1524E+04	0.1836E+07	0.0	0.0	0.0	10.0000	0.1553E+04	0.1871E+07
12.0000	0.1500E+04	0.1806E+07	0.0	0.0	0.0	11.0000	0.1524E+04	0.1836E+07
13.0000	0.1472E+04	0.1773E+07	0.0	0.0	0.0	12.0000	0.1500E+04	0.1806E+07
14.0000	0.1442E+04	0.1737E+07	0.0	0.0	0.0	13.0000	0.1472E+04	0.1773E+07
15.0000	0.1410E+04	0.1699E+07	0.0	0.0	0.0	14.0000	0.1442E+04	0.1737E+07
17.5000	0.1333E+04	0.1606E+07	0.0	0.0	0.0	15.0000	0.1410E+04	0.1699E+07
20.0000	0.1260E+04	0.1510E+07	0.0	0.0	0.0	17.5000	0.1333E+04	0.1606E+07
22.5000	0.1194E+04	0.1439E+07	0.0	0.0	0.0	20.0000	0.1260E+04	0.1518E+07
25.0000	0.1135E+04	0.1367E+07	0.0	0.0	0.0	22.5000	0.1194E+04	0.1438E+07
27.5000	0.1082E+04	0.1303E+07	0.0	0.0	0.0	25.0000	0.1135E+04	0.1367E+07
30.0000	0.1034E+04	0.1240E+07	0.0	0.0	0.0	27.5000	0.1082E+04	0.1303E+07
35.0000	0.9601E+03	0.1156E+07	0.0	0.0	0.0	30.0000	0.1034E+04	0.1240E+07
40.0000	0.9017E+03	0.1095E+07	0.0	0.0	0.0	35.0000	0.9601E+03	0.1156E+07
45.0000	0.8564E+03	0.1030E+07	0.0	0.0	0.0	40.0000	0.9017E+03	0.1085E+07
50.0000	0.8212E+03	0.9735E+06	0.0	0.0	0.0	45.0000	0.8564E+03	0.1030E+07
60.0000	0.7716E+03	0.9273E+06	0.0	0.0	0.0	50.0000	0.8212E+03	0.9675E+06
70.0000	0.7395E+03	0.8894E+06	0.0	0.0	0.0	60.0000	0.7716E+03	0.9273E+06
80.0000	0.7159E+03	0.8599E+06	0.0	0.0	0.0	70.0000	0.7395E+03	0.8894E+06
90.0000	0.6942E+03	0.8335E+06	0.0	0.0	0.0	80.0000	0.7159E+03	0.8599E+06
100.0000	0.6727E+03	0.8075E+06	0.0	0.0	0.0	90.0000	0.6942E+03	0.8335E+06
120.0000	0.6330E+03	0.7593E+06	0.0	0.0	0.0	100.0000	0.6727E+03	0.8075E+06
140.0000	0.5974E+03	0.7161E+06	0.0	0.0	0.0	120.0000	0.6330E+03	0.7593E+06
160.0000	0.5633E+03	0.6785E+06	0.0	0.0	0.0	140.0000	0.5974E+03	0.6785E+06
180.0000	0.5391E+03	0.6455E+06	0.0	0.0	0.0	160.0000	0.5633E+03	0.6455E+06
200.0000	0.5154E+03	0.6167E+06	0.0	0.0	0.0	180.0000	0.5391E+03	0.6167E+06
250.0000	0.4666E+03	0.5576E+06	0.0	0.0	0.0	200.0000	0.5154E+03	0.5576E+06
280.2390	0.4666E+03	0.5576E+06	0.0	0.0	0.0	250.0000	0.4666E+03	0.5576E+06
288.2468	0.4666E+03	0.5576E+06	0.0	0.0	0.0	280.2390	0.4666E+03	0.5576E+06
288.2468	0.2191E+03	0.2640E+06	0.0	0.0	0.0	288.2468	0.4666E+03	0.5576E+06
10799.9961	0.2191E+03	0.2640E+06	0.0	0.0	0.0	10799.9961	0.2191E+03	0.2640E+06
10000.0039	0.0	0.0	0.0	0.0	0.0	10000.0039	0.0	0.0
10000.0000	0.0	0.0	0.0	0.0	0.0	10000.0000	0.0	0.0

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TIME (SEC)	FLOW (LBI/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBI/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBI/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBI/SEC)	ENERGY (BTU/SEC)	TIME (SEC)	FLOW (LBI/SEC)	ENERGY (BTU/SEC)
0.0	0.296E+04	0.353E+07	0.0	0.550E+04	0.656E+07	0.0	0.0475E+04	0.101E+08	0.0	0.0475E+04	0.101E+08	0.0	0.0475E+04	0.101E+08
0.0	0.296E+04	0.353E+07	0.0	0.550E+04	0.656E+07	0.0	0.0475E+04	0.101E+08	0.0	0.0475E+04	0.101E+08	0.0	0.0475E+04	0.101E+08
0.0100	0.296E+04	0.353E+07	0.0100	0.550E+04	0.656E+07	0.0100	0.0475E+04	0.101E+08	0.0100	0.0475E+04	0.101E+08	0.0100	0.0475E+04	0.101E+08
2.0000	0.2750E+04	0.329E+07	1.0000	0.550E+04	0.656E+07	1.0000	0.0475E+04	0.101E+08	1.0000	0.0475E+04	0.101E+08	1.0000	0.0475E+04	0.101E+08
3.0000	0.239E+04	0.286E+07	2.0000	0.470E+04	0.573E+07	2.0000	0.0475E+04	0.101E+08	2.0000	0.0475E+04	0.101E+08	2.0000	0.0475E+04	0.101E+08
4.0000	0.211E+04	0.254E+07	3.0000	0.422E+04	0.507E+07	3.0000	0.0475E+04	0.101E+08	3.0000	0.0475E+04	0.101E+08	3.0000	0.0475E+04	0.101E+08
5.0000	0.1890E+04	0.227E+07	4.0000	0.377E+04	0.454E+07	4.0000	0.0475E+04	0.101E+08	4.0000	0.0475E+04	0.101E+08	4.0000	0.0475E+04	0.101E+08
6.0000	0.155E+04	0.186E+07	5.0000	0.341E+04	0.410E+07	5.0000	0.0475E+04	0.101E+08	5.0000	0.0475E+04	0.101E+08	5.0000	0.0475E+04	0.101E+08
7.0000	0.142E+04	0.171E+07	6.0000	0.310E+04	0.374E+07	6.0000	0.0475E+04	0.101E+08	6.0000	0.0475E+04	0.101E+08	6.0000	0.0475E+04	0.101E+08
8.0000	0.133E+04	0.160E+07	7.0000	0.285E+04	0.343E+07	7.0000	0.0475E+04	0.101E+08	7.0000	0.0475E+04	0.101E+08	7.0000	0.0475E+04	0.101E+08
8.512	0.131E+04	0.159E+07	7.8000	0.268E+04	0.322E+07	7.8000	0.0475E+04	0.101E+08	7.8000	0.0475E+04	0.101E+08	7.8000	0.0475E+04	0.101E+08
9.0000	0.126E+04	0.152E+07	8.0000	0.0	0.0	8.0000	0.0475E+04	0.101E+08	8.0000	0.0475E+04	0.101E+08	8.0000	0.0475E+04	0.101E+08
10.0000	0.121E+04	0.149E+07	8.5112	0.0	0.0	8.5112	0.0475E+04	0.101E+08	8.5112	0.0475E+04	0.101E+08	8.5112	0.0475E+04	0.101E+08
11.0000	0.1137E+04	0.137E+07	9.0000	0.0	0.0	9.0000	0.0475E+04	0.101E+08	9.0000	0.0475E+04	0.101E+08	9.0000	0.0475E+04	0.101E+08
12.0000	0.1037E+04	0.128E+07	0.0	0.0	0.0	10.0000	0.1137E+04	0.137E+07	10.0000	0.1137E+04	0.137E+07	10.0000	0.1137E+04	0.137E+07
13.0000	0.1033E+04	0.124E+07	0.0	0.0	0.0	11.0000	0.1037E+04	0.128E+07	11.0000	0.1037E+04	0.128E+07	11.0000	0.1037E+04	0.128E+07
14.0000	0.1020E+04	0.122E+07	0.0	0.0	0.0	12.0000	0.1033E+04	0.124E+07	12.0000	0.1033E+04	0.124E+07	12.0000	0.1033E+04	0.124E+07
15.0000	0.1020E+04	0.122E+07	0.0	0.0	0.0	13.0000	0.1020E+04	0.122E+07	13.0000	0.1020E+04	0.122E+07	13.0000	0.1020E+04	0.122E+07
17.5000	0.9934E+03	0.119E+07	0.0	0.0	0.0	14.0000	0.1020E+04	0.122E+07	14.0000	0.1020E+04	0.122E+07	14.0000	0.1020E+04	0.122E+07
20.0000	0.950E+03	0.115E+07	0.0	0.0	0.0	15.0000	0.1020E+04	0.122E+07	15.0000	0.1020E+04	0.122E+07	15.0000	0.1020E+04	0.122E+07
22.5000	0.9197E+03	0.1107E+07	0.0	0.0	0.0	17.5000	0.9934E+03	0.119E+07	17.5000	0.9934E+03	0.119E+07	17.5000	0.9934E+03	0.119E+07
25.0000	0.8929E+03	0.1062E+07	0.0	0.0	0.0	20.0000	0.950E+03	0.115E+07	20.0000	0.950E+03	0.115E+07	20.0000	0.950E+03	0.115E+07
30.0000	0.8497E+03	0.985E+06	0.0	0.0	0.0	22.5000	0.9197E+03	0.1107E+07	22.5000	0.9197E+03	0.1107E+07	22.5000	0.9197E+03	0.1107E+07
35.0000	0.7691E+03	0.923E+06	0.0	0.0	0.0	25.0000	0.8929E+03	0.1062E+07	25.0000	0.8929E+03	0.1062E+07	25.0000	0.8929E+03	0.1062E+07
40.0000	0.7265E+03	0.872E+06	0.0	0.0	0.0	27.5000	0.8497E+03	0.985E+06	27.5000	0.8497E+03	0.985E+06	27.5000	0.8497E+03	0.985E+06
45.0000	0.6935E+03	0.832E+06	0.0	0.0	0.0	30.0000	0.7691E+03	0.923E+06	30.0000	0.7691E+03	0.923E+06	30.0000	0.7691E+03	0.923E+06
50.0000	0.620E+03	0.754E+06	0.0	0.0	0.0	35.0000	0.7265E+03	0.872E+06	35.0000	0.7265E+03	0.872E+06	35.0000	0.7265E+03	0.872E+06
60.0000	0.600E+03	0.719E+06	0.0	0.0	0.0	40.0000	0.6935E+03	0.832E+06	40.0000	0.6935E+03	0.832E+06	40.0000	0.6935E+03	0.832E+06
70.0000	0.5747E+03	0.680E+06	0.0	0.0	0.0	45.0000	0.620E+03	0.754E+06	45.0000	0.620E+03	0.754E+06	45.0000	0.620E+03	0.754E+06
90.0000	0.5517E+03	0.660E+06	0.0	0.0	0.0	50.0000	0.600E+03	0.719E+06	50.0000	0.600E+03	0.719E+06	50.0000	0.600E+03	0.719E+06
100.0000	0.530E+03	0.634E+06	0.0	0.0	0.0	60.0000	0.5747E+03	0.680E+06	60.0000	0.5747E+03	0.680E+06	60.0000	0.5747E+03	0.680E+06
120.0000	0.4927E+03	0.589E+06	0.0	0.0	0.0	70.0000	0.5517E+03	0.660E+06	70.0000	0.5517E+03	0.660E+06	70.0000	0.5517E+03	0.660E+06
140.0000	0.4584E+03	0.5477E+06	0.0	0.0	0.0	90.0000	0.530E+03	0.634E+06	90.0000	0.530E+03	0.634E+06	90.0000	0.530E+03	0.634E+06
160.0000	0.4270E+03	0.5097E+06	0.0	0.0	0.0	100.0000	0.4927E+03	0.589E+06	100.0000	0.4927E+03	0.589E+06	100.0000	0.4927E+03	0.589E+06
180.0000	0.3981E+03	0.478E+06	0.0	0.0	0.0	120.0000	0.4584E+03	0.5477E+06	120.0000	0.4584E+03	0.5477E+06	120.0000	0.4584E+03	0.5477E+06
200.0000	0.3710E+03	0.441E+06	0.0	0.0	0.0	140.0000	0.4270E+03	0.5097E+06	140.0000	0.4270E+03	0.5097E+06	140.0000	0.4270E+03	0.5097E+06
250.0000	0.3124E+03	0.371E+06	0.0	0.0	0.0	160.0000	0.3981E+03	0.478E+06	160.0000	0.3981E+03	0.478E+06	160.0000	0.3981E+03	0.478E+06
300.0000	0.267E+03	0.316E+06	0.0	0.0	0.0	180.0000	0.3710E+03	0.441E+06	180.0000	0.3710E+03	0.441E+06	180.0000	0.3710E+03	0.441E+06
1810.2661	0.267E+03	0.316E+06	0.0	0.0	0.0	200.0000	0.3124E+03	0.371E+06	200.0000	0.3124E+03	0.371E+06	200.0000	0.3124E+03	0.371E+06
1810.2759	0.219E+03	0.264E+06	0.0	0.0	0.0	250.0000	0.267E+03	0.316E+06	250.0000	0.267E+03	0.316E+06	250.0000	0.267E+03	0.316E+06
10799.9961	0.219E+03	0.264E+06	0.0	0.0	0.0	300.0000	0.219E+03	0.264E+06	300.0000	0.219E+03	0.264E+06	300.0000	0.219E+03	0.264E+06
10000.0039	0.0	0.0	0.0	0.0	0.0	1810.2661	0.267E+03	0.316E+06	1810.2661	0.267E+03	0.316E+06	1810.2661	0.267E+03	0.316E+06
10000.0000	0.0	0.0	0.0	0.0	0.0	1810.2759	0.219E+03	0.264E+06	1810.2759	0.219E+03	0.264E+06	1810.2759	0.219E+03	0.264E+06
			0.0	0.0	0.0	10799.9961	0.219E+03	0.264E+06	10799.9961	0.219E+03	0.264E+06	10799.9961	0.219E+03	0.264E+06
			0.0	0.0	0.0	10000.0039	0.0	0.0	10000.0039	0.0	0.0	10000.0039	0.0	0.0
			0.0	0.0	0.0	10000.0000	0.0	0.0	10000.0000	0.0	0.0	10000.0000	0.0	0.0

SHEET 4 OF 4
(PRELIMINARY INFORMATION -
NOT FOR DOCKETING)

1497 340

PARAMETERS RELATED TO MSLB IN CONTAINMENT

Break Sizes Considered	4.9, 1.4 ft ²
Steam Generator Inventory	
0% power	150,000 lb @ 1020 psia, 1192 BTU/lb
30% power	136,000 lb @ 929 psia, 1195 BTU/lb
102% power	108,000 lb @ 782 psia, 1200 BTU/lb
Main Feedwater added to affected Steam Generator	28,836 lb @ 416 BTU/lb
Main Steam line backflow to break	2258 lb @ 1192 BTU/lb
AFS runout flow to affected Steam Generator	1594 gpm @ 35 psia backpressure
Quench Spray Flow Rate	2030 gpm/train @ 55 psia containment pressure, full RWST
Recirculation Spray Flow Rate	6800 gpm/train
Quench Spray Heat Removal Rate	3.42 X 10 ⁶ BTU/min/train @ 270°F containment
Recirculation Spray Heat Removal Rate	6.35 X 10 ⁶ BTU/min/train @ 270°F containment, 240°F sump
Spray Start Time	QS-1 min., RS-5 min.
Containment Free Volume	1,800,000 Ft ³
BTU's available above 32°F (excluding decay heat)	649.8 X 10 ⁶ BTU
Heat sinks	
Surface Area	
Liner	73,300 ft ²
Steel	156,800 ft ²
Concrete	152,400 ft ²
Steel Mass	2.65 X 10 ⁶ lb

1497 341



700 GPM
@ 2696 FT. TDH
TURBINE DRIVEN

BEAVER VALLEY-1
BASED ON 8700-RM-124A