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AUTH. NAME AUTHOR AFFILIATION
 ALEXICH, M. P. Indiana & Michigan Electric Co.
 RECIP. NAME RECIPIENT AFFILIATION
 DENTON, H. R. Office of Nuclear Reactor Regulation, Director (post 851125)

SUBJECT: Forwards hydrogen steam: fission product source terms for preliminary review per request Source terms to be used as input for containment analysis (CLASIC code). Transmittal ltr from BMI to Westinghouse also encl.

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INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631
COLUMBUS, OHIO 43216

April 23, 1986
AEP:NRC:0500W

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
HYDROGEN CONTROL PROGRAM (10 CFR 50.44(c))

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

Mr. D. L. Wigginton of your staff has requested for preliminary review a copy of the hydrogen, steam, and fission product source terms obtained from the MARCH computer code to be used as input for the containment analysis CLASIX computer code. Attached is a copy of those source terms for the S1D, S2D, and TMLU accident scenarios, and a letter of transmittal from Battelle Columbus Laboratories to Westinghouse. The S1D and S2D are small-break LOCA accidents with failure of the emergency core coolant system (ECCS), and the TMLU is a transient involving loss of heat sink and ECCS failure. These accident scenarios are being analyzed by Battelle and Westinghouse as part of the hydrogen control program for D. C. Cook Plant.

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,



M. P. Alexich
Vice President *BRS 4/23/86*

MPA/rjn

Attachment

cc: John E. Dolan
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Bruchmann
G. Charnoff
NRC Resident Inspector - Bridgman

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Battelle

Columbus Laboratories
305 King Avenue
Columbus, Ohio 43201-2693
Telephone (614) 424-6424
Telex 24-5454

January 28, 1986

Mr. V. Srinivas
Nuclear Technology Division
Westinghouse Electric Corporation
P. O. Box 355
Pittsburgh, PA 15230

Dear Mr. Srinivas:

Enclosed are revised CLASIX input data from our MARCH calculations of the three accident sequences to be analyzed for A.E.P. As I informed you over the phone, the data transmitted in my letter of January 14, 1986, misrepresented the energy flow rate to containment, particularly during periods in which the efflux was primarily water, rather than steam. This problem has been corrected in the attached tables. You should discard the previously transmitted data and use the attached.

If you have any questions, please call me at (614) 424-7278.

Sincerely,

Mark T. Leonard
Nuclear Systems Section

MTL:dem

enclosures

cc: Thomas Crawford

TABLE 1. D. C. COOK TMLU CASE

INTERVAL	TIME INTERVAL (Seconds)	HYDROGEN MASS FLOW (lb/sec)	HYDROGEN TEMPERATURE (F)	STEAM/WATER MASS FLOW (lb/sec)	STEAM/WATER ENERGY FLOW (Btu/sec)	FISSION PRODUCTS ENERGY FLOW (Btu/sec)
1	0-60	0	574.1	.2448E+2	.15422E+5	0
2	60-120	0	574.1	.10654E+3	.28459E+5	0
3	120-180	0	574.1	.99785E+2	.96734E+5	0
4	180-3300	0	574.1	0	0	0
5	3300-3600	0	574.1	.52017E+2	.32373E+5	0
6	3600-3660	0	574.1	.57257E+2	.35579E+5	0
7	3660-4140	0	574.1	.62347E+2	.39559E+5	0
8	4140-4440	0	574.1	.69953E+2	.47192E+5	0
9	4440-4500	0	593.3	.16785E+3	.52254E+5	0
10	4500-4740	0	631.0	.32738E+3	.25844E+6	0
11	4740-4920	0	651.6	.39472E+3	.28255E+6	0
12	4920-4980	0	654.3	.40263E+3	.28492E+6	0
13	4980-5040	0	655.0	.24510E+3	.29336E+6	0
14	5040-5895	0	657.4	.78842E+2	.10453E+6	0
15	5895-6090	0	659.8	.59103E+2	.70210E+5	0
16	6090-6270	0	660.2	.33668E+2	.37756E+5	0
17	6270-7065	.542E-2	663.5	.12230E+2	.13630E+5	0
18	7065-7545	.191E-1	667.1	.73587E+1	.78265E+4	0
19	7545-7920	.191E-1	667.7	.36615E+1	.41467E+4	0
20	7920-8685	.260E-1	667.7	.33853E+1	.42306E+4	.62230E+2
21	8685-9120	0	668.8	0	0	.12143E+3
22	9120-9150	.32963E+0	670.2	.31770E+2	.39008E+5	.14642E+3
23	9150-9300	.40922E+0	670.2	.39442E+2	.54587E+5	.40098E+3
24	9300-9345	.7988E-1	670.2	.76985E+1	.14163E+5	.64632E+3
25	9345-9510	0	674.4	0	0	.65970E+3
26	9510-9555	.20095E+1	691.3	.10878E+3	.12859E+6	.87829E+3
27	9555-9570	.36888E+1	722.9	.18345E+3	.21165E+6	.12081E+4
28	9570-9660	.28262E+1	782.6	.12292E+3	.15900E+6	.16394E+4
29	9660-9855	.22576E+1	1014.2	.96043E+2	.12229E+6	.33195E+4
30	9855-10020	.14795E+1	1363.7	.78208E+2	.11290E+6	.45274E+4

TABLE 1. D. C. COOK TMLU CASE
(Continued)

INTERVAL	TIME INTERVAL (Seconds)	HYDROGEN MASS FLOW (lb/sec)	HYDROGEN TEMPERATURE (F)	STEAM/WATER MASS FLOW (lb/sec)	STEAM/WATER ENERGY FLOW (Btu/sec)	FISSION PRODUCTS ENERGY FLOW (Btu/sec)
31	10020-10110	.11369E+1	1630.3	.72005E+2	.11555E+6	.51149E+4
32	10110-10320	.70593E+0	1870.9	.52280E+2	.89694E+5	.55092E+4
33	10320-10650	.32387E+0	2137.1	.31992E+2	.62026E+5	.58741E+4
34	10650-10710	.24047E+0	2273.9	.29592E+2	.58733E+5	.60378E+4
35	10710-11085	.17630E+0	2330.5	.25325E+2	.58628E+5	.61447E+4
36	11085-11190	.6131E-1	2368.1	.11578E+2	.13824E+5	.62296E+4
37	11190-11310	.2994E-1	2366.3	.57477E+1	.10337E+5	.62297E+4
38	11310-12000	.2961E-1	2366.3	.56857E+1	.11425E+5	.62006E+4
39	12000-13215	.2072E-1	2366.3	.39772E+1	.79682E+4	.61398E+4
40	13215-15105	0	2366.3	.49333E+2	.33964E+5	.59967E+4

TABLE 2. D. C. COOK S2D CASE

INTERVAL	TIME INTERVAL (Seconds)	HYDROGEN MASS FLOW (lb/sec)	HYDROGEN TEMPERATURE (F)	STEAM/WATER MASS FLOW (lb/sec)	STEAM/WATER ENERGY FLOW (Btu/sec)	FISSION PRODUCTS ENERGY FLOW (Btu/sec)
1	0-34	0	574.1	.35833E+3	.20298E+6	0
2	34-60	0	574.1	.30398E+3	.17532E+6	0
3	60-95	0	574.1	.24998E+3	.14160E+6	0
4	95-443	0	574.9	.22478E+3	.12116E+6	0
5	443-1087	0	576.9	.23008E+3	.13040E+6	0
6	1087-1558	0	580.2	.23678E+3	.14626E+6	0
7	1558-1607	0	582.5	.15109E+3	.15290E+6	0
8	1607-1801	0	582.8	.60902E+2	.70894E+5	0
9	1801-2876	.1473E-1	620.4	.47793E+2	.60533E+5	0
10	2876-3070	.10075E+0	669.1	.32670E+2	.42359E+5	0
11	3070-3280	.37882E+0	693.7	.25393E+2	.33900E+5	0
12	3280-3445	.74463E+0	722.3	.18850E+2	.24337E+5	.39604E+3
13	3445-3640	.10550E+1	761.5	.13660E+2	.18508E+5	.16383E+4
14	3640-3691	.11169E+1	785.5	.10342E+2	.15269E+5	.28159E+4
15	3691-3753	.93743E+0	785.5	.86795E+1	.12083E+5	.33731E+4
16	3753-3842	.75128E+0	787.0	.68123E+1	.90690E+4	.39797E+4
17	3842-4000	.87305E+0	836.6	.49060E+1	.67674E+4	.49240E+4
18	4000-4062	.13193E+1	921.9	.38185E+1	.59742E+4	.58120E+4
19	4062-4103	.18323E+1	994.1	.37098E+1	.56886E+4	.63149E+4
20	4103-4166	.24497E+1	1085.7	.40913E+1	.62754E+4	.70711E+4
21	4166-4196	.28130E+1	1178.1	.50335E+1	.81081E+4	.75639E+4
22	4196-4235	.26385E+1	1269.6	.69985E+1	.11065E+5	.78790E+4
23	4235-4274	.22200E+1	1397.5	.10243E+2	.15904E+5	.81579E+4
24	4274-4365	.16205E+1	1641.3	.16301E+2	.26320E+5	.84521E+4
25	4365-4451	.10469E+1	1973.7	.24532E+2	.48987E+5	.8711E+4
26	4451-4483	.80237E+0	2180.2	.29792E+2	.59844E+5	.88295E+4
27	4483-4598	.61807E+0	2322.2	.34755E+2	.71580E+5	.89077E+4
28	4598-4712	.40463E+0	2364.4	.38357E+2	.78504E+5	.89834E+4
29	4712-4786	.28582E+0	2248.8	.38257E+2	.79495E+5	.90082E+4
30	4786-4891	.20938E+0	2086.5	.38155E+2	.76216E+5	.90097E+4

TABLE 2. D. C. COOK S2D CASE
(Continued)

INTERVAL	TIME INTERVAL (Seconds)	HYDROGEN MASS FLOW (lb/sec)	HYDROGEN TEMPERATURE (F)	STEAM/WATER MASS FLOW (lb/sec)	STEAM/WATER ENERGY FLOW (Btu/sec)	FISSION PRODUCTS ENERGY FLOW (Btu/sec)
31	4891-5026	.14019E+0	1875.1	.38600E+2	.72311E+5	.89998E+4
32	5026-5221	.8419E-1	1632.4	.39737E+2	.68744E+5	.89537E+4
33	5221-5506	.4276E-1	1377.1	.41217E+2	.65941E+5	.88607E+4
34	5506-5611	.2301E-1	1216.9	.42135E+2	.63970E+5	.87808E+4
35	5611-6136	.1254E-1	1092.2	.38673E+2	.58101E+5	.86487E+4
36	6136-6361	.416E-2	976.2	.33142E+2	.47366E+5	.84917E+4
37	6361-6841	.151E-2	910.7	.28435E+2	.39930E+5	.83613E+4
38	6841-8403	0	821.7	.67568E+2	.46112E+5	.80340E+4
39	8403-10092	0	748.7	.70525E+2	.41770E+5	.75974E+4

TABLE 3. D. C. COOK SID CASE

INTERVAL	TIME INTERVAL (Seconds)	HYDROGEN MASS FLOW (lb/sec)	HYDROGEN TEMPERATURE (F)	STEAM/WATER MASS FLOW (lb/sec)	STEAM/WATER ENERGY FLOW (Btu/sec)	FISSION PRODUCTS ENERGY FLOW (Btu/sec)
1	0-2.5	0	574.1	.32943E+4	.18174E+7	0
2	2.5-10	0	574.1	.25885E+4	.14831E+7	0
3	10-182	0	575.6	.20297E+4	.11101E+7	0
4	182-194	0	576.4	.12209E+4	.10557E+7	0
5	194-377	0	572.2	.28317E+3	.40414E+6	0
6	377-602	.1712E-1	640.3	.11239E+3	.13984E+6	0
7	602-807	.25215E+0	706.5	.28005E+2	.38070E+5	0
8	807-854	.66413E+0	722.6	.11295E+2	.18345E+5	0
9	854-957	.10795E+1	740.0	.53398E+1	.74792E+4	0
10	957-1185	.64375E+0	758.7	.10863E+2	.11672E+4	0
11	1185-1455	.30618E+0	752.6	.9020E-1	.14895E+3	.43194E+4
12	1455-1500	.17617E+0	737.7	.1246E-1	.19112E+2	.21211E+4
13	1500-1590	.15638E+0	730.4	.886E-2	.13273E+2	.27836E+4
14	1590-1740	.13027E+0	717.9	.530E-2	.63330E+1	.39701E+4
15	1740-1860	.10980E+0	704.6	.311E-2	.44077E+1	.51551E+4
16	1860-2160	.9069E-1	687.8	.176E-2	.25414E+1	.62859E+4
17	2160-2460	.7649E-1	669.1	.92E-3	.12813E+1	.73043E+4
18	2460-2670	.1986E-1	659.0	0	.46720E+0	.76523E+4
19	2670-2835	.2273E-1	654.6	.19E-3	.16518E+0	.75677E+4
20	2835-3060	.8218E-1	651.1	.60E-3	.83356E+0	.75880E+4
21	3060-3360	.3529E-1	651.1	.26E-3	.20127E+0	.78200E+4
22	3360-3620	.65598E+0	726.4	.588E-2	.16953E+2	.82694E+4
23	3620-3646	.18628E+1	832.9	.2140E+0	.96298E+2	.89577E+4
24	3646-3682	.42490E+1	919.9	.29707E+1	.22983E+4	.90848E+4
25	3682-3706	.61718E+1	1044.5	.85315E+1	.12179E+5	.94255E+4
26	3706-3800	.56188E+1	1319.7	.13175E+2	.19522E+5	.99866E+4
27	3800-3943	.21307E+1	2028.9	.33125E+2	.79790E+5	.10287E+5
28	3943-3998	.18830E+0	2651.7	.50558E+2	.11231E+6	.10215E+5
29	3998-4152	.2799E-1	3015.5	.56838E+2	.15744E+6	.10132E+5
30	4152-4315	.25E-3	3098.3	.71227E+2	.19665E+6	.10011E+5

TABLE 3. D. C. COOK SID CASE
(Continued)

INTERVAL	TIME INTERVAL (Seconds)	HYDROGEN MASS FLOW (lb/sec)	HYDROGEN TEMPERATURE (F)	STEAM/WATER MASS FLOW (lb/sec)	STEAM/WATER ENERGY FLOW (Btu/sec)	FISSION PRODUCTS ENERGY FLOW (Btu/sec)
31	4315-4412	0	2862.6	.78907E+2	.21558E+6	.99160E+4
32	4412-4518	0	2614.7	.80922E+2	.19037E+6	.98424E+4
33	4518-4665	0	2379.3	.77387E+2	.18006E+6	.97598E+4
34	4665-5012	0	2110.0	.67720E+2	.15013E+6	.96047E+4
35	5012-5575	0	1910.5	.29298E+2	.55605E+5	.93473E+4
36	5575-5835	0	1617.1	.32993E+2	.60933E+5	.91330E+4
37	5835-6149	0	1475.1	.33630E+2	.62813E+5	.90001E+4
38	6149-6500	0	1313.8	.31525E+2	.54854E+5	.86416E+4
39	6500-7148	0	1166.9	.25682E+2	.41263E+5	.86637E+4
40	7148-7368	0	1062.5	.61565E+2	.63292E+5	.85063E+4

