NS-TMA-2458

Westinghouse Electric Corporation Power Systems

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Pittsburgh Pennsylvania 15230

June 12, 1981

Ref.: NS-TMA-2448, 3/15/81
Anderson to Miller

Mr. James Miller
Special Projects Branch
Division of Licensing
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dear Mr. Miller:

This letter contains information which supplements the information provided in the referenced letter. This additional information was requested by Mr. Norm Lauben in a telephone conversation which took place on June 11.

The attached table summarizes the results of the downcomer modeling sensitivities for a three loop plant. These results show that the peak clad temperature difference among the cases is small, with method 3 resulting in the highest peak clad temperature. Figure 1 shows the downcomer modeling used for the four methods. (The two intact loops are lumped together for method 3.) Method 3 was chosen because it was felt to be the most realistic method. (This method is also slightly conservative.)

Figure 2 shows the actual cold leg arrangement for two, three and four loop plants. For the four loop plant SATAN-VI model, the downcomer is split in half, with two loops feeding each half. The three intact loops are modeled as one lumped loop from the vessel outlet to the steam generator outlet. The loops are split, at the outlet of the steam generator, into a leg consisting of 2 lumped intact RCS loops and a leg consisting of one intact RCS loop. The lumped intact loop flows to one side of the downcomer and the single intact loop, along with the broken loop, flows to the other side of the downcomer. The one single loop and the broken loop flow to the same downcomer node due to their proximity. This is considered to be the most realistic model. The intact loops were split upstream of the pumps in order to assure that the injected ECCS water did not flow back to the junction and to the vessel through the wrong loop. The SATAN-VI code version used for UHI plants has logic, internal to the code, to prevent this occurrence.

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For the 3 loop SATAN-VI model, the intact loops are not split, as discussed earlier. The two lumped intact loops are connected to a node consisting of two-thirds of the downcomer volume and the broken loop is connected to a node consisting of one-third of the downcomer. The downcomer volume is split equally for the 2 loop SATAN-VI model with one loop injecting into each half.

If there are any questions regarding this information, please contact Mr. R. A. Muench, (412) 373-5506.

Very truly yours,

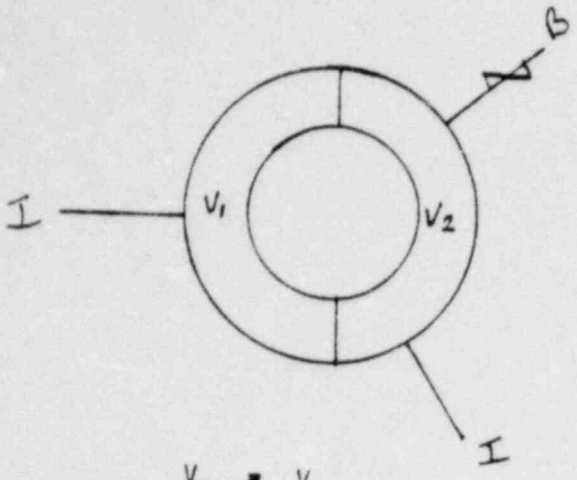
T. M. Anderson, Manager
Nuclear Safety Department

Table 1

Downcomer Modeling Sensitivity Results

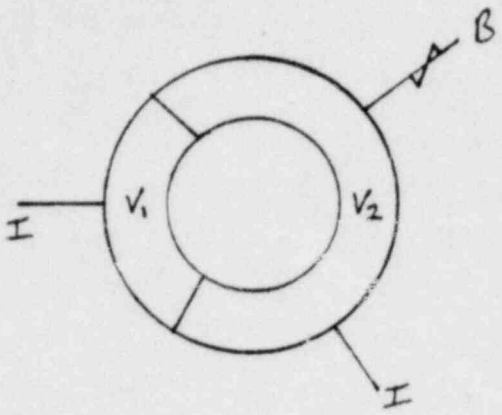
Event	Non-UHI	Method 1	Method 2	Method 3	Method 4
Start	0.0	0.0	0.0	0.0	0.0
Reactor Trip	.641	.646	.645	.646	.647
Acc Inj	16.7	15.5	15.5	15.5	15.5
End of ECC Bypass	27.41	28.39	31.07	30.80	29.0
End of Blowdown	28.55	28.41	31.07	30.80	29.0
Bottom of Core Recovery	45.68	46.82	49.18	48.98	46.60
Results					
PCT, °F	2148	2021	2081	2084	2013
PCT Location, ft	6.0	7.5	7.5	7.5	7.5
PCT Time, Sec	59.8	120	130.2	123.2	117.2
Hot Rod Burst Time, Sec	35.8	39.0	39.6	39.8	39.8
Hot Rod Burst Location, ft	6.0	5.75	6.25	6.0	6.0
Peaking Factor	1.99	2.32	2.32	2.32	2.32

Figure 1 Downcomer Modeling Techniques for a Three Loop Plant



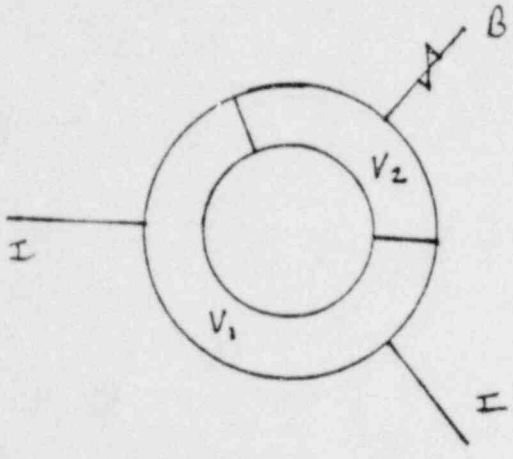
$V_1 = V_2$

Method 1



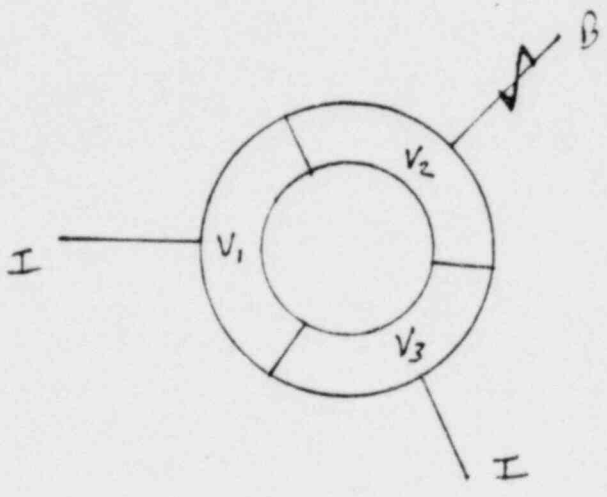
$V_1 = 1/2\ V_2$

Method 2



$V_1 = 2\ V_2$

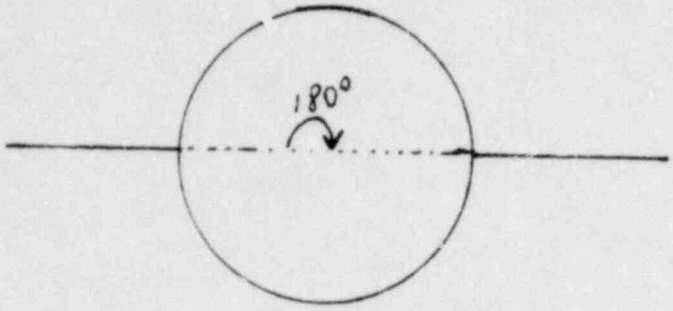
Method 3



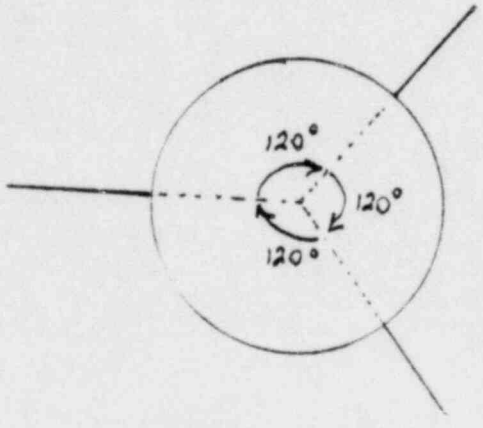
$V_1 = V_2 = V_3$

Method 4

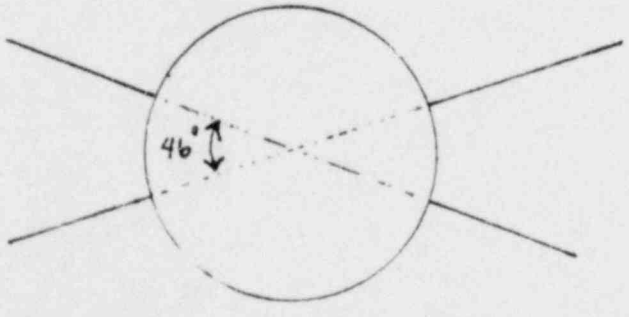
Figure 2 Cold Leg Orientation for W PWR's



2 Loop



3 Loop



4 Loop