EEQ
Pasochoa (Hydro)

	1984	1985	1986	1987	1988	1989	1990	Average
No. 1	2	1	0	0	0	0	0	0.36
No. 2	0	2	0	0	0	0	0	

Los Chillos (Hydro)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average
No. 1	1.0	0	0	6.0	0	0	0	7.0	0	0	2.65
No. 2	2.1	0	0	6.0	0	0	0	3.0	0	0	

Nayon (Hydro)

	1983	1984	1985	1986	1987	1988	1989	1990	Average
No. 1	1.8	2.0	3.9	3.0	3.8	3.5	2.4	4.9	3.13
No. 2	1.9	1.6	3.9	3.2	4.2	3.1	2.3	4.5	

Cumbaya (Hydro)

	1983	1984	1985	1986	1987	1988	1989	1990	Average
No. 1	3.3	3.3	4.2	3.6	4.1	5.3	4.1	5.4	
No. 2	1.9	2.2	4.5	4.3	4.7	3.4	3.2	5.9	3.84
No. 3	2.8	2.4	4.0	3.0	3.0	3.2	3.0	5.6	
No. 4	1.9	2.6	3.9	4.9	6.2	4.0	3.6	5.3	

EMELEC
Estero Salado

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average
Steam	0.3	6.5	0.8	1.9	0.3	1.7	19.7	14.2	0	5.6	5.10
Gas Turbine											
No. 1	32.0	0	0	–	5.7	14.3	0	0	0	30.7	10.73
No. 2	0.3	0	54.5	–	–	–	–	0	28.5	43.0	
No. 3	0.3	3.6	0	0	0	7.8	15.4	–	–	–	
No. 5	0.9	0	0	0	3.6	0	0	5.43	9.86	0	8.05
No. 6	1.9	0	0	0	0	0	0	0.16	0	0	

Guayaquil

Steam	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average
No. 1	62.5	53.2	18.2	29.8	24.0	37.2	22.4	36.4	36.4	37.8	30.30
No. 2	30.1	27.3	18.5	11.9	19.6	24.9	21.2	32.2	34.7	27.6	
No. 3	5.2	8.8	8.0	3.0	4.4	6.4	5.2	5.2	5.0	6.6	6.20
No. 4	7.2	5.8	6.9	5.2	7.2	4.1	7.4	6.3	7.2	8.5	
Gas Turbine	37.2	26.4	12.9	14.3	12.1	8.8	8.0	3.9	10.2	5.8	14.00

The creation of demand variation distribution caused by factors other than temperature change is implemented by the interconnected power system reliability analysis program (REPORT).

The actual data of maximum power demand (MW) and the projected values of maximum power demand (MW) are used as input data, and the data for creation of demand variation distribution caused by factors other than temperature change.

    (1)   Calculation Procedure

        (a) The power demand deviation (from projected value) is calculated for the year and month of calculation from the actual data of maximum power demand and the projected values of maximum power demand.

            Power Demand Deviation
= [Actual data of maximum power demand (MW) – Projected value of maximum power demand (MW)] / Projected value of maximum power demand x 100 (%)

        (b) The standard deviation is calculated from the power demand deviation and the average value.

            Average value = [Sum of power demand deviations] / Number of data (%)

            Standard deviation = {Sum of (demand deviation – average)^2 / Number of data}$^{1/2}$ (%)

        (c) The average value and the standard deviation thereby calculated are multiplied by the maximum power (MW) to convert the unit to MW, and then used as the input data of REPORT.

(2) Description of Input Data

(a) Description of Input Data

Table A-4-7 Description of Input Data

No.	Variable	Type	Unit	Description
1	C			Description of format of No. 2 data
2	SYSTEM	I1		Number of systems (maximum 4)
3	C			Description of format of No. 4 data
4	REAL	I2		Number of years of real data (maximum 50)
5	C			Description of format of No. 6 data
6	CODE	C8		Name of systems
7	C			Description of format of No. 8 data
8	YEAR	I4		Year of real data of maximum demand
9	C			Description of format of No. 10 data
10	RDATA	F8	MW	Real data of maximum demand
11	C			Description of format of No. 12 data
12	PROG	I2		Number of years of programmed data (maximum 50)
13	C			Description of format of No. 14 data
14	CODE	C8		System name
15	C			Description of format of No. 16 data
16	YEAR	I4		Year of programmed data of maximum demand
17	C			Description of format of No. 18 data
18	PDATA	F8	MW	Programmed data of maximum demand
19	C			Description of format of No. 20 data
20	NMONTH	I2		Number of months for calculation (maximum 12)
21	C			Description of format of No. 22 data
22	MH	I2		Month for calculation

No.   : Input data number. Must consistent with the number of input
               format.

Variable name: The name of input data variable

Type   : The input data type and maximum digits.

    Type C :   Character

        F :   Floating point decimal

        I :   integer

    Maximum digits: The maximum digits if the number of
                        following C, F or I.

Unit   : Input data unit

Description   : Input data description

    (b)   Input Data Format

        In the table of input data format, the data are entered to the
        hatched area.

        The data input is flushed to left they are characters (C), or
        flushed to right if they are floating decimals (F) or integers
        (I).

No.	Field layout (columns 1–70)
1	C SYSTEM
2	C
3	C REAL
4	
5	C CODE
6	
7	C YEAR YEAR YEAR YEAR YEAR YEAR
8	
9	C MONTH RDATA RDATA RDATA RDATA RDATA
10	RDATA
11	C PROG
12	
13	C CODE
14	
15	C YEAR YEAR YEAR YEAR YEAR YEAR
16	MONTH PDATA PDATA PDATA PDATA PDATA
17	C MONTH PDATA PDATA PDATA
18	PDATA
19	C NMONTH
20	
21	C MH MH MH MH MH MH MH
22	MH

(3) Calculation Example

(a) Input Data Example

```
C    SYSTEM
          2
C     REAL
         11
C CODE
  NORTH
C              YEAR     YEAR     YEAR     YEAR     YEAR
               1981     1982     1983     1984     1985
C     MONTH    RDATA    RDATA    RDATA    RDATA    RDATA
          1    241.8    257.8    273.9    294.6    317.2
          2    240.3    259.6    276.4    301.7    326.3
          3    239.2    271.5    278.9    300.8    328.4
          4    241.9    264.3    284.4    299.4    323.8
          5    241.2    262.8    287.3    303.9    326.0
          6    248.0    268.0    293.8    301.4    325.0
          7    247.3    265.0    283.0    298.9    327.6
          8    238.5    257.8    280.8    298.0    329.1
          9    246.4    263.6    277.8    305.8    321.0
         10    251.4    268.6    287.8    308.3    341.1
         11    254.3    272.9    292.7    316.9    342.7
         12    258.0    279.7    300.2    316.0    345.3
C              YEAR     YEAR     YEAR     YEAR     YEAR
               1986     1987     1988     1989     1990
C     MONTH    RDATA    RDATA    RDATA    RDATA    RDATA
          1    314.4    336.8    399.5    393.9    408.9
          2    321.3    344.0    377.9    393.3    412.1
          3    315.7    377.6    377.8    390.4    421.9
          4    314.0    344.8    382.6    400.2    413.8
          5    318.6    341.9    378.1    408.1    424.6
          6    326.8    353.7    378.4    401.1    430.5
          7    321.9    346.2    380.9    404.5    428.9
          8    313.8    347.9    370.5    389.7    416.4
          9    315.5    363.5    374.7    400.8    434.0
         10    333.0    369.2    390.6    416.7    439.5
         11    342.6    386.3    393.4    423.0    463.2
         12    340.3    385.4    396.3    422.5    464.2
C              YEAR
               1991
C     MONTH    RDATA
          1    450.6
          2    442.9
          3    446.0
          4    451.5
          5    462.7
          6    463.9
          7    463.8
          8    460.8
          9    458.6
         10    438.6
         11    493.1
         12    491.4
C CODE
  SOUTH
C              YEAR     YEAR     YEAR     YEAR     YEAR
               1981     1982     1983     1984     1985
C     MONTH    RDATA    RDATA    RDATA    RDATA    RDATA
          1    386.8    424.2    446.2    459.1    465.3
          2    388.1    427.6    434.7    443.3    474.6
          3    391.4    424.5    439.2    437.6    476.7
          4    391.0    437.1    435.0    451.5    475.9
          5    390.4    440.8    452.4    439.1    479.2
```

MONTH					
6	376.5	430.0	447.3	438.0	478.7
7	374.5	418.7	448.0	426.0	492.0
8	390.4	423.5	438.7	426.3	492.3
9	402.6	435.3	433.8	430.2	488.4
10	404.2	446.9	421.0	451.8	480.3
11	408.0	466.5	432.4	447.9	492.6
12	444.7	477.6	442.5	472.9	505.9

C

	YEAR	YEAR	YEAR	YEAR	YEAR
	1986	1987	1988	1989	1990

C

MONTH	RDATA	RDATA	RDATA	RDATA	RDATA
1	454.9	507.4	588.8	570.9	644.0
2	470.8	503.7	557.8	557.5	627.2
3	468.5	500.4	556.0	568.6	650.2
4	474.4	514.2	570.2	577.4	636.6
5	475.3	524.6	567.3	582.4	630.4
6	461.8	514.2	559.1	561.9	626.0
7	461.9	512.0	542.6	559.7	623.5
8	458.5	516.9	539.7	565.1	621.0
9	472.6	531.9	557.2	596.0	634.8
10	475.3	532.7	558.2	606.4	636.9
11	491.8	554.9	562.2	608.8	658.5
12	525.1	579.4	594.1	630.6	700.2

C

	YEAR
	1991

C

MONTH	RDATA
1	682.1
2	677.3
3	678.0
4	696.9
5	712.0
6	697.3
7	684.8
8	687.6
9	695.5
10	703.2
11	752.7
12	749.5

C PROG
   18
C CODE
NORTH

C

	YEAR	YEAR	YEAR	YEAR	YEAR
	1986	1987	1988	1989	1990

C

MONTH	PDATA	PDATA	PDATA	PDATA	PDATA
1	370.9	365.3	385.4	396.8	400.0
2	358.6	373.8	389.3	406.4	412.8
3	372.4	374.1	393.7	403.9	413.7
4	355.8	374.5	392.0	407.3	415.3
5	372.7	367.8	391.4	411.0	425.4
6	370.5	377.2	392.6	413.0	428.1
7	365.0	363.6	391.7	406.1	418.1
8	366.6	364.8	387.4	396.0	412.7
9	355.7	377.1	386.3	393.8	421.4
10	379.6	384.5	408.6	412.1	437.8
11	371.5	393.7	415.8	422.0	450.5
12	370.8	395.1	418.8	428.0	450.6

C

	YEAR	YEAR	YEAR	YEAR	YEAR
	1991	1992	1993	1994	1995

C

MONTH	PDATA	PDATA	PDATA	PDATA	PDATA
1	447.4	497.9	508.4	535.9	560.3
2	430.9	516.5	501.4	528.5	552.6
3	438.3	491.9	511.4	539.1	563.7

MONTH					
4	446.6	470.7	511.2	538.9	563.4
5	439.5	483.3	515.7	543.6	568.4
6	443.5	484.3	508.8	536.3	560.7
7	442.7	480.6	508.1	535.6	560.0
8	437.0	487.2	502.0	529.2	553.3
9	447.7	491.4	520.7	548.9	573.9
10	462.3	495.7	529.5	558.2	583.7
11	460.3	526.9	542.7	572.1	598.2
12	467.5	535.3	558.7	588.9	615.8

C

	YEAR	YEAR	YEAR	YEAR	YEAR
	1996	1997	1998	1999	2000

C

MONTH	PDATA	PDATA	PDATA	PDATA	PDATA
1	582.9	612.7	645.1	680.2	709.1
2	574.9	604.2	636.3	670.9	699.3
3	586.4	616.4	649.0	684.3	713.4
4	586.1	616.0	648.7	684.0	713.0
5	591.3	621.5	654.5	690.1	719.3
6	583.3	613.1	645.6	680.7	709.6
7	582.5	612.3	644.8	679.9	708.7
8	575.6	604.9	637.0	671.7	700.2
9	597.0	627.5	660.8	696.7	726.3
10	607.1	638.1	672.0	708.5	738.6
11	622.3	654.1	688.8	726.2	757.0
12	640.6	673.3	709.0	747.5	779.2

C

	YEAR	YEAR	YEAR
	2001	2002	2003

C

MONTH	PDATA	PDATA	PDATA
1	762.9	803.4	843.9
2	752.4	792.4	832.3
3	767.5	808.3	849.0
4	767.1	807.9	848.5
5	773.9	815.1	856.1
6	763.5	804.0	844.6
7	762.4	803.0	843.5
8	753.3	793.4	833.3
9	781.4	823.0	864.4
10	794.6	836.9	879.0
11	814.4	857.8	901.0
12	838.4	883.0	927.4

C CODE
SOUTH

C

	YEAR	YEAR	YEAR	YEAR	YEAR
	1986	1987	1988	1989	1990

C

MONTH	PDATA	PDATA	PDATA	PDATA	PDATA
1	536.8	550.3	568.1	575.1	629.9
2	525.5	547.4	574.6	576.1	628.4
3	552.5	554.4	579.6	588.2	637.7
4	537.4	558.6	584.0	587.5	638.9
5	556.2	564.4	587.2	586.5	631.6
6	523.6	548.5	580.2	578.6	622.7
7	523.7	537.7	558.1	562.0	607.8
8	535.7	541.9	564.5	574.3	615.5
9	533.0	552.0	574.5	585.5	616.4
10	541.7	555.0	584.1	599.8	634.5
11	533.5	565.7	594.2	607.5	640.4
12	572.2	593.9	627.8	638.8	679.9

C

	YEAR	YEAR	YEAR	YEAR	YEAR
	1991	1992	1993	1994	1995

C

MONTH	PDATA	PDATA	PDATA	PDATA	PDATA
1	677.3	759.4	803.6	858.0	904.0
2	659.0	780.7	792.5	846.2	891.6
3	666.4	759.5	808.5	863.2	909.5

MONTH					
4	689.5	746.8	808.0	862.7	909.0
5	676.3	757.4	815.2	870.4	917.1
6	666.7	747.2	804.2	858.6	904.7
7	653.6	737.1	803.2	857.5	903.5
8	651.9	729.2	793.5	847.2	892.6
9	679.0	755.0	823.1	878.8	925.9
10	672.4	760.1	837.1	893.7	941.6
11	702.6	807.2	858.0	916.0	965.1
12	713.2	837.1	883.1	942.9	993.4

C

MONTH	YEAR 1996 PDATA	YEAR 1997 PDATA	YEAR 1998 PDATA	YEAR 1999 PDATA	YEAR 2000 PDATA
1	953.3	1007.3	1059.8	1114.1	1144.1
2	940.2	993.5	1045.1	1098.8	1128.4
3	959.1	1013.4	1066.2	1120.9	1151.0
4	958.6	1012.9	1065.6	1120.2	1150.4
5	967.1	1021.9	1075.0	1130.2	1160.7
6	954.1	1008.1	1060.6	1115.0	1145.0
7	952.8	1006.8	1059.2	1113.5	1143.5
8	941.3	994.7	1046.5	1100.1	1129.7
9	976.5	1031.8	1085.5	1141.2	1171.9
10	993.0	1049.3	1103.9	1160.5	1191.7
11	1017.7	1075.4	1131.4	1189.5	1221.5
12	1047.6	1107.0	1164.6	1224.4	1257.4

C

MONTH	YEAR 2001 PDATA	YEAR 2002 PDATA	YEAR 2003 PDATA
1	1233.5	1303.2	1377.4
2	1216.6	1285.2	1358.4
3	1241.0	1311.1	1385.7
4	1240.4	1310.3	1385.0
5	1251.4	1322.0	1397.3
6	1234.5	1304.2	1378.4
7	1232.9	1302.5	1376.6
8	1218.1	1286.8	1360.1
9	1263.5	1334.8	1410.8
10	1284.9	1357.4	1434.7
11	1317.0	1391.3	1470.5
12	1355.6	1432.1	1513.7

C NMONTH
  12

C
MH	MH	MH	MH	MH	MH	MH	MH	MH	MH	MH	MH
1	2	3	4	5	6	7	8	9	10	11	12

(b). Calculation Example of Power Demand Deviation

Data No.	Max.Power Demand Actual data (MW)	Max.Power Demand Projected data (MW)	Power Demand Deviation (%)
1	314.400	370.900	-15.23322
2	321.300	358.600	-10.40157
3	315.700	372.400	-15.22555
4	314.000	355.800	-11.74818
5	318.600	372.700	-14.51566
6	326.800	370.500	-11.79485
7	321.900	365.000	-11.80824
8	313.800	366.600	-14.40263
9	315.500	355.700	-11.30164
10	333.000	379.600	-12.27610
11	342.600	371.500	-7.77925
12	340.300	370.800	-8.22545
13	336.800	365.300	-7.80180
14	344.000	373.800	-7.97219
15	377.600	374.100	0.93558
16	344.800	374.500	-7.93056
17	341.900	367.800	-7.04191
18	353.700	377.200	-6.23012
19	346.200	363.600	-4.78552
20	347.900	364.800	-4.63271
21	363.500	377.100	-3.60649
22	369.200	384.500	-3.97921
23	386.300	393.700	-1.87958
24	385.400	395.100	-2.45512
25	399.500	385.400	3.65856
26	377.900	389.300	-2.92837
27	377.800	393.700	-4.03858
28	382.600	392.000	-2.39793
29	378.100	391.400	-3.39801
30	378.400	392.600	-3.61696
31	380.900	391.700	-2.75722
32	370.500	387.400	-4.36239
33	374.700	386.300	-3.00287
34	390.600	408.600	-4.40528
35	393.400	415.800	-5.38724
36	396.300	418.800	-5.37249
37	393.900	396.800	-0.73088
38	393.300	406.400	-3.22339
39	390.400	403.900	-3.34241
40	400.200	407.300	-1.74321
41	408.100	411.000	-0.70557
42	401.100	413.000	-2.88133
43	404.500	406.100	-0.39402
44	389.700	396.000	-1.59092
45	400.800	393.800	1.77755
46	416.700	412.100	1.11620
47	423.000	422.000	0.23697
48	422.500	428.000	-1.28505
49	408.900	400.000	2.22497
50	412.100	412.800	-0.16956
51	421.900	413.700	1.98210
52	413.800	415.300	-0.36118
53	424.600	425.400	-0.18801
54	430.500	428.100	0.56059
55	428.900	418.100	2.58307
56	416.400	412.700	0.89652
57	434.000	421.400	2.99006
58	439.500	437.800	0.38829
59	463.200	450.500	2.81908
60	464.200	450.600	3.01816
61	450.600	447.400	0.71529
62	442.900	430.900	2.78487
63	446.000	438.300	1.75678
64	451.500	446.600	1.09716
65	462.700	439.500	5.27871
66	463.900	443.500	4.59975
67	463.800	442.700	4.76623
68	460.800	437.000	5.44623
69	458.600	447.700	2.43470
70	438.600	462.300	-5.12653
71	493.100	460.300	7.12579
72	491.400	467.500	5.11228

Number of data is 72 which is calculated multiplying 6 (Number of years, 1985-1991) by 12 (Number of months).

(c) Result Example of Output

• SYSTEM CODE   :   NORTH
• STANDARD DEVIATION   :   5.40943 (%)
• AVERAGE VALUE   :   -2.77960 (%)

If the maximum demand is 496 (mw), Input data to report will be as follows;

Average value   = -2.77960/100 x 496 = -13.79 (MW)
Standard deviation = 5.40943/100 x 496 = 26.83 (MW)

A-4-3 Formulation of Inflow Diversity Distribution

The inflow diversity distribution is formulated by using the input data of daily inflow [m^3/s] and power to inflow ratio [$kW/(m^3/s)$].

(1) Calculation Procedure

(a) The daily average available power P[kW] is calculated from the daily inflow [m^3/s] and the power to discharge ratio [$kW/(m^3/s)$].

$$P = \frac{W \times R}{1000}$$

W; Daily Inflow

R; Power to Discharge Ratio

(b) Arrange the data of the daily average available power [P] in the decreasing order of [P], as below.

Number of Days of Occurrence
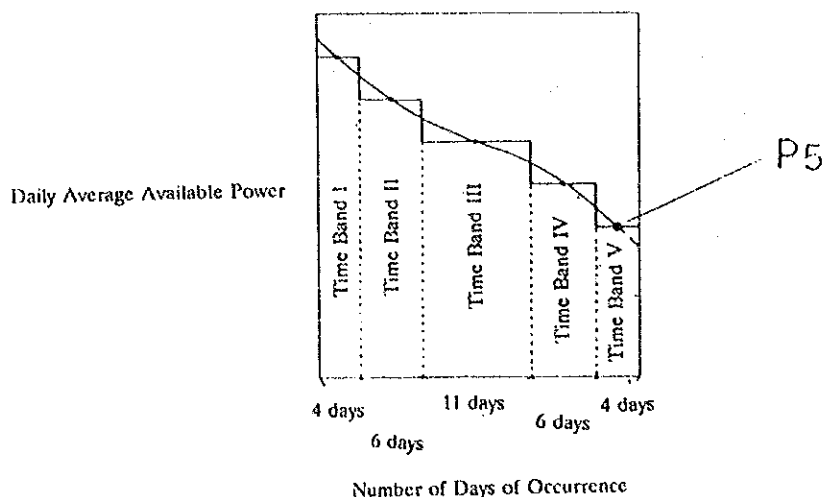
(c) Calculate ΔP, the difference between the daily average available power P and the average available power P5, which is the median of Time Band V. Seek the number of occurrence of ΔP. Divide this number by the number of days of a month (31), to convert the number to the probability.

(2) Calculation Example

Assume that we have a hydroelectric power station A, having a power to discharge ratio of 1291 [kW/(m³/s)]. The daily inflow data of this power station is given in Table A-4-9.

Table A-4-9 Data of Daily Inflow

Year	1990	1991	1992
Day	Daily Inflow [m³/s]		
1	71	92	52
2	60	80	63
3	68	75	63
4	85	75	66
5	76	87	59
6	64	78	61
7	62	66	59
8	56	62	61
9	54	57	62
10	48	66	59
11	52	62	60
12	52	57	68
13	47	53	70
14	57	68	60
15	48	70	57
16	68	59	54
17	168	57	50
18	105	60	62
19	96	58	42
20	76	58	61
21	94	65	60
22	72	59	65
23	68	57	64
24	72	57	78
25	92	57	94
26	64	59	83
27	68	59	70
28	59	61	66
29	60	56	52
30	61	56	47
31	71	65	47

The result of the calculation of the daily average available power, calculated from daily inflow and power to discharge ratio, is given in Table A-4-10.

Table A-4-10   Calculation Result of Daily Average Available Power

Year	1990	1991	1992
Day	Average Available Power [MW]		
1	92	119	67
2	77	103	81
3	88	97	81
4	110	97	85
5	98	112	76
6	83	101	79
7	80	85	76
8	72	80	79
9	70	74	80
10	62	85	76
11	67	80	77
12	67	74	88
13	61	68	90
14	74	88	77
15	62	90	74
16	88	76	70
17	217	74	65
18	136	77	80
19	124	75	54
20	98	75	79
21	121	84	77
22	93	76	84
23	88	74	83
24	93	74	101
25	119	74	108
26	83	76	107
27	88	76	90
28	76	79	85
29	77	72	67
30	79	72	61
31	92	84	61

The result of the calculation of the total of daily average available power of each day, which has been re-arranged in the order of decreasing magnitude, is given in Table A-4-11.

Table A-4-11 Total of Daily Average Available Power

Day	Average Available Power [MW]	
	Total	Re-Arranged in Decreasing Order
1	278	356
2	261	301
3	266	293
4	292	292
5	286	286
6	263	282
7	241	278
8	231	268
9	224	266
10	223	266
11	224	263
12	229	261
13	219	254
14	239	253
15	226	253
16	234	252
17	356	245
18	293	241
19	253	240
20	252	239
21	282	237
22	253	234
23	245	231
24	268	229
25	301	226
26	266	224
27	254	224
28	240	223
29	216	219
30	212	216
31	237	212

From the result of re-arranging the average available power of each day in the decreasing order, the average available power at the median of Time Band V is:

Average available power at median of Time Band V = (219+216)/2 = 217.5

The calculation of the difference between the average available power of each day and the average available power at the median of Time Band V is given in Table A-4-12.

Table A-4-12 Difference between Average Available Power of Each Day
and Average Available Power at Median of Time Band V

Day	Difference between Average Available Power of Each Day and Average Available Power at Median of Time Band V (MW)
1	138.5
2	83.5
3	75.5
4	74.5
5	68.5
6	64.5
7	60.5
8	50.5
9	48.5
10	48.5
11	45.5
12	43.5
13	36.5
14	35.5
15	35.5
16	34.5
17	27.5
18	23.5
19	22.5
20	21.5
21	19.5
22	16.5
23	13.5
24	11.5
25	8.5
26	6.5
27	6.5
28	5.5
29	1.5
30	-1.5
31	-5.5

The number of occurrence of a certain value of the difference between the average available power of each day and the average available power at the median of Time Band V is counted. This number is divided by the number of days in a month, or 31. This probability is the inflow diversity distribution.

An inflow diversity distribution is given in Table A-4-13.

Table A-4-13   Inflow Diversity Distribution

No.	MW	Number of Occurrence	Probability
1	138.5	1	0.03226
2	83.5	1	0.03226
3	75.5	1	0.03226
4	74.5	1	0.03226
5	68.5	1	0.03226
6	64.5	1	0.03226
7	60.5	1	0.03226
8	50.5	1	0.03226
9	48.5	2	0.06452
10	45.5	1	0.03226
11	43.5	1	0.03226
12	36.5	1	0.03226
13	35.5	2	0.06452
14	34.5	1	0.03226
15	27.5	1	0.03226
16	23.5	1	0.03226
17	22.5	1	0.03226
18	21.5	1	0.03226
19	19.5	1	0.03226
20	16.5	1	0.03226
21	13.5	1	0.03226
22	11.5	1	0.03226
23	8.5	1	0.03226
24	6.5	2	0.06452
25	5.5	1	0.03226
26	1.5	1	0.03226
27	-1.5	1	0.03226
28	-5.5	1	0.03226

(3)　Input Data and Output

　(a)　Description of Input Data

Table A-4-14　Description of Input Data

No.	Variable	Type	Unit	Description
1	C			Description of format of No. 2 data.
2	NPS	I2		Number of power stations (maximum 5)
3	C			Description of format of No. 4 data.
4	PSNAME	C8		Power station name.
	EWR	F8	kW/(m³/s)	Power to discharge ratio.
5	C			Description of format of No. 6 data.
6	NYEAR	I2		Number of years of data (maximum 20).
7	C			Description of format of No. 8 data.
8	YEAR	I4		Number of years of data.
9	C			Description of format of No. 10 data.
10	VOLUME	F8	m³/s	Daily inflow.
11	C			Description of format of No. 12 data.
12	NCASE	I2		Number of calculation cases.
13	C			Description of format of No. 14 data.
14	CASENA	C78		Name of calculation case.
15	C			Description of format of No. 16 data.
16	PSNAME	C8		Name of power stations for which data are integrated. (The number of PSNAME must be equal to NPS of No. 2.)

No.:　　Input data number. Must consistent with the number of input format.
Variable name:　The name of input data variable.
Type:　　The input data type and maximum digits.
　　　Type　　C: character
　　　　　　F: floating point decimal
　　　　　　I: integer
　　　Maximum digits: The maximum digits if the number following C, F or I.
Unit:　　Input data unit.
Description:　　Input data description.

　(b)　Input Data Format

　　　In the table of input data format, the data are entered to the hatched area.

　　　The data input is flushed to left they are characters (C), or flushed to right if they are floating decimals (F) or integers (I).

Table A-4-15 Input Data Format

No.		Field contents
1	C	NPS
2		
3	C	PSNAME
4		EWR
5	C	NYEAR
6		
7	C	YEAR YEAR YEAR YEAR YEAR
8		YEAR YEAR YEAR YEAR YEAR
9	C	VOLUME VOLUME VOLUME VOLUME VOLUME
10		VOLUME VOLUME VOLUME VOLUME VOLUME
11	C	NCASE
12		
13	C	CASENA
14		PSNAME PSNAME PSNAME PSNAME PSNAME
15	C	PSNAME PSNAME PSNAME PSNAME PSNAME
16		

(C) Examples for Input Data

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

		YEAR	YEAR	YEAR	YEAR	YEAR
1	C	NPS				
2		2				
3	C	PSNAME	EWR			
4		PISAYAMB	3528.			
5	C	NYEAR				
6		14				
7	C		YEAR	YEAR	YEAR	YEAR	YEAR
8			1979	1980	1981	1982	1983
9	C		VOLUME	VOLUME	VOLUME	VOLUME	VOLUME
10	1		9.68	1.70	2.17	2.42	4.58
11	2		5.51	1.81	2.41	2.73	2.85
12	3		6.40	3.55	1.19	3.53	4.05
13	4		4.88	3.80	3.30	5.37	2.97
14	5		5.36	2.50	3.34	4.10	3.90
15	6		14.71	3.48	4.14	5.24	4.67
16	7		17.42	1.24	0.52	4.58	3.27
17	8		14.71	1.22	1.96	2.91	2.68
18	9		11.22	3.92	2.22	2.48	2.38
19	10		6.34	5.29	2.55	2.50	2.40
20	11		5.50	1.92	2.92	0.00	2.50
21	12		4.73	1.99	13.19	0.48	1.97
22	13		3.51	4.45	13.19	1.96	2.99
23	14		2.36	2.62	4.77	4.66	1.72
24	15		4.45	1.89	2.77	3.08	2.60
25	16		3.66	1.96	5.10	2.80	4.35
26	17		4.32	2.50	4.42	5.78	4.70
27	18		1.11	1.63	4.87	5.94	4.82
28	19		6.95	2.57	0.27	7.91	0.83
29	20		2.64	4.11	2.13	8.57	4.12
30	21		1.67	2.29	2.57	8.08	10.40
31	22		4.54	4.32	5.32	6.61	3.61
32	23		2.36	1.64	4.37	5.69	2.99
33	24		3.18	3.21	4.15	3.54	2.92
34	25		2.32	2.29	5.07	4.94	2.20
35	26		0.14	1.19	2.82	2.54	2.23
36	27		4.22	2.43	2.82	5.55	2.87
37	28		1.09	1.81	2.96	7.85	4.87
38	29		1.98	1.93	4.12	7.48	2.23
39	30		2.10	1.93	4.56	4.52	3.69
40	31		7.62	1.31	4.66	3.49	3.82
41	C		YEAR	YEAR	YEAR	YEAR	YEAR
42			1984	1985	1986	1987	1988
43	C		VOLUME	VOLUME	VOLUME	VOLUME	VOLUME
44	1		5.56	0.95	1.87	3.51	4.22
45	2		5.28	0.90	1.04	7.32	7.69
46	3		4.07	2.69	1.80	3.58	3.17
47	4		3.80	1.37	2.87	6.51	3.06
48	5		3.12	1.47	3.61	5.06	2.73
49	6		2.82	2.34	4.99	2.85	3.30
50	7		2.83	1.03	3.95	3.61	4.53

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

  51      8       2.70      1.76      4.74      3.33      4.60
  52      9       2.01      6.66     14.33      2.23      1.66
  53     10       2.18      2.03     15.33      1.50      2.10
  54     11       2.54      5.72     13.78      3.81      2.45
  55     12       2.18      0.16      7.80      2.33      2.73
  56     13       2.20      1.46      5.31      3.65      2.07
  57     14       2.23      1.88      4.31     10.39      3.38
  58     15       1.78      0.57      3.16      7.29      4.75
  59     16       1.60      2.32      5.03      5.49      3.72
  60     17       1.80      1.79      3.91      2.66      5.90
  61     18       5.44      0.77      2.82      2.34      6.94
  62     19      10.83      0.59      3.50      2.62      5.70
  63     20       6.58      2.39      4.70      9.99      3.23
  64     21       7.59      1.43     20.82     25.18      3.08
  65     22       5.63      0.15     23.07     15.42      3.16
  66     23       4.71      3.78     24.14     12.35      0.83
  67     24       3.71      1.23     11.98      9.80      2.72
  68     25       3.37      1.39      7.04      6.91      1.75
  69     26       5.26      1.89      6.64      5.60      2.95
  70     27       4.90      2.54      4.25      4.17      2.84
  71     28       5.10      3.30      3.50      3.80      2.08
  72     29       5.61      5.25      4.31      3.02      3.89
  73     30       4.69      2.81      3.58      4.30      2.84
  74     31       3.55      2.43      3.33     12.46      2.84
  75  C           YEAR      YEAR      YEAR      YEAR      YEAR
  76               1989      1990      1991      1992
  77  C          VOLUME    VOLUME    VOLUME    VOLUME    VOLUME
  78      1       5.74      3.52      2.71      2.87
  79      2       1.00      0.75      5.71      4.08
  80      3       6.16      4.25      2.93      2.47
  81      4       4.16      3.63      3.59      2.51
  82      5       3.02      2.98      2.75      1.49
  83      6       2.88      2.89      1.36      1.72
  84      7       2.05      2.26      3.28      0.66
  85      8       1.35      2.62      1.97      2.04
  86      9       1.73      2.60      1.46      1.21
  87     10       2.39      1.00      1.90      1.25
  88     11       2.20      0.40      2.36      2.39
  89     12       2.29      0.55      1.14      1.87
  90     13       1.86      0.09      0.79      1.02
  91     14       1.52      3.71      0.46      1.54
  92     15       5.62      0.82      0.85      1.69
  93     16       1.25      1.97      1.64      1.23
  94     17       2.10     12.40      0.64      1.91
  95     18       0.81      9.54      0.67      1.78
  96     19       2.80      9.63      1.37      1.41
  97     20       2.91      7.79      1.84      0.72
  98     21       0.72      6.81      1.92      0.90
  99     22       1.35      5.30      6.18      1.99
 100     23       0.56      3.85      2.03      3.54

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

101	24	0.56	3.82	0.87	2.60
102	25	1.48	3.66	1.82	5.42
103	26	2.32	4.19	1.04	4.23
104	27	4.03	4.04	2.09	3.69
105	28	0.34	2.29	1.19	7.47
106	29	0.92	3.53	3.28	2.78
107	30	4.97	3.33	1.47	1.90
108	31	1.28	4.46	1.36	2.42
109 C	PSNAME	EWR			
110	AGOYAN	1291.			
111 C	NYEAR				
112	3				

		YEAR	YEAR	YEAR	YEAR	YEAR
113 C						
114		1990	1991	1992		
115 C		VOLUME	VOLUME	VOLUME	VOLUME	VOLUME
116	1	71.00	92.00	52.00		
117	2	60.00	80.00	63.00		
118	3	68.00	75.00	63.00		
119	4	85.00	75.00	66.00		
120	5	76.00	87.00	59.00		
121	6	64.00	78.00	61.00		
122	7	62.00	66.00	59.00		
123	8	56.00	62.00	61.00		
124	9	54.00	57.00	62.00		
125	10	48.00	66.00	59.00		
126	11	52.00	62.00	60.00		
127	12	52.00	57.00	68.00		
128	13	47.00	53.00	70.00		
129	14	57.00	68.00	60.00		
130	15	48.00	70.00	57.00		
131	16	68.00	59.00	54.00		
132	17	168.00	57.00	50.00		
133	18	105.00	60.00	62.00		
134	19	96.00	58.00	42.00		
135	20	76.00	58.00	61.00		
136	21	94.00	65.00	60.00		
137	22	72.00	59.00	65.00		
138	23	68.00	57.00	64.00		
139	24	72.00	57.00	78.00		
140	25	92.00	57.00	84.00		
141	26	64.00	59.00	83.00		
142	27	68.00	59.00	70.00		
143	28	59.00	61.00	66.00		
144	29	60.00	56.00	52.00		
145	30	61.00	56.00	47.00		
146	31	71.00	65.00	47.00		
147 C	NCASE				
148	3				
149 C	CASENA				
150	CASE-1 PISAYAMBO				

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

151 C    PSNAME      PSNAME      PSNAME      PSNAME      PSNAME
152    PISAYAMB
153 C    CASENA
154    CASE-2 AGOYAN
155 C    PSNAME      PSNAME      PSNAME      PSNAME      PSNAME
156    AGOYAN
157 C    CASENA
158    CASE-3 PISAYAMBO & AGOYAN
159 C    PSNAME      PSNAME      PSNAME      PSNAME      PSNAME
160    PISAYAMB  AGOYAN

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

(d) Examples for Output

CASE-1 PISAYAMBO

NO.	MW	FREQUENCY	PROBABILITY
1	181.00	1	0.03226
2	156.00	1	0.03226
3	107.00	1	0.03226
4	67.00	1	0.03226
5	52.00	1	0.03226
6	51.00	1	0.03226
7	48.00	1	0.03226
8	46.00	1	0.03226
9	43.00	1	0.03226
10	40.00	1	0.03226
11	33.00	1	0.03226
12	32.00	1	0.03226
13	31.00	1	0.03226
14	29.00	1	0.03226
15	28.00	1	0.03226
16	25.00	1	0.03226
17	24.00	3	0.09677
18	21.00	2	0.06452
19	20.00	1	0.03226
20	16.00	2	0.06452
21	12.00	1	0.03226
22	10.00	1	0.03226
23	9.00	1	0.03226
24	6.00	1	0.03226
25	2.00	1	0.03226
26	-2.00	1	0.03226
27	-3.00	1	0.03226

CASE-2 AGOYAN

NO.	MW	FREQUENCY	PROBABILITY
1	138.50	1	0.03226
2	83.50	1	0.03226
3	75.50	1	0.03226
4	74.50	1	0.03226
5	68.50	1	0.03226
6	64.50	1	0.03226
7	60.50	1	0.03226
8	50.50	1	0.03226
9	48.50	2	0.06452
10	45.50	1	0.03226
11	43.50	1	0.03226
12	36.50	1	0.03226
13	35.50	2	0.06452
14	34.50	1	0.03226
15	27.50	1	0.03226
16	23.50	1	0.03226
17	22.50	1	0.03226
18	21.50	1	0.03226
19	19.50	1	0.03226
20	16.50	1	0.03226
21	13.50	1	0.03226
22	11.50	1	0.03226
23	8.50	1	0.03226
24	6.50	2	0.06452
25	5.50	1	0.03226
26	1.50	1	0.03226
27	-1.50	1	0.03226
28	-5.50	1	0.03226

CASE-3 PISAYAMBO & AGOYAN

NO.	MW	FREQUENCY	PROBABILITY
1	235.00	1	0.03226
2	181.00	1	0.03226
3	171.00	1	0.03226
4	124.00	1	0.03226
5	97.00	2	0.06452
6	91.00	1	0.03226
7	89.00	1	0.03226
8	87.00	1	0.03226
9	82.00	1	0.03226
10	80.00	1	0.03226
11	76.00	1	0.03226
12	70.00	1	0.03226
13	63.00	1	0.03226
14	57.00	1	0.03226
15	55.00	1	0.03226
16	54.00	1	0.03226
17	44.00	2	0.06452
18	40.00	1	0.03226
19	28.00	1	0.03226
20	24.00	1	0.03226
21	21.00	1	0.03226
22	17.00	1	0.03226
23	16.00	2	0.06452
24	7.00	1	0.03226
25	4.00	1	0.03226
26	0.0	2	0.06452
27	-5.00	1	0.03226

A-4-4 Output Data of Computer

```
*********************************************************************************
*                                                                              *
*                                                                              *
*      RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS    *
*                                                                              *
*                                 ( REPORT )                                    *
*                                                                              *
*                                              PRESENTED  BY  KCC               *
*                                                                              *
*                                                                              *
*********************************************************************************
```

CALCULATION DATE   11/18/1993

LOLP OF SNI, AS OF DECEMBER, 1991

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70

 1  &&BEGIN CONTR
 2  C DATE
 3    11/18/1993
 4  C TITLE
 5    LOLP OF SNI, AS OF DECEMBER, 1991
 6  C   GRID
 7      2
 8  C ICALCU   IPSING   IPMULT
 9      0        0        0
10  C  ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK
11     0.5      0.4      0.3
12  *       END OF "ANSMK" DATA
13  &&END
14  &&BEGIN SINGL
15  C TITLE
16    ECUADOR DECEMBER 1991
17  C CODEO    KBLOCK
18    NORTH      1
19  C RANGEL   HEIJIT   DELTXX   LTYP
20     50.      20.      50.      P
21  C  LMWF
22     1
23  C   LNMW     LNMW     LNMW     LNMW     LNMW     LNMW
24    536.0    520.9    531.7    529.5    513.3    497.1    526.3
25    530.6    536.0    526.3    525.2    531.7    531.7    527.4
26    520.9    520.9    500.3    488.5    513.3    504.7    497.1
27  *        END OF "LNMW" DATA
28  C INDEX1
29     1
30  C CODE     TKW      CN      Q      IPOBI
31    AGOYAN   78.00    2.     0.14     0
32    PISAYAMB 32.70    2.     0.66     0
33    CUMBAYA  4.4125   4.     3.84     0
34    NAYON    7.00     2.     3.13     0
35    PASOCHOA 1.125    2.     0.36     0
36    CHILLOS  0.430    2.     2.65     0
37    OTHERS H 1.620    18.    3.84     0
38  *     END OF "CODE TKW CN Q IPOBI" DATA
39  C INDEX2
40     2
41  C CODE     TKW      CN      Q      IPOBI
42    ESMERALD 125.00   1.     0.80     0
43    SANTA RO 15.00    3.     20.23    0
44    GUANGOPO 4.05     6.     17.54    0
45    S.R DIES 1.64     5.     20.23    0
46    S.R BUNK 5.00     2.     17.54    0
47  *     END OF "CODE TKW CN Q IPOBI" DATA
48  C INDEX3   LOVAR    LOAV
49     3       26.83    -13.79
50  C INDEX4   LTVAR    LTAV

----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70

51       4          0.0        0.0
52 C  INDEXS     IHD                           BT        BT        BT        BT
53       5        H
54       BT       BT         BT          BT
55       0.0
56 *        END OF "BT" DATA
57 C  BPROB    BPROB      BPROB       BPROB     BPROB     BPROB     BPROB
58       1.00000
59 *        END OF "BPROB" DATA
60 C  CODEO    KBLOCK
61     SOUTH    1
62 C  RANGEL   HEIJIT     DELTXX      LTYP
63       50.     20.        50.        P
64 C  LMWF
65       1
66 C  LNMW     LNMW       LNMW        LNMW      LNMW      LNMW      LNMW
67     804.0    780.3      795.4      794.3     769.5     745.7     788.9
68     794.3    804.0      788.9      786.7     795.4     796.4     788.9
69     780.3    780.3      750.0      730.6     769.5     769.5     744.6
70 *        END OF "LNMW" DATA
71 C  INDEX1
72       1
73 C  CODE       TKW        CN          Q         IPOBI
74     PAUTE      87.70      5.         1.87        0
75     OTHERS H   4.54       6.         3.84        0
76 *        END OF "CODE TKW CN Q IPOBI" DATA
77 C  INDEX2
78       2
79 C  CODE       TKW        CN          Q         IPOBI
80     ESTERO V   70.00      2.         0.48        0
81     ESTERO G   20.00      1.         0.80        0
82     GUA V #1   4.70       2.        30.30        0
83     GUA V #2   9.50       2.         6.20        0
84     GUA GAS    12.00      1.        14.00        0
85     GUA VAP    31.60      1.         5.10        0
86     ESTERO E   15.00      1.         8.05        0
87     ESTERO E   20.00      4.        10.73        0
88     S.R DIES   1.40       23.       20.23        0
89     S.R BUNK   3.14       10.       17.54        0
90 *        END OF "CODE TKW CN Q IPOBI" DATA
91 C  INDEX3     LOVAR      LOAV
92       3       41.09     -20.86
93 C  INDEX4     LTVAR      LTAV
94       4        0.0        0.0
95 C  INDEX5     IHD
96       5        H
97       BT       BT         BT          BT        BT        BT        BT
98       0.0
99 *        END OF "BT" DATA
100 C  BPROB    BPROB      BPROB       BPROB     BPROB     BPROB     BPROB

----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70
101     1.00000        END OF "BPROB" DATA
102  *
103  &&END
104  &&BEGIN GROUP
105  *              END OF GROUP DATA
106  &&END
107  &&BEGIN MULTI
108  C TITLE
109  C ECUADOR DECEMBER 1991
110  C ISAMPL    LOLP    IRULE    RNTYP    RNINT
111     5000     0.5    RATAL      1        1
112  C TOL1     TOL2      H      RANGEM    JSAMP
113     30.      3.      3.3      10.       10
114  C IRELAX   NHINDO   ITMAXO
115     0         1        31
116  C CODEB   FROM     TO       CAP     PFTMX    PTFMX
117  LINE     NORTH    SOUTH    900.     900.     900.
118  *      END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
119  C CODEX   DIV  DIV  DIV  DIV
120  DIV-1    0.0
121  DIV-2    0.0
122  *      END OF "CODEX DIV" DATA
123  C CODEG    TM    IRESER    KDIF   RANGE1   RANGE2
124  NORTH    50.      0         1      10.      1.0
125  SOUTH    120.     0         1      10.      1.0
126  *      END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
127  &&END
128  &&BEGIN MULTI
129  C TITLF
130  C ECUADOR DECEMBER 1991
131  C ISAMPL    LOLP    IRULE    RNTYP    RNINT
132     5000             RATAL      1        1
133  C TOL1     TOL2      H      RANGEM    JSAMP
134     30.      3.      3.3      10.       10
135  C IRELAX   NHINDO   ITMAXO
136     9         1        1
137  C CODER   FROM     TO       CAP     PFTMX    PTFMX
138  LINE     NORTH    SOUTH    900.     900.     900.
139  *      END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
140  C CODEX   DIV  DIV  DIV  DIV
141  DIV-1    0.0
142  DIV-2    0.0
143  *      END OF "CODEX DIV" DATA
144  C CODEG    TM    IRESER    KDIF   RANGE1   RANGE2
145  NORTH  -38.18     0         1      10.      1.0
146  SOUTH   52.34     0         1      10.      1.0
147  *      END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
148  &&END
----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

*** UNIT DATA OF GRID NORTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
AGOYAN	78.00	2.	0.1	PISAYAMB	32.70	2.	0.7
CUMBAYA	4.41	4.	3.8	NAYON	7.00	2.	3.1
PASOCHOA	1.13	2.	0.4	CHILLOS	0.43	2.	2.6
OTHERS H	1.62	18.	3.8				
				TOTAL	285.32	32.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESMERALD	125.00	1.	0.8	SANTA RO	15.00	3.	20.2
GUANGOPO	4.05	6.	17.5	S.R DIES	1.64	5.	20.2
S.R BUNK	5.00	2.	17.5				
				TOTAL	212.50	17.	
				HYDRO+THERMAL TOTAL	497.82	49.	

*** LOAD DATA OF GRID NORTH ***

HI(MW)   WKDAYS(DAY)

536.   20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.787876	141.92	26.48	-0.017279
0.400000	147.70	27.56	-0.017279
1.078846	136.32	25.43	-0.001000
*19.791108	-38.18	-7.12	

ECUADOR DECEMBER 1991   1-5

*** UNIT DATA OF GRID SOUTH ***

HYDRO	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	PAUTE	87.70	5.	1.9	OTHERS H	4.54	6.	3.8
					TOTAL	465.74	11.	

THERMAL	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	ESTERO V	70.00	2.	0.5	ESTERO G	20.00	1.	0.8
	GUA V #1	4.70	2.	30.3	GUA V #2	9.50	2.	6.2
	GUA GAS	12.00	1.	14.0	GUA VAP	31.60	1.	5.1
	ESTERO E	15.00	1.	8.1	ESTERO E	20.00	4.	10.7
	S.R DIES	1.40	23.	20.2	S.R BUNK	3.14	10.	17.5
					TOTAL	390.60	47.	

HYDRO+THERMAL TOTAL   856.34   58.

*** LOAD DATA OF GRID SOUTH ***

H1(MW)	WKDAYS(DAY)
804.	20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.500000	198.35	24.67	-0.009177
0.370240	215.59	26.82	-0.005501
0.300000	230.84	28.71	-0.003235
*10.132179	52.34	6.51	

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KOIF
1	NORTH	50.0	1	536.0	0	1
2	SOUTH	120.0	1	804.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

ECUADOR DECEMBER 1991   /- '/

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 8   NORTH   SOUTH
RESERVE MARGIN (MW)   46.39   125.04
              (%)   8.65   15.55

IT = 500   0.47449   0.46583
IT = 1000   0.50025   0.44180
IT = 1500   0.50673   0.47721
IT = 2000   0.49392   0.46277
IT = 2500   0.51412   0.51235
IT = 3000   0.50930   0.52034
IT = 3500   0.52667   0.52073
IT = 4000   0.51501   0.51398
IT = 4500   0.51693   0.50330
IT = 5000   0.49945   0.49766
LOLP(DAY/MONTH) 0.49945   0.49766

TOTAL RESERVE MARGIN   171.43(MW)   12.79(%)

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ECUADOR DECEMBER 1991

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.0	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	XDIF
1	NORTH	-36.2	1	536.0	0	1
2	SOUTH	52.3	1	804.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

ECUADOR DECEMBER 1991   P. 9

*** RELIABILITY OF INTERCONNECTED GRID ***

```
IT = 1                    NORTH     SOUTH
RESERVE MARGIN (MW)      -38.18     52.34
               (%)        -7.12      6.51

IT =  500      10.01636   5.13827
IT = 1000      10.22468   5.22245
IT = 1500      10.20075   5.15423
IT = 2000      10.17308   5.01941
IT = 2500      10.14246   5.00274
IT = 3000      10.12077   4.99431
IT = 3500      10.06771   4.94252
IT = 4000      10.08694   4.93148
IT = 4500      10.03529   4.92031
IT = 5000      10.06598   4.90487
LOLP(DAY/MONTH)  10.06598   4.90487

TOTAL RESERVE MARGIN    14.16(MW)        1.06(%)
```

```
*********************************************************************************
*                                                                              *
*      RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS    *
*                                                                              *
*                                ( REPORT )                                     *
*                                                                              *
*                                              PRESENTED  BY  KCC               *
*                                                                              *
*                                                                              *
*********************************************************************************
```

CALCULATION DATE   11/19/1993

LOLP OF SNI, AS OF DECEMBER, 1998

```
---+---10---+---20---+---30---+---40---+---50---+---60---+---70

 1  &&BEGIN CONTR
 2  C DATE
 3  C 11/19/1993
 4  C TITLE
 5  LOLP OF GNI, AS OF DECEMBER, 1998
 6  C GRID
 7  2
 8  C ICALCU   IPSING   IPMULT
 9  0        0        0
10  C ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK
11  0.5      0.4      0.3
12  *       END OF "ANSMK" DATA
13  &&END
14  &&BEGIN SINGL
15  C TITLE
16  ECUADOR DECEMBER 1998
17  C CODEO   KBLOCK
18  NORTH    1
19  C RANGEL   HEIJIT   DELTXX   LTYP
20  50.      20.      50.      P
21  C LMWF
22  1
23  C LNMW     LNMW     LNMW     LNMW     LNMW     LNMW
24  753.9    747.0    743.9    721.2    698.4    739.5
25  745.5    753.0    739.4    737.8    747.0    747.0    740.9
26  731.8    731.8    702.8    686.3    721.1    709.0    698.4
27  *       END OF "LNMW" DATA
28  C INDEX1
29  1
30  C CODE     TKW      CN       Q        IPOBI
31  AGOYAN   78.00    2.       0.154    0
32  PISAYAMB 32.70    2.       0.726    0
33  CUMBAYA  4.4125   4.       4.221    0
34  NAYON    7.00     2.       3.437    0
35  PASOCHOA 1.125    2.       0.396    0
36  CHILLOS  0.430    2.       2.915    0
37  OTHERS H 1.620    18.      4.221    0
38  *       END OF "CODE TKW CN Q IPOBI" DATA
39  C INDEX2
40  2
41  C CODE     TKW      CN       Q        IPOBI
42  ESMERALD 125.00   1.       0.88     0
43  SANTA RO 15.00    3.       22.25    0
44  GUANGOPO 4.05     6.       19.29    0
45  S.R DIES 2.20     1.       22.25    0
46  S.R BUNK 1.64     5.       19.29    0
47  SR.REDIE 1.73     6.       22.25    0
48  SR.REDUN 3.76     9.       19.29    0
49  *       END OF "CODE TKW CN Q IPOBI" DATA
50  C INDEX3   LOVAR    LOAV

---+---10---+---20---+---30---+---40---+---50---+---60---+---70
```

```
----+--10----+--20----+--30----+--40----+--50----+--60----+--70

51        3       39.62   -21.40            BT      BT      BT      BT
52 C INDEX4   4   LTVAR   LTAV
53           0.0          0.0
54 C INDEXS       IHD
55        5          H
56        BT         BT      BT      BT      BT      BT
57        0.0
58 *              END OF "BT" DATA
59 C BPROR        BPROB   BPROB   BPROB   BPROB   BPROB   BPROB
60   1.00000
61 *              END OF "BPROB" DATA
62 C CODEO        KBLOCK
63   SOUTH          1
64 C RANGEL       HEIJIT  DELTXX                  LTYP
65    50.          20.     50.                      P
66 C LMWF           H
67    1
68 C    LNMW        LNMW    LNMW    LNMW    LNMW    LNMW
69      1238.0     1224.8  1223.1  1184.9  1148.2  1214.7
70      1223.1     1214.7  1211.4  1224.8  1226.3  1214.7
71      1201.5     1154.9  1125.0  1184.9  1164.9  1146.5
72 *              END OF "LNMW" DATA
73 C INDEX1
74    1
75 C CODE          TKW      CN      Q       IPOBI
76   PAUTEAB       87.70    5.      2.06    0
77   PAUTE C       91.88    5.      2.06    0
78   DAU-PERI      43.00    2.      0.50    0
79   OTHERS H      4.54     6.      4.22    0
80 *         END OF "CODE TKW CN Q IPOBI" DATA
81 C INDEX2
82    2
83 C CODE          TKW      CN      Q       IPOBI
84   ESTERO V      70.00    2.      0.53    0
85   ESTERO G      20.00    1.      0.88    0
86   GUA V #2      9.50     2.      6.82    0
87   GUA VAP       31.60    1.      5.61    0
88   ESTERO E      15.00    1.      8.85    0
89   ESTERO E      20.00    4.      11.80   0
90   S.R DIES      1.34     17.     22.25   0
91   S.R BUNK      2.85     4.      19.29   0
92   SR.REDIE      1.84     20.     22.25   0
93   SR.REBUN      3.00     2.      19.29   0
94   ELECQUIL      37.00    2.      14.00   0
95   ELECQUIT      16.00    2.      14.00   0
96   GAS-93        78.00    1.      0.80    0
97   GAS-94        78.00    1.      0.80    0
98   VAPOR-95      117.50   1.      0.80    0
99   VAPOR-97      66.00    2.      0.80    0
100 *        END OF "CODE TKW CN Q IPOBI" DATA

----+--10----+--20----+--30----+--40----+--50----+--60----+--70
```

```
---+---10---+---20---+---30---+---40---+---50---+---60---+---70

101  C  INDEX3     LOVAR      LOAV
102         3      66.31     -35.40
103  C  INDEX4     LTVAR      LTAV
104         4      0.0        0.0
105  C  INDEX5     IHD
106         5      H
107     BT         BT         BT         BT         BT         BT
108     0.0
109  *      END OF "BT" DATA
110  C  BPROB      BPROB      BPROB      BPROB      BPROB      BPROB
111     1.00000
112  *      END OF "BPROB" DATA
113  &&END
114  &&BEGIN GROUP      END OF GROUP DATA
115  *      END OF GROUP DATA
116  R&END
117  &&BEGIN MULTI
118  C  TITLE
119  C  ECUADOR DECEMBER 1998
120  C  ISAMPL     LOLP       IRULE      RNTYP      RNINT
121        5000    0.5        RATAL      1          1
122  C  TOL1       TOL2       H          RANGEM     JSAMP
123     30.        3.         3.3        10.        10
124  C  IRELAX     NHINDO     ITMAXO
125        0         1         31
126  C  CODEB      FROM       TO         CAP        PFTMX      PFTMX
127     LINE       NORTH      SOUTH      900.       900.       900.
128  *      END OF "CODEB FROM TO CAP PFTMX PFTMX" DATA
129  C  CODEX      DIV  DIV   DIV  DIV
130     DIV-1      0.0
131     DIV-2      0.0
132  *      END OF "CODEX DIV" DATA
133  C  CODEG      TM         IRESER     KDIF       RANGE1     RANGE2
134     NORTH      100.       0          1          10.        1.0
135     SOUTH      200.       0          1          10.        1.0
136  *      END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
137  &&END
138  &&BEGIN MULTI
139  C  TITLE
140  C  ECUADOR DECEMBER 1998
141  C  ISAMPL     LOLP       IRULE      RNTYP      RNINT
142        5000    0.5        RATAL      1          1
143  C  TOL1       TOL2       H          RANGEM     JSAMP
144     30.        3.         3.3        10.        10
145  C  IRELAX     NHINDO     ITMAXO
146        9         1
147  C  CODEB      FROM       TO         CAP        PFTMX      PFTMX
148     LINE       NORTH      SOUTH      900.       900.       900.
149  *      END OF "CODEB FROM TO CAP PFTMX PFTMX" DATA
150  C  CODEX      DIV  DIV   DIV  DIV

---+---10---+---20---+---30---+---40---+---50---+---60---+---70
```

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```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

151  DIV-1      0.0
152  DIV-2      0.0
153  *  END OF "CODEX DIV" DATA
154  C CODEG    TM    IRESER    KDIF    RANGE1    RANGE2
155  NORTH   -218.78     0        1      10.       1.0
156  SOUTH    667.24     0        1      10.       1.0
157  *  END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
158  &&END

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

ECUADOR DECEMBER 1998   P-5

*** UNIT DATA OF GRID NORTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
AGOYAN	78.00	2.	0.2	PISAYAMB	32.70	2.	0.7
CUMBAYA	4.41	4.	4.2	NAYON	7.00	2.	3.4
PASOCHOA	1.13	2.	0.4	CHILLOS	0.63	2.	2.9
OTHERS H	1.62	18.	4.2				
				TOTAL	285.32	32.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESMERALD	125.00	1.	0.9	SANTA RO	15.00	3.	22.3
GUANGOPO	4.05	6.	19.3	S.R DIES	2.20	1.	22.3
S.R BUNK	1.64	5.	19.3	SR.REDIE	1.73	6.	22.3
SR.REBUN	3.76	9.	19.3				
				TOTAL	248.92	31.	

HYDRO+THERMAL TOTAL 534.24 63.

*** LOAD DATA OF GRID NORTH ***

H1(MW)	WKDAYS(DAY)
753.	20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.500871	186.40	24.75	-0.360770
0.400000	189.98	25.23	-0.012962
0.330807	193.26	25.67	-0.052489
*19.995999	-218.76	-29.05	

ECUADOR DECEMBER 1998

*** UNIT DATA OF GRID SOUTH ***

HYDRO	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	PAUTEAB	87.70	5.	2.1	PAUTE C	91.88	5.	2.1
	DAU-PERI	43.00	2.	0.5	OTHERS H	4.54	6.	4.2
					TOTAL	1011.14	18.	

THERMAL	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	ESTERO V	70.00	2.	0.5	ESTERO G	20.00	1.	0.9
	GUA V #2	9.50	2.	6.8	GUA VAP	31.60	1.	5.6
	ESTERO E	15.00	1.	8.9	ESTERO E	20.00	4.	11.8
	S-R DIES	1.34	17.	22.3	S-R BUNK	2.85	4.	19.3
	SR-REDIE	1.84	20.	22.3	SR-REBUN	3.00	2.	19.3
	ELECQUIL	37.00	2.	14.0	ELECQUIT	16.00	2.	14.0
	GAS-93	78.00	1.	0.8	GAS-94	78.00	1.	0.8
	VAPOR-95	117.50	1.	0.8	VAPOR-97	66.00	2.	0.8
					TOTAL	894.08	63.	

HYDRO+THERMAL TOTAL 1905.22 81.

*** LOAD DATA OF GRID SOUTH ***

H1(MW)   WKDAYS(DAY)

1238.   20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.500000	285.51	23.06	-0.020249
0.400000	289.91	23.42	-0.003729
0.300499	310.28	25.06	-0.004032
* 0.0	667.22	53.89	

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	100.0	1	753.0	0	1
2	SOUTH	200.0	1	1238.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 17

RESERVE MARGIN (MW)	NORTH	SOUTH
	68.74	212.20
(%)	9.13	17.14
IT = 500	0.42879	0.49410
IT = 1000	0.48543	0.45802
IT = 1500	0.49104	0.48793
IT = 2000	0.48175	0.47016
IT = 2500	0.51452	0.51121
IT = 3000	0.50819	0.51852
IT = 3500	0.52432	0.51957
IT = 4000	0.51490	0.51073
IT = 4500	0.51560	0.50641
IT = 5000	0.49831	0.50046
LOLP(DAY/MONTH)	0.49831	0.50046

TOTAL RESERVE MARGIN   280.94(MW)   14.11(%)

ECUADOR DECEMBER 1990   4 - 9

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	-218.8	1	753.0	0	1
2	SOUTH	667.2	1	1238.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 1
RESERVE MARGIN (MW)	NORTH	SOUTH
	-218.78	667.24
(%)	-29.05	53.90
IT = 500	0.07830	0.0
IT = 1000	0.04082	0.0
IT = 1500	0.02722	0.0
IT = 2000	0.02699	0.0
IT = 2500	0.03189	0.0
IT = 3000	0.03722	0.0
IT = 3500	0.05915	0.0
IT = 4000	0.05203	0.0
IT = 4500	0.05237	0.0
IT = 5000	0.04981	0.0
LOLP(DAY/MONTH)	0.04981	0.0

TOTAL RESERVE MARGIN   448.46(MW)   22.52(%)

```
*******************************************************************************
*                                                                             *
*                                                                             *
*      RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS   *
*                                                                             *
*                              ( REPORT )                                      *
*                                                                             *
*                                          PRESENTED  BY  KCC                  *
*                                                                             *
*                                                                             *
*******************************************************************************
```

CALCULATION DATE   11/24/1993

LOLP OF SNI, AS OF DECEMBER, 2003

```
---+---10---+---20---+---30---+---40---+---50---+---60---+---70
 1 &&BEGIN CONTR
 2 C DATE
 3   11/24/1993
 4 C TITLE
 5   LOLP OF SNI, AS OF DECEMBER, 2003
 6 C   GRID
 7      2
 8 C ICALCU   IPSING   IPMULT
 9      0        0        0
10 C ANSMK   ANSMK   ANSMK   ANSMK   ANSMK   ANSMK   ANSMK
11     0.5     0.4     0.3
12 *        END OF "ANSMK" DATA
13 &&END
14 &&BEGIN SINGL
15 C TITLE
16   ECUADOR DECEMBER 2003
17 C CODEQ   KBLOCK
18   NORTH     1
19 C RANGEL  HEIJIT  DELTXX  LTYP
20     50.     20.     50.    P
21 C LMWF
22      1
23 C  LNMW    LNMW    LNMW    LNMW    LNMW    LNMW    LNMW
24   906.0   958.2   978.1   974.0   944.2   914.4   968.2
25   976.1   986.0   968.2   966.1   978.1   978.1   970.2
26   958.2   958.2   920.3   898.6   944.2   928.6   914.4
27 *        END OF "LNMW" DATA
28 C INDEX1
29      1
30 C CODE      TKW     CN     Q     IPOBI
31 AGOYAN     78.00    2.   0.185    0
32 PISAYAMB   32.70    2.   0.871    0
33 CUMBAYA    4.4125   4.   5.065    0
34 NAYON      7.00     2.   4.125    0
35 PASOCHOA   1.125    2.   0.475    0
36 CHILLOS    0.430    2.   3.498    0
37 S.FRACIS   113.0    2.   0.500    0
38 TOACHI     64.4     2.   0.500    0
39 OTHERS H   1.620   18.   5.065    0
40 *    END OF "CODE TKW CN Q IPOBI" DATA
41 C  INDEX2
42      2
43 C CODE      TKW     CN     Q     IPOBI
44 ESMERALD  125.00    1.   1.07     0
45 SANTA RO   15.00    3.   26.70    0
46 GUANGOPO   4.05     6.   23.15    0
47 S.R DIES   2.20     1.   26.70    0
48 S.R BUNK   1.64     5.   23.15    0
49 SR.REDIE   1.73     6.   23.36    0
50 SR.REBUN   3.76     9.   20.26    0
---+---10---+---20---+---30---+---40---+---50---+---60---+---70
```

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70

51  GAS-2001    78.00     1.      0.80       0
52  GAS-2003    27.00     1.      0.80       0
53 *              END OF "CODE TKW CN Q IPOBI" DATA
54 C INDEX3    LOVAR     LOAV
55       3     51.88    -28.02
56 C INDEX4    LTVAR     LTAV
57       4       0.0      0.0
58 C INDEX5    IHD
59       5      H
60       BT      BT        BT        BT        BT
61      0.0
62 *              END OF "BT" DATA
63 C  BPROB    BPROB     BPROB     BPROB     BPROB     BPROB
64 1.00000
65 *              END OF "BPROB" DATA
66 C CODEO    KBLOCK
67  SOUTH        1
68 C RANGEL    HEIJIT    DELTXX    LTYP
69    50.       20.       50.       P
70 C LMWF
71       1
72 C  LNMW      LNMW      LNMW      LNMW      LNMW      LNMW
73 1609.0    1561.5    1591.8    1589.6    1540.0    1492.3    1578.8
74 1589.6    1609.0    1578.8    1574.4    1591.8    1593.8    1578.8
75 1561.6    1561.6    1500.9    1462.1    1540.0    1513.9    1490.1
76 *              END OF "LNMW" DATA
77 C INDEX1
78       1
79 C CODE       TKW      CN        Q       IPOBI
80  PAUTEAB   87.70      5.       2.47       0
81  PAUTE C   91.88      5.       2.47       0
82  DAU-PERI  43.00      2.       0.52       0
83  MAZAR     53.90      2.       0.50       0
84  OTHERS H   4.54      6.       5.07       0
85 *              END OF "CODE TKW CN Q IPOBI" DATA
86 C INDEX2
87       2
88 C CODE       TKW      CN        Q       IPOBI
89  ESTERO V  70.00      2.       0.63       0
90  ESTERO G  20.00      1.       1.06       0
91  GUA V #2   9.50      2.       8.18       0
92  GUA VAP   31.60      1.       6.73       0
93  ESTERO E  15.00      1.      10.63       0
94  ESTERO E  20.00      4.      14.16       0
95  S.R DIES   1.34     17.      26.70       0
96  S.R BUNK   2.85      4.      23.15       0
97  SR.REDIE   1.84     20.      20.56       0
98  SR.REBUN   3.00      2.      21.22       0
99  ELECQUIL  57.00      2.      15.40       0
100 ELECQUIT  16.00      2.      15.40       0

----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
---+---10---+---20---+---30---+---40---+---50---+---60---+---70

101   GAS-93      78.00       1.          0.84        0
102   GAS-94      78.00       1.          0.84        0
103   VAPOR-95    117.50      1.          0.84        0
104   VAPOR-97    66.00       2.          0.84        0
105 *     END OF "CODE TKW CN Q IPOBI" DATA
106 C INDEX3      LOVAR       LOAV
107     3         86.19       -46.01
108 C INDEX4      LTVAR       LTAV
109     4         0.0         0.0
110 C INDEX5      IHD
111     5         H
112         BT          BT          BT          BT          BT          BT
113     0.0
114 *     END OF "BT" DATA
115 C BPROB       BPROB       BPROB       BPROB       BPROB       BPROB
116   1.00000
117 *     END OF "BPROB" DATA
118 &&END
119 &&BEGIN GROUP
120 *     END OF GROUP DATA
121 R&END
122 &&BEGIN MULTI
123 C TITLE
124   ECUADOR DECEMBER 2003
125 C ISAMPL      LOLP        IRULE       RNTYP       RNINT
126   5000        0.5         RATAL       1           1
127 C TOL1        TOL2        H           RANGEM      JSAMP
128   30.         3.          3.3         10.         10
129 C IRELAX      NHINDO      ITMAXO
130   0           1           31
131 C CODEB       FROM        TO          CAP         PFTMX       PTFMX
132   LINE        NORTH       SOUTH       900.        900.        900.
133 *     END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
134 C CODEX       DIV DIV DIV DIV
135   DIV-1       0.0
136   DIV-2       0.0
137 *     END OF "CODEX DIV" DATA
138 C CODEG       TM          IRESER      KDIF        RANGE1      RANGE2
139   NORTH       100.        0           .1          10.         1.0
140   SOUTH       300.        0           .1          10.         1.0
141 *     END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
142 &&END
143 &&BEGIN MULTI
144 C TITLE
145   ECUADOR DECEMBER 2003
146 C ISAMPL      LOLP        IRULE       RNTYP       RNINT
147   5000        0.5         RATAL       1           1
148 C TOL1        TOL2        H           RANGEM      JSAMP
149   30.         3.          3.3         10.         10
150 C IRELAX      NHINDO      ITMAXO

---+---10---+---20---+---30---+---40---+---50---+---60---+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

151     9
152 C CODEB    FROM      TO      1      1          CAP     PFTMX    PTFMX
153   LINE     NORTH    SOUTH                       900.    900.     900.
154 * END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
155 C CODEX    DIV   DIV   DIV   DIV
156   DIV-1    0.0
157   DIV-2    0.0
158 * END OF "CODEX DIV" DATA
159 C CODEG    TM     IRESER    KDIF     RANGE1    RANGE2
160   NORTH    9.10     0         1       10.       1.0
161   SOUTH    404.04   0         1       10.       1.0
162 * END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
163 &&END

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

ECUADOR DECEMBER 2003   P-5

*** UNIT DATA OF GRID NORTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
AGOYAN	78.00	2.	0.2	PISAYAMB	32.70	2.	0.9
CUMBAYA	4.41	4.	5.1	NAYON	7.00	2.	4.1
PASOCHOA	1.13	2.	0.5	CHILLOS	0.43	2.	3.5
S.FRACIS	113.00	2.	0.5	TOACHI	64.40	2.	0.5
OTHERS H	1.62	18.	5.1				
				TOTAL	640.12	36.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESMERALD	125.00	1.	1.1	SANTA RO	15.00	3.	26.7
GUANGOPO	4.05	6.	23.1	S.R DIES	2.20	1.	26.7
S.R BUNK	1.64	5.	23.1	SR.REDIE	1.73	6.	23.4
SR.REBUN	3.76	9.	20.3	GAS-2001	78.00	1.	0.8
GAS-2003	27.00	1.	0.8				
				TOTAL	353.92	33.	

HYDRO+THERMAL TOTAL   994.04   69.

*** LOAD DATA OF GRID NORTH ***

H1(MW)   WKDAYS(DAY)
986.   20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.504395	199.84	20.27	-0.147124
0.399699	211.65	21.47	-0.001738
0.299487	231.46	23.47	-0.008922
*15.236311	8.04	0.82	

*** UNIT DATA OF GRID SOUTH ***

HYDRO	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	PAUTEAB	87.70	5.	2.5	PAUTE C	91.88	5.	2.5
	DAU-PERI	43.00	2.	0.5	MAZAR	53.90	2.	0.5
	OTHERS H	4.54	6.	5.1				
					TOTAL	1118.94	20.	

THERMAL	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	ESTERO V	70.00	2.	0.6	ESTERO G	20.00	1.	1.1
	GUA V.#2	9.50	2.	8.2	GUA-VAP	31.50	1.	6.7
	ESTERO E	15.00	1.	10.6	ESTERO E	20.00	4.	14.2
	S.R DIES	1.34	17.	26.7	S.R BUNK	2.85	4.	23.1
	SR.REDIE	1.84	20.	20.6	SR.REBUN	3.00	2.	21.2
	ELECQUIL	37.00	2.	15.4	ELECQUIT	16.00	2.	15.4
	GAS-93	78.00	1.	0.8	GAS-94	78.00	1.	0.8
	VAPOR-95	117.50	1.	0.8	VAPOR-97	66.00	2.	0.8
					TOTAL	894.08	63.	
					HYDRO+THERMAL TOTAL	2013.02	83.	

*** LOAD DATA OF GRID SOUTH ***

H1(MW)	WKDAYS(DAY)
1609.	20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN. (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.472392	322.61	20.05	-0.010883
0.400000	331.53	20.60	-0.014110
0.300038	345.45	21.47	-0.002552
* 0.085998	404.02	25.11	

ECUADOR DECEMBER 2003   P- 1

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	NT	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	100.0	1		986.0	0	1
2	SOUTH	300.0	1		1609.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF		NT		CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH	(1)	SOUTH	(2)	900.0	900.0	900.0

ECUADOR DECEMBER 2003   P-8

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 12
RESERVE MARGIN (MW)   NORTH   SOUTH
                             95.51   248.83
                 (%)   9.69   15.46

IT = 500   0.45888   0.48566
IT = 1000   0.51230   0.45677
IT = 1500   0.50953   0.48481
IT = 2000   0.49372   0.47094
IT = 2500   0.52317   0.51098
IT = 3000   0.51435   0.51641
IT = 3500   0.52620   0.51934
IT = 4000   0.51593   0.51101
IT = 4500   0.51812   0.50424
IT = 5000   0.50158   0.49844
LOLP(DAY/MONTH)   0.50158   0.49844

TOTAL RESERVE MARGIN   344.34(MW)   13.27(%)

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	HI (MW)	RMMIN (%)	KOIF
1	NORTH	9.1	1	986.0	0	1
2	SOUTH	404.0	1	1609.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF		NT		CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH	(1)	SOUTH	(2)	900.0	900.0	900.0

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 1

RESERVE MARGIN (MW)	NORTH	SOUTH
	9.10	404.04
(%)	0.92	25.11
IT = 500	0.36606	0.05526
IT = 1000	0.33982	0.04974
IT = 1500	0.35580	0.03316
IT = 2000	0.33136	0.03343
IT = 2500	0.35536	0.04969
IT = 3000	0.36010	0.04751
IT = 3500	0.36747	0.06510
IT = 4000	0.35258	0.06239
IT = 4500	0.34189	0.06168
IT = 5000	0.32852	0.05756
LOLP(DAY/MONTH)	0.32852	0.05756

TOTAL RESERVE MARGIN   413.14(MW)   15.92(%)

```
***********************************************************************************
*                                                                                 *
*                                                                                 *
*     RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS        *
*                                                                                 *
*                              ( REPORT )                                          *
*                                                                                 *
*                                            PRESENTED  BY  KCC                    *
*                                                                                 *
*                                                                                 *
***********************************************************************************
```

CALCULATION DATE   12/01/1993

LOLP OF SNI, AS OF DECEMBER, 1998 ALTERNATIVE

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70

 1  &BEGIN CONTR
 2  C DATE
 3    12/01/1993
 4  C TITLE
 5    LOLP OF SNI, AS OF DECEMBER, 1998  ALTERNATIVE
 6  C GRID
 7    2
 8  C ICALCU   IPSING   IPMULT
 9    0        0        0
10  C ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK
11    0.5      0.4      0.3
12  *           END OF "ANSMK" DATA
13  &END
14  &BEGIN SINGL
15  C TITLE
16    ECUADOR DECEMBER 1998
17  C CODEO   KBLOCK
18    NORTH   1
19  C RANGEL   HEIJIT   DELTXX   LTYP
20    50.      20.      50.      P
21  C LMWF
22    1
23  C LNMW     LNMW     LNMW     LNMW     LNMW     LNMW     LNMW
24    753.0    731.9    747.0    743.9    721.2    698.4    739.5
25    745.5    753.0    739.4    737.8    747.0    747.0    740.9
26    731.8    731.8    702.8    686.3    721.1    709.0    698.4
27  *           END OF "LNMW" DATA
28  C INDEX1
29    1
30  C CODE     TKW      CN    Q        IPOBI
31    AGOYAN   78.00    2.    0.154    0
32    PISAYAMB 32.70    2.    0.726    0
33    CUMBAYA  4.4125   4.    4.221    0
34    NAYON    7.00     2.    3.437    0
35    PASOCHOA 1.125    2.    0.396    0
36    CHILLOS  0.430    2.    2.915    0
37    OTHERS H 1.620    18.   4.221    0
38  *           END OF "CODE TKW CN Q IPOBI" DATA
39  C INDEX2
40    2
41  C CODE     TKW      CN    Q        IPOBI
42    ESMERALD 125.00   1.    0.88     0
43    SANTA RO 15.00    3.    22.25    0
44    GUANGOPO 4.05     6.    19.29    0
45    S.R DIES 2.20     1.    22.25    0
46    S.R BUNK 1.64     5.    19.29    0
47    SR.REDIE 1.73     6.    22.25    0
48    SR.REDUN 3.76     9.    19.29    0
49    VAPOR-95 117.50   1.    0.80     0
50    VAPOR-97 66.00    2.    0.80     0

----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
---+---10---+---20---+---30---+---40---+---50---+---60---+---70

51 *
52 C  INDEX3   LOVAR    LOAV      BT       BT       BT
53        3   39.62   -21.40
54 C  INDEX4   LTVAR    LTAV
55        4     0.0      0.0
56 C  INDEX5   IHD
57        5     H
58           BT       BT       BT       BT       BT       BT
59          0.0
60 *       END OF "BT" DATA
61 C  BPROB    BPROB    BPROB    BPROB    BPROB    BPROB
62  1.00000
63 *       END OF "BPROB" DATA
64 C  CODEO    KBLOCK
65  SOUTH      1
66 C  RANGEL   HEIJIT   DELTXX   LTYP
67    50.      20.      50.      P
68 C  LNWF
69    1
70 C  LNMW     LNMW     LNMW     LNMW     LNMW     LNMW
71  1238.0   1224.8   1223.1   1184.9   1148.2   1214.7
72  1223.1   1214.7   1211.4   1224.8   1226.3   1214.7
73  1201.5   1154.9   1125.0   1184.9   1164.9   1146.5
74 *       END OF "LNMW" DATA
75 C  INDEX1
76    1
77 C  CODE     TKW      CN       Q        IPOBI
78  PAUTEAB  87.70     5.      2.06       0
79  PAUTE C  91.88     5.      2.06       0
80  DAU-PERI 43.00     2.      0.50       0
81  OTHERS H  4.54     6.      4.22       0
82 *       END OF "CODE TKW CN Q IPOBI" DATA
83 C  INDEX2
84    2
85 C  CODE     TKW      CN       Q        IPOBI
86  ESTERO V 70.00     2.      0.53       0
87  ESTERO G 20.00     1.      0.88       0
88  GUA V #2  9.50     2.      6.82       0
89  GUA VAP  31.60     1.      5.61       0
90  ESTERO E 15.00     1.      8.85       0
91  ESTERO E 20.00     4.     11.80       0
92  S.R DIES  1.34    17.     22.25       0
93  S.R BUNK  2.85     4.     19.29       0
94  SR.REDIE  1.84    20.     22.25       0
95  SR.REBUN  3.00     2.     19.29       0
96  ELECQUIL 37.00     2.     14.00       0
97  ELECQUIT 16.00     2.     14.00       0
98  GAS-93   78.00     1.      0.80       0
99  GAS-94   78.00     1.      0.80       0
100 *      END OF "CODE TKW CN Q IPOBI" DATA

---+---10---+---20---+---30---+---40---+---50---+---60---+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

101 C  INDEX3    LOVAR     LOAV
102    3         66.31     -35.40
103 C  INDEX4    LTVAR     LTAV
104    4         0.0       0.0
105 C  INDEX5    IHD
106    5         H
107    BT        BT        BT        BT        BT        BT        BT
108    0.0
109 *  END OF "BT" DATA
110 C  BPROB     BPROB     BPROB     BPROB     BPROB     BPROB
111    1.00000
112 *  END OF "BPROB" DATA
113 &&END
114 &&BEGIN GROUP
115 *  END OF GROUP DATA
116 &&END
117 &&BEGIN MULTI
118 C  TITLE
119    ECUADOR DECEMBER 1998
120 C  ISAMPL    LOLP      IRULE     RNTYP     RNINT
121    5000      0.5       RATAL     1         1
122 C  TOL1      TOL2      H         RANGEM    JSAMP
123    30.       3.        3.3       10.       10
124 C  IRELAX    NHINDO    ITMAXO
125    0         1         31
126 C  CODEB     FROM      TO        CAP       PFTMX     PTFMX
127    LINE      NORTH     SOUTH     900.      900.      900.
128 *  END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
129 C  CODEX     DIV       DIV       DIV       DIV
130    DIV-1     0.0
131    DIV-2     0.0
132 *  END OF "CODEX DIV" DATA
133 C  CODEG     TM        IRESER    KDIF      RANGE1    RANGE2
134    NORTH     100.      0         1         10.       1.0
135    SOUTH     200.      0         1         10.       1.0
136 *  END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
137 &&END
138 &&BEGIN MULTI
139 C  TITLE
140    ECUADOR DECEMBER 1998
141 C  ISAMPL    LOLP      IRULE     RNTYP     RNINT
142    5000      0.5       RATAL     1         1
143 C  TOL1      TOL2      H         RANGEM    JSAMP
144    30.       3.        3.3       10.       10
145 C  IRELAX    NHINDO    ITMAXO
146    9         1
147 C  CODEB     FROM      TO        CAP       PFTMX     PTFMX
148    LINE      NORTH     SOUTH     900.      900.      900.
149 *  END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
150 C  CODEX     DIV       DIV       DIV       DIV

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

151  DIV-1        0.0
152  DIV-2        0.0
153  *      END OF "CODEX DIV" DATA
154  C CODEG      TM     IRESER    KDIF    RANGE1    RANGE2
155    NORTH    30.74      0         1       10.       1.0
156    SOUTH   417.72      0         1       10.       1.0
157  *      END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
158  &&END

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

ECUADOR DECEMBER 1998   P-5

*** UNIT DATA OF GRID NORTH ***

HYDRO	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	AGOYAN	78.00	2.	0.2	PISAYAMB	32.70	2.	0.7
	CUMBAYA	4.41	4.	4.2	NAYON	7.00	2.	3.4
	PASOCHOA	1.13	2.	0.4	CHILLOS	0.43	2.	2.9
	OTHERS H	1.62	18.	4.2				
					TOTAL	285.32	32.	

THERMAL	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	ESMERALD	125.00	1.	0.9	SANTA RO	15.00	3.	22.3
	GUANGOPO	4.05	6.	19.3	S.R DIES	2.20	1.	22.3
	S.R BUNK	1.64	5.	19.3	SR.REDIE	1.73	6.	22.3
	SR.REBUN	3.76	9.	19.3	VAPOR-95	117.50	1.	0.8
	VAPOR-97	66.00	2.	0.8				
					TOTAL	498.42	34.	

HYDRO+THERMAL TOTAL   783.74   66.

*** LOAD DATA OF GRID NORTH ***

HI(MW)	WKDAYS(DAY)
753.	20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.500000	190.48	25.30	-0.014810
0.407439	194.00	25.76	-4.031279
0.300000	195.68	25.99	-0.009227
*14.035419	30.74	4.08	

*** UNIT DATA OF GRID SOUTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
PAUTEAR	87.70	5.	2.1	PAUTE C	91.88	5.	2.1
DAU-PERI	43.00	2.	0.5	OTHERS H	4.54	6.	4.2
				TOTAL	1011.14	18.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESTERO V	70.00	2.	0.5	ESTERO G	20.00	1.	0.9
GUA V #2	9.50	2.	6.8	GUA VAP	31.60	1.	5.6
ESTERO E	15.00	1.	8.9	ESTERO E	20.00	4.	11.8
S.R DIES	1.34	17.	22.3	S.R BUNK	2.85	4.	19.3
SR.REDIE	1.84	20.	22.3	SR.REBUN	3.00	2.	19.3
ELECQUIL	37.00	2.	14.0	ELECQUIL	16.00	2.	14.0
GAS-93	78.00	1.	0.8	GAS-94	78.00	1.	0.8
				TOTAL	644.58	60.	

HYDRO+THERMAL TOTAL   1655.72   78.

*** LOAD DATA OF GRID SOUTH ***

HI(MW)	WKDAYS(DAY)
1238.	20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.500000	283.72	22.92	-0.004336
0.392397	287.11	23.19	-0.075217
0.201054	301.07	24.32	-0.010432
* 0.020822	417.72	33.74	

ECUADOR DECEMBER 1998   p.1

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	NT	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	100.0	1	1	753.0	0	1
2	SOUTH	200.0	1	1	1238.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

ECUADOR DECEMBER 1998   p. 8

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 14

RESERVE MARGIN (MW)	NORTH	SOUTH
	76.91	203.73
(%)	10.21	16.46
IT = 500	0.45792	0.49287
IT = 1000	0.50733	0.45707
IT = 1500	0.50436	0.48638
IT = 2000	0.49387	0.47173
IT = 2500	0.52451	0.51379
IT = 3000	0.51556	0.52009
IT = 3500	0.53142	0.52169
IT = 4000	0.52011	0.51281
IT = 4500	0.51986	0.50594
IT = 5000	0.50143	0.50051
LOLP(DAY/MONTH)	0.50143	0.50051

TOTAL RESERVE MARGIN   280.64(MW)   14.10(%)

ECUADOR DECEMBER 1998   P-9

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	30.7	1	753.0	0	1
2	SOUTH	417.7	1	1238.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF		NT		CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH	(1)	SOUTH	(2)	900.0	900.0	900.0

ECUADOR DECEMBER 1998   P-10

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 1
RESERVE MARGIN (MW)   NORTH   SOUTH
                           30.74   417.72
              (%)   4.08   33.74

IT =   500   0.10453   0.02169
IT = 1000   0.05391   0.01084
IT = 1500   0.03665   0.00723
IT = 2000   0.03406   0.00542
IT = 2500   0.03205   0.00497
IT = 3000   0.03872   0.00414
IT = 3500   0.05934   0.00914
IT = 4000   0.05228   0.00800
IT = 4500   0.05382   0.00711
IT = 5000   0.05112   0.00640
LOLP(DAY/MONTH) 0.05112 0.00640

TOTAL RESERVE MARGIN   448.46(MW)   22.52(%)

```
***********************************************************************
*                                                                     *
*                                                                     *
*    RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS  *
*                                                                     *
*                            ( REPORT )                               *
*                                                                     *
*                                       PRESENTED  BY  KCC            *
*                                                                     *
*                                                                     *
***********************************************************************
```

CALCULATION DATE   12/01/1993

LOLP OF SNI, AS OF DECEMBER, 2003 ALTERNATIVE

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70

 1  &&BEGIN CONTR
 2  C DATE
 3  12/01/1993
 4  C TITLE
 5  LOLP OF SNI, AS OF DECEMBER, 2003  ALTERNATIVE
 6  C  GRID
 7      2
 8  C  ICALCU   IPSING   IPMULT
 9       0        0        0
10  C  ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK    ANSMK
11      0.5      0.4      0.3
12  *      END OF "ANSMK" DATA
13  &&END
14  &&BEGIN SINGL
15  C TITLE
16  ECUADOR DECEMBER 2003
17  C CODEO   KBLOCK
18  C NORTH     1
19  C RANGEL   HEIJIT   DELTXX   LTYP
20      50.     20.       50.      P
21      LMWF
22        1
23  C    LNMW     LNMW     LNMW     LNMW     LNMW     LNMW     LNMW
24     986.0    978.1    974.0    944.2    914.4    968.2
25     976.1    968.2    966.1    978.1    978.1    970.2
26     958.2    920.3    898.6    944.2    928.4    914.4
27  *     END OF "LNMW" DATA
28  C INDEX1
29       1
30  C CODE     TKW      CN       Q       IPOBI
31  AGOYAN     78.00    2.      0.185     0
32  PISAYAMB   32.70    2.      0.871     0
33  CUMBAYA    4.4125   4.      5.065     0
34  NAYON      7.00     2.      4.125     0
35  PASOCHOA   1.125    2.      0.475     0
36  CHILLOS    0.430    2.      3.498     0
37  S.FRACIS   113.0    2.      0.500     0
38  TOACHI     64.4     2.      0.500     0
39  OTHERS H   1.620    18.     5.065     0
40  *    END OF "CODE TKW CN Q IPOBI" DATA
41  C INDEX2
42       2
43  C CODE     TKW      CN       Q       IPOBI
44  ESMERALD   125.00   1.      1.07      0
45  SANTA RO   15.00    3.      26.70     0
46  GUANGOPO   4.05     6.      23.15     0
47  S.R DIES   2.20     1.      26.70     0
48  S.R DUNK   1.64     5.      23.15     0
49  SR.REDIE   1.73     6.      23.36     0
50  SR.RERUN   3.76     9.      20.26     0

----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70

51   GAS-2003    27.00     1.     0.80    0
52   VAPOR-95    117.50    1.     0.84    0
53   VAPOR-97    66.00     2.     0.84    0
54 *            END OF "CODE TKW CN Q IPOBI" DATA
55 C   INDEX3    LOVAR     LOAV
56 C   3         51.88    -28.02
57 C   INDEX4    LTVAR     LTAV
58 C   4         0.0       0.0
59 C   INDEX5    IHD
60             5           H
61     BT        BT        BT      BT      BT      BT
62     0.0
63 *            END OF "BT" DATA
64 C   BPROB     BPROB     BPROB   BPROB   BPROB   BPROB
65     1.00000
66 *            END OF "BPROB" DATA
67 C   CODEO     KBLOCK
68     SOUTH     1
69 C   RANGEL    HEIJIT    DELTXX  LTYP
70     50.       20.       50.     P
71 C   LMWF
72     1
73 C   LNMW      LNMW      LNMW    LNMW    LNMW    LNMW
74     1609.0    1561.6    1591.8  1589.6  1540.0  1492.3  1578.8
75     1589.6    1609.0    1578.8  1574.4  1591.8  1593.8  1578.8
76     1561.6    1561.6    1500.9  1462.1  1540.0  1513.9  1490.1
77 *            END OF "LNMW" DATA
78 C   INDEX1
79     1
80 C   CODE      TKW       CN      Q               IPOBI
81 C   PAUTEAB   87.70     5.      2.47    0
82 C   PAUTE C   91.88     5.      2.47    0
83 C   DAU-PERI  43.00     2.      0.52    0
84     MAZAR     53.90     2.      0.50    0
85     OTHERS H  4.54      6.      5.07    0
86 *            END OF "CODE TKW CN Q IPOBI" DATA
87 C   INDEX2
88     2
89 C   CODE      TKW       CN      Q               IPOBI
90 C   ESTERO V  70.00     2.      0.63    0
91     ESTERO G  20.00     1.      1.06    0
92     GUA V #2  9.50      2.      8.18    0
93     GUA VAP   31.60     1.      6.73    0
94     ESTERO E  15.00     1.      10.63   0
95     ESTERO E  20.00     4.      14.16   0
96     S.R DIES  1.34      17.     26.70   0
97     S.R BUNK  2.85      4.      23.15   0
98     SR.REDIE  1.84      20.     20.56   0
99     SR.REBUN  3.00      2.      21.22   0
100    ELECQUIL  37.00     2.      15.40   0

----+----10----+----20----+----30----+----40----+----50----+----60----+----70
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```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70
101   ELECQUIT   16.00      2.        15.40    0
102   GAS-93     78.00      1.         0.84    0
103   GAS-94     78.00      1.         0.84    0
104   GAS-2001   78.00      1.         0.80    0
105 *     END OF "CODE TKW CN Q IPOBI" DATA
106 C   INDEX3    LOVAR     LOAV
107     3         86.19    -46.01
108 C   INDEX4    LTVAR     LTAV
109     4         0.0       0.0
110 C   INDEX5    IHD
111     5         H
112     BT        BT        BT        BT        BT        BT
113     0.0
114 *     END OF "BT" DATA
115 C   BPROB     BPROB     BPROB     BPROB     BPROB     BPROB
116     1.00000
117 *     END OF "BPROB" DATA
118 &&END
119 &&BEGIN GROUP
120 *     END OF GROUP DATA
121 &&END
122 &&BEGIN MULTI
123 C TITLE
124   ECUADOR DECEMBER 2003
125 C   ISAMPL    LOLP      IRULE     RNTYP     RNINT
126     5000      0.5       RATAL     1         1
127 C   TOL1      TOL2      H         RANGEM    JSAMP
128     30.       3.        3.3       10.       10
129 C   IRELAX    NHINDO    ITMAXO
130     0         1         31
131 C   CODEB     FROM      TO        CAP       PFTMX     PTFMX
132     LINE      NORTH     SOUTH     900.      900.      900.
133 *     END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
134 C   CODEX     DIV DIV   DIV DIV
135     DIV-1     0.0
136     DIV-2     0.0
137 *     END OF "CODEX DIV" DATA
138 C   CODEG     TM        IRESER    KDIF      RANGE1    RANGE2
139     NORTH     100.      0         .1        10.       1.0
140     SOUTH     300.      0         1         10.       1.0
141 *     END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
142 &&END
143 &&BEGIN MULTI
144 C TITLE
145   ECUADOR DECEMBER 2003
146 C   ISAMPL    LOLP      IRULE     RNTYP     RNINT
147     5000      0.5       RATAL     1         1
148 C   TOL1      TOL2      H         RANGEM    JSAMP
149     30.       3.        3.3       10.       10
150 C   IRELAX    NHINDO    ITMAXO
----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
    ----+---10----+---20----+---30----+---40----+---50----+---60----+---70
151                9
152 C CODEB
153   LINE        FROM    1    TO    1
                  NORTH        SOUTH        CAP    PFTMX    PTFMX
                                            900.   900.     900.
154 *  END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
155 C CODEX        DIV DIV DIV DIV
156   DIV-1        0.0
157   DIV-2    0.0
158 *  END OF "CODEX DIV" DATA
159 C CODEG        TM    IRESER   KDIF   RANGE1   RANGE2
160   NORTH      179.54    0       1      10.      1.0
161   SOUTH      232.52    0       1      10.      1.0
162 *  END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
163 &END
    ----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

ECUADOR DECEMBER 2003   P - 5

*** UNIT DATA OF GRID NORTH ***

HYDRO	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	AGOYAN	78.00	2.	0.2	PISAYAMB	32.70	2.	0.9
	CUMBAYA	4.41	4.	5.1	NAYON	7.00	2.	4.1
	PASOCHOA	1.13	2.	0.5	CHILLOS	0.43	2.	3.5
	S.FRACIS	113.00	2.	0.5	TOACHI	64.40	2.	0.5
	OTHERS H	1.62	18.	5.1				
					TOTAL	640.12	36.	

THERMAL	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	ESMERALD	125.00	1.	1.1	SANTA RO	15.00	3.	26.7
	GUANGOPO	4.05	6.	23.1	S.R DIES	2.20	1.	26.7
	S.R BUNK	1.64	5.	23.1	SR.REDIE	1.73	6.	23.4
	SR.REBUN	3.76	9.	20.3	GAS-2003	27.00	1.	0.8
	VAPOR-95	117.50	1.	0.8	VAPOR-97	66.00	2.	0.8
					TOTAL	525.42	35.	

HYDRO+THERMAL TOTAL 1165.54   71.

*** LOAD DATA OF GRID NORTH ***

HI(MW)   WKDAYS(DAY)
986.   20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.498322	200.46	20.33	-0.064507
0.442476	220.79	22.39	-0.003171
0.299418	233.68	23.70	-0.010961
* 1.262555	179.54	18.21	

*** UNIT DATA OF GRID SOUTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
PAUTEAB	87.70	5.	2.5	PAUTE C	91.88	5.	2.5
DAU-PERI	43.00	2.	0.5	MAZAR	53.90	2.	0.5
OTHERS H	4.54	6.	5.1				
				TOTAL	1118.94	20.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESTERO V	70.00	2.	0.6	ESTERO G	20.00	1.	1.1
GUA V #2	9.50	2.	8.2	GUA VAP	31.60	1.	6.7
ESTERO E	15.00	1.	10.6	ESTERO E	20.00	4.	14.2
S.R DIES	1.34	17.	26.7	S.R BUNK	2.85	4.	23.1
SR.REDIE	1.84	20.	20.6	SR.REBUN	3.00	2.	21.2
ELECQUIL	37.00	2.	15.4	ELECQUIT	16.00	2.	15.4
GAS-93	78.00	1.	0.8	GAS-94	78.00	1.	0.8
GAS-2001	78.00	1.	0.8				
				TOTAL	722.58	61.	

HYDRO+THERMAL TOTAL   1841.52   81.

*** LOAD DATA OF GRID SOUTH ***

H1(MW)	WKDAYS(DAY)
1609.	20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.560113	303.44	18.86	-0.002826
0.423419	330.53	20.54	-0.020102
0.299462	337.89	21.00	-0.002000
* 1.861536	232.52	14.45	

ECUADOR DECEMBER 2003   P-7

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	100.0	1	986.0	0	1
2	SOUTH	300.0	1	1609.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

ECUADOR DECEMBER 2003   P - 8

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 9

RESERVE MARGIN (MW)	NORTH	SOUTH
	100.00	244.40
(%)	10.14	15.19
IT = 500	0.46049	0.48598
IT = 1000	0.51722	0.45600
IT = 1500	0.51177	0.48498
IT = 2000	0.49741	0.47246
IT = 2500	0.52587	0.51420
IT = 3000	0.51682	0.51952
IT = 3500	0.53052	0.52227
IT = 4000	0.51904	0.51383
IT = 4500	0.51977	0.50542
IT = 5000	0.50276	0.49921
LOLP(DAY/MONTH)	0.50276	0.49921

TOTAL RESERVE MARGIN   344.40(MW)   13.27(%)

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	179.5	1	986.0	0	1
2	SOUTH	232.5	1	1609.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

ECUADOR DECEMBER 2003   P-10

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 1
		NORTH	SOUTH
RESERVE MARGIN (MW)		179.54	232.52
	(%)	18.21	14.45
IT =	500	0.15093	0.22681
IT =	1000	0.12394	0.23131
IT =	1500	0.13894	0.23961
IT =	2000	0.12697	0.22489
IT =	2500	0.11071	0.26455
IT =	3000	0.11388	0.26141
IT =	3500	0.11642	0.27380
IT =	4000	0.11562	0.26105
IT =	4500	0.11679	0.25103
IT =	5000	0.11305	0.23832
LOLP(DAY/MONTH)		0.11305	0.23832

TOTAL RESERVE MARGIN   412.06(MW)   15.88(%)

```
************************************************************************
*                                                                      *
*                                                                      *
*     RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS     *
*                                                                      *
*                            ( REPORT )                                *
*                                                                      *
*                                         PRESENTED  BY  KCC           *
*                                                                      *
*                                                                      *
************************************************************************
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CALCULATION DATE   12/15/1993

LOLP OF SNI, AS OF DECEMBER, 1998 RECOMMENDATION

```
---+---10----+---20----+---30----+---40----+---50----+---60----+---70

 1 &&BEGIN CONTR
 2 C DATE
 3   12/15/1993
 4 C TITLE
 5   LOLP OF SNI, AS OF DECEMBER, 1998  RECOMMENDATION
 6 C GRID
 7   2
 8 C ICALCU  IPSING  IPMULT
 9   0       0       0
10 C ANSMK   ANSMK   ANSMK   ANSMK   ANSMK   ANSMK   ANSMK
11   0.5     0.4     0.3
12 *           END OF "ANSMK" DATA
13 &&END
14 &&BEGIN SINGL
15 C TITLE
16   ECUADOR DECEMBER 1998
17 C CODEO   KBLOCK
18   NORTH   1
19 C RANGEL  HEIJIT  DELTXX  LTYP
20   50.     20.     50.     P
21 C LMWF
22   1
23 C LNMW    LNMW    LNMW    LNMW    LNMW    LNMW    LNMW
24   753.0   747.0   743.9   721.2   698.4   739.5
25   745.5   753.0   739.4   737.8   747.0   747.0   740.9
26   731.8   731.8   702.8   686.3   721.1   709.0   698.4
27 *           END OF "LNMW" DATA
28 C INDEX1
29   1
30 C CODE      TKW      CN      Q       IPOBI
31   AGOYAN    78.00    2.      0.154   0
32   PISAYAMB  32.70    2.      0.726   0
33   CUMBAYA   4.4125   4.      4.221   0
34   NAYON     7.00     2.      3.437   0
35   PASOCHOA  1.125    2.      0.396   0
36   CHILLOS   0.430    2.      2.915   0
37   OTHERS H  1.620    18.     4.221   0
38   DAU-PERI  43.00    2.      0.50    0
39 *           END OF "CODE TKW CN Q IPOBI" DATA
40 C INDEX2
41   2
42 C CODE      TKW      CN      Q       IPOBI
43   ESMERALD  125.00   1.      0.88    0
44   SANTA RO  15.00    3.      22.25   0
45   GUANGOPO  4.05     6.      19.29   0
46   S.R DIES  2.20     1.      22.25   0
47   S.R BUNK  1.64     5.      19.29   0
48   SR.REDIE  1.73     6.      22.25   0
49   SR.REBUN  3.76     9.      19.29   0
50   VAPOR-97  66.00    2.      0.80    0

---+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
51 *                 END OF "CODE TKW CN Q IPOBI" DATA
52 C    INDEX3   LOVAR    LOAV
53         3     39.62   -21.40
54 C    INDEX4   LTVAR    LTAV
55         4      0.0      0.0
56 C    INDEX5   IHD
57         5       H
58         BT      BT      BT      BT      BT      BT      BT
59        0.0
60 *          END OF "BT" DATA
61 C     BPROB   BPROB   BPROB   BPROB   BPROB   BPROB   BPROB
62   1.00000
63 *          END OF "BPROB" DATA
64 C    CODEO   KBLOCK
65     SOUTH      1
66 C    RANGEL   HEIJIT   DELTXX   LTYP
67       50.      20.      50.      P
68 C    LMWF
69         1
70 C     LNMW    LNMW    LNMW    LNMW    LNMW    LNMW    LNMW
71    1238.0  1201.5  1224.8  1223.1  1184.9  1148.2  1214.7
72    1223.1  1238.0  1214.7  1211.4  1224.8  1226.3  1214.7
73    1201.5  1201.5  1154.9  1125.0  1184.9  1164.9  1146.5
74 *          END OF "LNMW" DATA
75 C    INDEX1
76         1
77 C     CODE     TKW      CN       Q    IPOBI
78     PAUTEAB   87.70     5.     2.06     0
79     PAUTE C   91.88     5.     2.06     0
80     OTHERS H   4.54     6.     4.22     0
81 *          END OF "CODE TKW CN Q IPOBI" DATA
82 C    INDEX2
83         2
84 C     CODE     TKW      CN       Q    IPOBI
85     ESTERO V  70.00     2.    0.53     0
86     ESTERO G  20.00     1.    0.88     0
87     GUA V #2   9.50     2.    6.82     0
88     GUA VAP   31.60     1.    5.61     0
89     ESTERO E  15.00     1.    8.85     0
90     ESTERO E  20.00     4.   11.80     0
91     S.R DIES   1.34    17.   22.25     0
92     S.R BUNK   2.85     4.   19.29     0
93     SR.REDIE   1.84    20.   22.25     0
94     SR.REBUN   3.00     2.   19.29     0
95     ELECQUIL  37.00     2.   14.00     0
96     ELECUIT   16.00     2.   14.00     0
97     GAS-93    78.00     1.    0.80     0
98     GAS-94    78.00     1.    0.80     0
99     VAPOR-95 117.50     1.    0.80     0
100 *         END OF "CODE TKW CN Q IPOBI" DATA
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
----+----10----+----20----+----30----+----40----+----50----+----60----+----70
101 C   INDEX3     LOVAR      LOAV
102        3       66.31     -35.40
103 C   INDEX4     LTVAR      LTAV
104        4        0.0        0.0
105 C   INDEX5     IHD
106        5         H
107        BT        BT         BT        BT         BT        BT
108       0.0
109 *       END OF "BT" DATA
110 C   BPROB     BPROB      BPROB      BPROB      BPROB     BPROB
111    1.00000
112 *       END OF "BPROB" DATA
113 &&END
114 &&BEGIN GROUP
115 *       END OF GROUP DATA
116 &&END
117 &&BEGIN MULTI
118 C TITLE
119 ECUADOR DECEMBER 1998
120 C  ISAMPL     LOLP      IRULE     RNTYP     RNINT
121     5000      0.5      RATAL       1         1
122 C   TOL1      TOL2        H       RANGEM    JSAMP
123     30.        3.       3.3       10.        10
124 C  IRELAX    NHINDC             ITMAXO
125      0          1                 31
126 C  CODEB     FROM        TO        CAP      PFTMX     PTFMX
127 LINE       NORTH      SOUTH       900.      900.      900.
128 *      END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
129 C  CODEX     DIV  DIV  DIV  DIV
130 DIV-1      0.0
131 DIV-2      0.0
132 *      END OF "CODEX DIV" DATA
133 C  CODEG      TM    IRESER      KDIF     RANGE1    RANGE2
134 NORTH      100.      0           1        10.       1.0
135 SOUTH      200.      0           1        10.       1.0
136 *      END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
137 &&END
138 &&BEGIN MULTI
139 C TITLE
140 ECUADOR DECEMBER 1998
141 C  ISAMPL     LOLP      IRULE     RNTYP     RNINT
142     5000      0.5      RATAL       1         1
143 C   TOL1      TOL2        H       RANGEM    JSAMP
144     30.        3.       3.3       10.        10
145 C  IRELAX    NHINDC             ITMAXO
146      9          1                  1
147 C  CODEB     FROM        TO        CAP      PFTMX     PTFMX
148 LINE       NORTH      SOUTH       900.      900.      900.
149 *      END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
150 C  CODEX     DIV  DIV  DIV  DIV
----+----10----+----20----+----30----+----40----+----50----+----60----+----70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

151  DIV-1          0.0
152  DIV-2    0.0
153  *  END OF "CODEX DIV" DATA
154  C CODEG     TM    IRESER   KDIF    RANGE1    RANGE2
155    NORTH    -0.76    0        1       10.       1.0
156    SOUTH   449.22    0        1       10.       1.0
157  *  END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
158  &&END

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

*** UNIT DATA OF GRID NORTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
AGOYAN	78.00	2.	0.2	PISAYAMB	32.70	2.	0.7
CUMBAYA	4.41	4.	4.2	NAYON	7.00	2.	3.4
PASOCHOA	1.13	2.	0.4	CHILLOS	0.43	2.	2.9
OTHERS H	1.62	18.	4.2	DAU-PERI	43.00	2.	0.5
				TOTAL	371.32	34.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESMERALD	125.00	1.	0.9	SANTA RO	15.00	3.	22.3
GUANGOPO	4.05	6.	19.3	S.R DIES	2.20	1.	22.3
S.R BUNK	1.64	5.	19.3	SR.REDIE	1.73	6.	22.3
SR.REBUN	3.76	9.	19.3	VAPOR-97	66.00	2.	0.8
				TOTAL	380.92	33.	

HYDRO+THERMAL TOTAL   752.24   67.

*** LOAD DATA OF GRID NORTH ***

H1(MW)	WKDAYS(DAY)
753.	20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.499277	187.39	24.89	-0.024185
0.400000	192.50	25.56	-0.026022
0.251498	196.19	26.05	-0.026791
*16.392649	-0.76	-0.10	

*** UNIT DATA OF GRID SOUTH ***

HYDRO	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	PAUTEAB	87.70	5.	2.1	PAUTE C	91.88	5.	2.1
	OTHERS H	4.54	6.	4.2				
					TOTAL	925.14	16.	

THERMAL	CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
	ESTERO V	70.00	2.	0.5	ESTERO G	20.00	1.	0.9
	GUA V #2	9.50	2.	6.8	GUA VAP	31.60	1.	5.6
	ESTERO E	15.00	1.	8.9	ESTERO E	20.00	4.	11.8
	S.R DIES	1.34	17.	22.3	S.R BUNK	2.85	4.	19.3
	SR.REDIE	1.84	20.	22.3	SR.REBUN	3.00	2.	19.3
	ELECQUIL	37.00	2.	14.0	ELECQUIT	16.00	2.	14.0
	GAS-93	78.00	1.	0.8	GAS-94	78.00	1.	0.8
	VAPOR-95	117.50	1.	0.8				
					TOTAL	762.08	61.	
				HYDRO+THERMAL TOTAL	1687.22	77.		

*** LOAD DATA OF GRID SOUTH ***

HI(MW)	WKDAYS(DAY)
1238.	20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.516102	284.59	22.99	-0.031453
0.400000	287.57	23.23	-0.022101
0.339292	297.29	24.01	-0.000964
* 0.008981	449.22	36.29	

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	100.0	1	753.0	0	1
2	SOUTH	200.0	1	1238.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF		NT		CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH	(1)	SOUTH	(2)	900.0	900.0	900.0

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 13

RESERVE MARGIN (MW)	NORTH	SOUTH
	73.27	207.35
(%)	9.73	16.75
IT = 500	0.44119	0.49643
IT = 1000	0.50241	0.46149
IT = 1500	0.50309	0.49054
IT = 2000	0.49193	0.47307
IT = 2500	0.52300	0.51502
IT = 3000	0.51426	0.52080
IT = 3500	0.52895	0.52153
IT = 4000	0.51895	0.51311
IT = 4500	0.51869	0.50828
IT = 5000	0.50029	0.50248
LOLP(DAY/MONTH)	0.50029	0.50248

TOTAL RESERVE MARGIN   280.62(MW)   14.09(%)

*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	-0.8	1	753.0	0	1
2	SOUTH	449.2	1	1238.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 1

RESERVE MARGIN (MW)	NORTH	SOUTH
	-0.76	449.22
(%)	-0.10	36.29
IT = 500	0.07887	0.00411
IT = 1000	0.04179	0.00205
IT = 1500	0.02786	0.00137
IT = 2000	0.02747	0.00103
IT = 2500	0.03059	0.00082
IT = 3000	0.03659	0.00068
IT = 3500	0.05856	0.00431
IT = 4000	0.05155	0.00377
IT = 4500	0.05285	0.00335
IT = 5000	0.05025	0.00301
LOLP(DAY/MONTH)	0.05025	0.00301

TOTAL RESERVE MARGIN   448.46(MW)   22.52(%)

```
************************************************************************
*                                                                      *
*                                                                      *
*     RELIABILITY  EVALUATION  PROGRAM  FOR  INTERCONNECTED  POWER  SYSTEMS  *
*                                                                      *
*                              ( REPORT )                              *
*                                                                      *
*                                        PRESENTED  BY  KCC           *
*                                                                      *
*                                                                      *
************************************************************************
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CALCULATION DATE   12/15/1993

LOLP OF SNI, AS OF DECEMBER, 2003 RECOMMENDATION

```
---+---10---+---20---+---30---+---40---+---50---+---60---+---70

 1  &&BEGIN CONTR
 2  C DATE
 3  C 12/15/1993
 4  C TITLE
 5  C LOLP OF SNI, AS OF DECEMBER, 2003  RECOMMENDATION
 6  C   GRID
 7        2
 8  C ICALCU  IPSING  IPMULT
 9        0       0       0
10  C ANSMK   ANSMK   ANSMK   ANSMK   ANSMK   ANSMK   ANSMK
11      0.5     0.4     0.3
12  *           END OF "ANSMK" DATA
13  &&END
14  &&BEGIN SINGL
15  C TITLE
16  C ECUADOR DECEMBER 2003
17  C CODEO   KBLOCK
18  C NORTH     1
19  C RANGEL  HEIJIT  DELTXX  LTYP
20        50.     20.     50.     P
21  C LMWF
22        1
23  C  LNMW    LNMW    LNMW    LNMW    LNMW    LNMW    LNMW
24    986.0   958.2   978.1   974.0   944.2   914.4   968.2
25    976.1   986.0   968.2   966.1   978.1   978.1   970.2
26    958.2   958.2   920.3   898.6   944.2   928.4   914.4
27  *           END OF "LNMW" DATA
28  C INDEX1
29        1
30  C CODE      TKW     CN      Q     IPOBI
31  AGOYAN     78.00    2.    0.185    0
32  PISAYAMB   32.70    2.    0.871    0
33  CUMBAYA     4.4125  4.    5.065    0
34  NAYON       7.00    2.    4.125    0
35  PASOCHOA    1.125   2.    0.475    0
36  CHILLOS     0.430   2.    3.498    0
37  S.FRACIS  113.0     2.    0.500    0
38  TOACHI     64.4     2.    0.500    0
39  OTHERS H    1.620  18.    5.065    0
40  DAU-PERI   43.00    2.    0.52     0
41  *  END OF "CODE TKW CN Q IPOBI" DATA
42  C INDEX2
43        2
44  C CODE      TKW     CN      Q     IPOBI
45  ESMERALD  125.00    1.    1.07     0
46  SANTA RO   15.00    3.   26.70     0
47  GUANGOPO    4.05    6.   23.15     0
48  S.R DIES    2.20    1.   26.70     0
49  S.R BUNK    1.64    5.   23.15     0
50  SR.REDIE    1.73    6.   23.36     0

---+---10---+---20---+---30---+---40---+---50---+---60---+---70
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70

51   SR.REBUN      3.76      9.       20.26    0
52   GAS-2001     78.00      1.        0.80    0
53   GAS-2003     27.00      1.        0.80    0
54   VAPOR-97     66.00      2.        0.84    0
55 * END OF "CODE TKW CN Q IPOBI" DATA
56 C INDEX3     LOVAR    LOAV
57            50.   51.88  -28.02
58 C INDEX4     LTVAR    LTAV
59             4.    0.0     0.0
60 C INDEX5     IHD
61             5.    H
62             BT        BT       BT       BT       BT
63            0.0
64 * END OF "BT" DATA
65 C    BPROB    BPROB    BPROB    BPROB    BPROB    BPROB
66     1.00000
67 * END OF "BPROB" DATA
68 C CODEO    XBLOCK
69 SOUTH        1
70 C RANGEL    HEIJIT   DELTXX    LTYP
71       50.      20.      50.        P
72 C LMWF
73        1
74 C   LNMW     LNMW     LNMW     LNMW     LNMW     LNMW
75    1609.0   1591.8   1589.6   1540.0   1492.3   1578.8
76    1589.6   1578.8   1574.4   1591.8   1593.8   1578.8
77    1561.6   1500.9   1462.1   1540.0   1513.9   1490.1
78 * END OF "LNMW" DATA
79 C INDEX1
80        1
81 C CODE     TKW      CN       Q       IPOBI
82 PAUTEAB   87.70    5.       2.47     0
83 PAUTE C   91.88    5.       2.47     0
84 MAZAR     53.90    2.       0.50     0
85 OTHERS H   4.54    6.       5.07     0
86 * END OF "CODE TKW CN Q IPOBI" DATA
87 C INDEX2
88        2
89 C CODE     TKW      CN       Q       IPOBI
90 ESTERO V  76.00    2.       0.63     0
91 ESTERO G  20.00    1.       1.06     0
92 GUA V #2   9.50    2.       8.18     0
93 GUA VAP   31.60    1.       6.73     0
94 ESTERO E  15.00    1.      10.63     0
95 ESTERO E  20.00    4.      14.16     0
96 S.R DIES   1.34   17.      26.70     0
97 S.R BUNK   2.85    4.      23.15     0
98 SR.REDIE   1.84   20.      20.56     0
99 SR.REBUN   3.00    2.      21.22     0
100 ELECQUIL 37.00    2.      15.40     0

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

```
101  ELECQUIT       16.00      2.      15.40      0
102  GAS-93         78.00      1.       0.84      0
103  GAS-94         78.00      1.       0.84      0
104  VAPOR-95      117.50      1.       0.84      0
105  *      END OF "CODE TKW CN G IPOBI" DATA
106  C      INDEX3     LOVAR      LOAV
107            3      86.19     -46.01
108  C      INDEX4     LTVAR      LTAV
109            4        0.0       0.0
110  C      INDEX5     IHD
111            5        H
112         BT         BT         BT         BT         BT         BT
113        0.0
114  *      END OF "BT" DATA
115  C      BPROB      BPROB      BPROB      BPROB      BPROB      BPROB
116    1.00000
117  *      END OF "BPROB" DATA
118  &&END
119  &&BEGIN GROUP
120  *      END OF GROUP DATA
121  &&END
122  &&BEGIN MULTI
123  C TITLE
124  C ECUADOR DECEMBER 2003
125  C      ISAMPL     LOLP       IRULE      RNTYP      RNINT
126            5000     0.5       RATAL        1          1
127  C      TOL1       TOL2       H          RANGEM     JSAMP
128            30.      3.        3.3         10.        10
129  C      IRELAX     NHINDO     ITMAXO
130            0          1         31
131  C      CODEB      FROM       TO         CAP        PFTMX      PTFMX
132    LINE         NORTH      SOUTH      900.       900.       900.
133  *      END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
134  C      CODEX      DIV        DIV DIV DIV
135    DIV-1        0.0
136    DIV-2        0.0
137  *      END OF "CODEX DIV" DATA
138  C      CODEG      TM         IRESER     KDIF       RANGE1     RANGE2
139    NORTH        100.       0          1          10.        1.0
140    SOUTH        300.       0          1          10.        1.0
141  *      END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
142  &&END
143  &&BEGIN MULTI
144  C TITLE
145  C ECUADOR DECEMBER 2003
146  C      ISAMPL     LOLP       IRULE      RNTYP      RNINT
147            5000     0.5       RATAL        1          1
148  C      TOL1       TOL2       H          RANGEM     JSAMP
149            30.      3.        3.3         10.        10
150  C      IRELAX     NHINDO     ITMAXO
```

```
----+---10----+---20----+---30----+---40----+---50----+---60----+---70
151      9           1           1
152 C CODEB     FROM        TO        CAP    PFTMX   PTFMX
153 LINE        NORTH       SOUTH     900.   900.    900.
154 * END OF "CODEB FROM TO CAP PFTMX PTFMX" DATA
155 C CODEX      DIV   DIV   DIV   DIV
156 DIV-1        0.0
157 DIV-2        0.0
158 * END OF "CODEX DIV" DATA
159 C CODEG       TM     IRESER   KDIF   RANGE1   RANGE2
160 NORTH        226.04    0        1      10.      1.0
161 SOUTH        186.02    0        1      10.      1.0
162 * END OF "CODEG TM IRESER KDIF RANGE1 RANGE2" DATA
163 &&END

----+---10----+---20----+---30----+---40----+---50----+---60----+---70
```

A-4-103

ECUADOR DECEMBER 2003

*** UNIT DATA OF GRID NORTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
AGOYAN	78.00	2.	0.2	PISAYAMB	32.70	2.	0.9
CUMBAYA	4.41	4.	5.1	NAYON	7.00	2.	4.1
PASOCHOA	1.13	2.	0.5	CHILLOS	0.43	2.	3.5
S.FRACIS	113.00	2.	0.5	TOACHI	64.40	2.	0.5
OTHERS H	1.62	18.	5.1	DAU-PERI	43.00	2.	0.5
				TOTAL	726.12	38.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESMERALD	125.00	1.	1.1	SANTA RO	15.00	3.	26.7
GUANGOPO	4.05	6.	23.1	S.R DIES	2.20	1.	26.7
S.R BUNK	1.64	5.	23.1	SR.REDIE	1.73	6.	23.4
SR.REBUN	3.76	9.	20.3	GAS-2001	78.00	1.	0.8
GAS-2003	27.00	1.	0.8	VAPOR-97	66.00	2.	0.8
				TOTAL	485.92	35.	

HYDRO+THERMAL TOTAL 1212.04 73.

*** LOAD DATA OF GRID NORTH ***

H1(MW)	WKDAYS(DAY)
986.	20.

*** RELIABILITY OF SINGLE GRID NORTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.949369	187.18	18.98	-0.001380
0.425442	221.44	22.46	-0.009293
0.300000	232.50	23.58	-0.011849
* 0.368442	226.04	22.92	

ECUADOR DECEMBER 2003

*** UNIT DATA OF GRID SOUTH ***

HYDRO

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
PAUTEAB	87.70	5.	2.5	PAUTE C	91.88	5.	2.5
MAZAR	53.90	2.	0.5	OTHERS H	4.54	6.	5.1
				TOTAL	1032.94	18.	

THERMAL

CODE	MW	UNIT	FOR	CODE	MW	UNIT	FOR
ESTERO V	70.00	2.	0.6	ESTERO G	20.00	1.	1.1
GUA V #2	9.50	2.	8.2	GUA VAP	31.60	1.	6.7
ESTERO E	15.00	1.	10.6	ESTERO E	20.00	4.	14.2
S.R DIES	1.34	17.	26.7	S.R BUNK	2.85	4.	23.1
SR.REDIE	1.84	20.	20.6	SR.REBUN	3.00	2.	21.2
ELECQUIL	37.00	2.	15.4	ELECQUIT	16.00	2.	15.4
GAS-93	78.00	1.	0.8	GAS-94	78.00	1.	0.8
VAPOR-95	117.50	1.	0.8				
				TOTAL	762.08	61.	

HYDRO+THERMAL TOTAL 1795.02 79.

*** LOAD DATA OF GRID SOUTH ***

H1(MW)	WKDAYS(DAY)
1609.	20.

*** RELIABILITY OF SINGLE GRID SOUTH ***

LOLP (DAY/MONTH)	RESERVE MARGIN (MW)	(%)	DIFF.COEF. (DAY/MONTH/MW)
0.459443	319.84	19.88	-0.006866
0.400725	330.89	20.56	-0.015401
0.300000	339.58	21.10	-0.002597
* 3.231045	186.02	11.56	

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*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	100.0	1	986.0	0	1
2	SOUTH	300.0	1	1609.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF	NT	CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH (1)	SOUTH (2)	900.0	900.0	900.0

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*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 10

RESERVE MARGIN (MW)	NORTH	SOUTH
	99.13	265.44
(%)	10.05	15.25
IT = 500	0.45232	0.48451
IT = 1000	0.51148	0.45554
IT = 1500	0.50860	0.48625
IT = 2000	0.49537	0.47237
IT = 2500	0.52492	0.51234
IT = 3000	0.51522	0.51790
IT = 3500	0.52652	0.52121
IT = 4000	0.51538	0.51255
IT = 4500	0.51645	0.50543
IT = 5000	0.49990	0.69946
LOLP(DAY/MONTH)	0.49990	0.49946

TOTAL RESERVE MARGIN   344.57(MW)   13.28(%)

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*** INPUT DATA OF INTERCONNECTED SYSTEM ***

** MONTE CARLO DATA **

SAMPLE	LOLP(D/M)	RULE	RANDOM	RINIT
5000	0.500	RATAL	1	1

** GRID DATA **

NO.	GRID NAME	RMINIT (MW)	BLOCK	H1 (MW)	RMMIN (%)	KDIF
1	NORTH	226.0	1	986.0	0	1
2	SOUTH	186.0	1	1609.0	0	1

** BRANCH DATA **

NB	BRANCH CODE	NF		NT		CAP (MW)	F->T (MW)	T->F (MW)
1	LINE	NORTH	(1)	SOUTH	(2)	900.0	900.0	900.0

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*** RELIABILITY OF INTERCONNECTED GRID ***

IT = 1

RESERVE MARGIN (MW)	NORTH	SOUTH
	226.04	186.02
(%)	22.92	11.56
IT = 500	0.12283	0.26075
IT = 1000	0.07701	0.26595
IT = 1500	0.06299	0.27412
IT = 2000	0.05751	0.25704
IT = 2500	0.04601	0.29228
IT = 3000	0.04838	0.29082
IT = 3500	0.04202	0.30634
IT = 4000	0.04357	0.29341
IT = 4500	0.04246	0.28225
IT = 5000	0.04123	0.26887
LOLP(DAY/MONTH)	0.04123	0.26887

TOTAL RESERVE MARGIN   412.06(MW)   15.88(%)