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To: <gxb1@nrc.gov> Goutam Bagchi, NRC
Date: Tue, Aug 15, 2000 10:52 AM
Subject: Corrected G-mean

Goutam - attached is an Excel spreadsheet with the corrected values for the Geometric mean. Two charts are also contained within the spreadsheet. Chart 3 presents the results one way and chart 4 presents the results in a manner consistent with the IPEEE format. In other words, the LLNL results have been sorted from lowest to highest seismic risk sites. The associated EPRI and Geometric mean values are also plotted. For the LLNL results, Commanche Peak is the lowest risk site and Robinson is the highest risk site. I have stripped off the site names from the file I sent you.

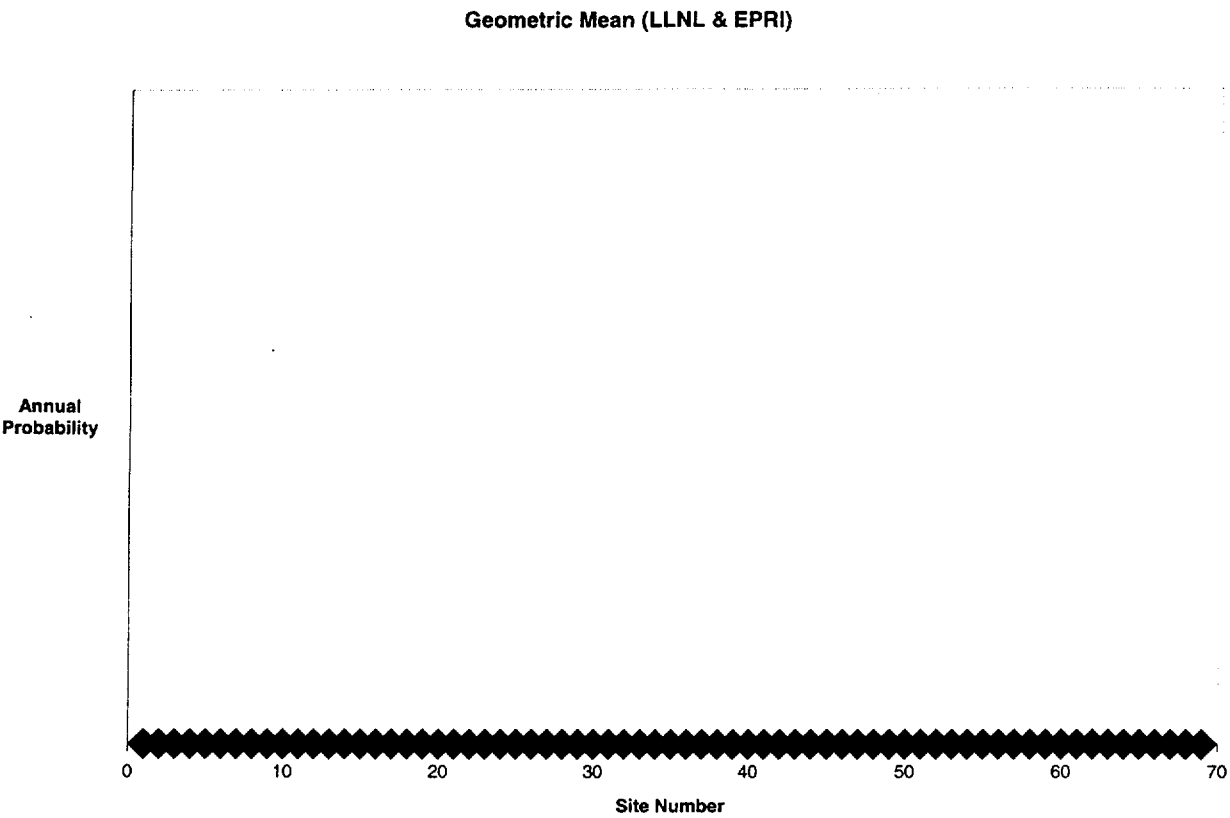
Interestingly, the LLNL risk at Robinson is about a factor of 100 higher than the EPRI estimate. It would be worthwhile to dissect the LLNL and EPRI inputs and methods at Robinson to understand this large disparity in results.

Some sites that do not have EPRI results now have geometric mean values above $1e-6$ because they only reflect LLNL - I believe that you can get one of your seismologists to attest that these are low seismic hazard sites and should be put into the group where no additional work is required. Use of the seismic checklist is a prudent method to show a high seismic capacity for a SFP and hence a low risk. Bear in mind that for those plants which satisfy the seismic checklist, the results presented on Chart 4 represent bounding SFP failure frequencies. With this in mind and other deterministic arguments, I believe that a careful review of the results shown on Chart 4 should result in only a handful of plants that require work above and beyond the seismic checklist.

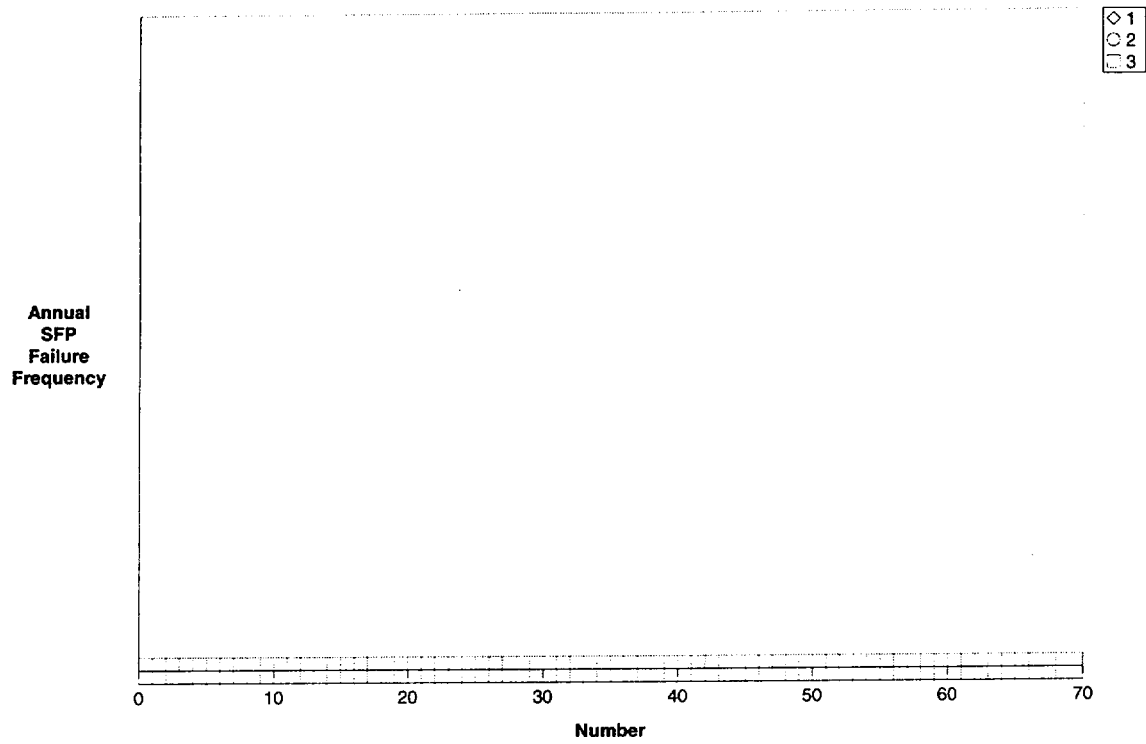
If you need additional information don't hesitate to call. Also, I am glad that you made me aware of the concerns about the geometric mean - I am humbled, but it is important to get it right.

Tom O'Hara

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Comparison - LLNL/EPRI/GEOMETRIC MEAN



Site	srtd	2.5hz	5hz	10hz	Max (2.5, 5, 10)	Max*0.5	EPRI	A-mean	G-mean	Acpt	B=1/P=2
58	1	9.12E-08	1.30E-07	7.10E-08	1.30E-07	6.51E-08	3.80E-09	3.45E-08	1.57E-08	3.00E-06	2
6	2	2.02E-07	2.44E-07	1.16E-07	2.44E-07	1.22E-07	2.22E-08	7.20E-08	5.20E-08	3.00E-06	2
61	3	2.22E-07	2.86E-07	1.61E-07	2.86E-07	1.43E-07		7.15E-08	1.43E-07	3.00E-06	1
68	4	2.34E-07	3.19E-07	1.81E-07	3.19E-07	1.59E-07		7.97E-08	1.59E-07	3.00E-06	2
30	5	3.20E-07	4.59E-07	2.61E-07	4.59E-07	2.30E-07	1.11E-08	1.20E-07	5.05E-08	3.00E-06	2
60	6	3.48E-07	4.61E-07	2.51E-07	4.61E-07	2.30E-07	5.96E-09	1.18E-07	3.71E-08	3.00E-06	2
2	7	4.23E-07	5.18E-07	2.44E-07	5.18E-07	2.59E-07	3.03E-08	1.45E-07	8.86E-08	3.00E-06	2
65	8	3.96E-07	5.41E-07	2.41E-07	5.41E-07	2.70E-07	1.91E-08	1.45E-07	7.19E-08	3.00E-06	1
3	9	4.04E-07	5.45E-07	2.69E-07	5.45E-07	2.72E-07	2.55E-08	1.49E-07	8.33E-08	3.00E-06	2
57	10	4.80E-07	5.48E-07	2.49E-07	5.48E-07	2.74E-07		1.37E-07	2.74E-07	3.00E-06	2
46	11	5.07E-07	6.74E-07	3.29E-07	6.74E-07	3.37E-07	3.08E-08	1.84E-07	1.02E-07	3.00E-06	1
11	12	5.24E-07	7.07E-07	3.83E-07	7.07E-07	3.53E-07	1.40E-08	1.84E-07	7.03E-08	3.00E-06	1
15	13	5.28E-07	7.14E-07	3.68E-07	7.14E-07	3.57E-07	1.40E-08	1.86E-07	7.07E-08	3.00E-06	1
51	14	5.71E-07	7.41E-07	3.88E-07	7.41E-07	3.71E-07	4.26E-08	2.07E-07	1.26E-07	3.00E-06	1
47	15	6.17E-07	8.00E-07	4.18E-07	8.00E-07	4.00E-07	1.06E-07	2.53E-07	2.06E-07	3.00E-06	1
42	16	7.60E-07	9.45E-07	4.85E-07	9.45E-07	4.73E-07	3.20E-08	2.52E-07	1.23E-07	3.00E-06	2
67	17	9.94E-07	9.40E-07	1.68E-07	9.94E-07	4.97E-07		2.49E-07	4.97E-07	3.00E-06	2
66	18	9.98E-07	7.16E-07	1.93E-07	9.98E-07	4.99E-07	2.90E-09	2.51E-07	3.80E-08	3.00E-06	2
33	19	8.50E-07	1.02E-06	5.15E-07	1.02E-06	5.10E-07	1.11E-07	3.11E-07	2.38E-07	3.00E-06	2
26	20	8.32E-07	1.05E-06	5.11E-07	1.05E-06	5.24E-07	4.29E-08	2.84E-07	1.50E-07	3.00E-06	1
34	21	1.02E-06	1.27E-06	6.24E-07	1.27E-06	6.33E-07	3.52E-07	4.92E-07	4.72E-07	3.00E-06	2
22	22	1.13E-06	1.36E-06	7.00E-07	1.36E-06	6.82E-07	3.89E-08	3.61E-07	1.63E-07	3.00E-06	1
45	23	1.08E-06	1.37E-06	6.85E-07	1.37E-06	6.85E-07	4.53E-08	3.65E-07	1.76E-07	3.00E-06	2
12	24	1.01E-06	1.39E-06	7.70E-07	1.39E-06	6.95E-07	5.41E-08	3.75E-07	1.94E-07	3.00E-06	2
56	25	1.18E-06	1.49E-06	7.93E-07	1.49E-06	7.43E-07	9.62E-08	4.20E-07	2.67E-07	3.00E-06	2
35	26	1.13E-06	1.54E-06	8.11E-07	1.54E-06	7.69E-07	2.86E-08	3.99E-07	1.48E-07	3.00E-06	2
29	27	1.17E-06	1.56E-06	9.36E-07	1.56E-06	7.78E-07	2.65E-07	5.21E-07	4.54E-07	3.00E-06	2
37	28	1.33E-06	1.71E-06	9.13E-07	1.71E-06	8.56E-07	4.95E-07	6.75E-07	6.51E-07	3.00E-06	2
7	29	1.36E-06	1.76E-06	9.54E-07	1.76E-06	8.79E-07	3.42E-07	6.11E-07	5.48E-07	3.00E-06	2
10	30	1.39E-06	1.90E-06	1.10E-06	1.90E-06	9.50E-07	1.85E-07	5.68E-07	4.19E-07	3.00E-06	2
5	31	1.94E-06	1.40E-06	4.35E-07	1.94E-06	9.68E-07	6.80E-09	4.88E-07	8.11E-08	3.00E-06	1
1	32	1.56E-06	2.00E-06	1.04E-06	2.00E-06	1.00E-06	2.27E-07	6.14E-07	4.76E-07	3.00E-06	1
52	33	6.09E-07	2.06E-06	1.16E-06	2.06E-06	1.03E-06	2.83E-07	6.57E-07	5.40E-07	3.00E-06	2
41	34	1.02E-06	1.32E-06	2.07E-06	2.07E-06	1.03E-06	3.45E-09	5.19E-07	5.97E-08	3.00E-06	1
48	35	6.36E-07	2.13E-06	1.16E-06	2.13E-06	1.06E-06	4.61E-07	7.62E-07	7.00E-07	3.00E-06	2
23	36	1.63E-06	2.14E-06	1.10E-06	2.14E-06	1.07E-06	1.42E-07	6.07E-07	3.90E-07	3.00E-06	1
17	37	1.65E-06	2.15E-06	1.09E-06	2.15E-06	1.08E-06	1.94E-07	6.35E-07	4.57E-07	3.00E-06	1
55	38	1.69E-06	2.15E-06	9.83E-07	2.15E-06	1.08E-06	5.13E-08	5.64E-07	2.35E-07	3.00E-06	2
24	39	1.59E-06	2.19E-06	1.25E-06	2.19E-06	1.10E-06	6.11E-07	8.54E-07	8.19E-07	3.00E-06	1
53	40	1.14E-06	2.29E-06	1.12E-06	2.29E-06	1.14E-06	1.01E-07	6.22E-07	3.40E-07	3.00E-06	2
64	41	6.10E-07	2.33E-06	1.75E-06	2.33E-06	1.16E-06	2.50E-07	7.07E-07	5.40E-07	3.00E-06	1
69	42	2.38E-06	1.37E-06	3.73E-07	2.38E-06	1.19E-06	2.75E-09	5.96E-07	5.72E-08	3.00E-06	2
9	43	1.71E-06	2.41E-06	1.34E-06	2.41E-06	1.21E-06	2.16E-07	7.11E-07	5.10E-07	3.00E-06	1
13	44	1.84E-06	2.57E-06	1.42E-06	2.57E-06	1.29E-06	3.27E-07	8.07E-07	6.48E-07	3.00E-06	2
14	45	1.88E-06	2.63E-06	1.41E-06	2.63E-06	1.32E-06	5.99E-07	9.58E-07	8.88E-07	3.00E-06	2
39	46	2.79E-06	1.84E-06	9.73E-07	2.79E-06	1.40E-06	1.40E-07	7.68E-07	4.42E-07	3.00E-06	2
31	47	1.79E-06	2.89E-06	5.35E-07	2.89E-06	1.45E-06	6.15E-08	7.53E-07	2.98E-07	3.00E-06	1
44	48	2.65E-06	2.79E-06	2.93E-06	2.93E-06	1.46E-06		7.32E-07	1.46E-06	3.00E-06	2
20	49	2.28E-06	2.94E-06	1.67E-06	2.94E-06	1.47E-06	5.50E-07	1.01E-06	9.00E-07	3.00E-06	2
50	50	1.84E-06	3.17E-06	1.25E-06	3.17E-06	1.59E-06	2.01E-07	8.94E-07	5.65E-07	3.00E-06	2
4	51	2.33E-06	3.22E-06	1.96E-06	3.22E-06	1.61E-06		8.06E-07	1.61E-06	3.00E-06	1
28	52	3.46E-06	2.43E-06	8.62E-07	3.46E-06	1.73E-06	3.86E-08	8.83E-07	2.58E-07	3.00E-06	2
32	53	3.54E-06	2.31E-06	1.06E-06	3.54E-06	1.77E-06	1.68E-07	9.70E-07	5.46E-07	3.00E-06	1
19	54	3.75E-06	2.23E-06	1.05E-06	3.75E-06	1.88E-06	1.68E-07	1.02E-06	5.61E-07	3.00E-06	2
54	55	2.37E-06	4.32E-06	2.64E-06	4.32E-06	2.16E-06	2.51E-07	1.21E-06	7.37E-07	3.00E-06	2
63	56	4.41E-06	2.75E-06	4.70E-07	4.41E-06	2.20E-06	5.91E-09	1.10E-06	1.14E-07	3.00E-06	1
38	57	3.42E-06	4.59E-06	2.35E-06	4.59E-06	2.29E-06	2.13E-07	1.25E-06	6.99E-07	3.00E-06	2
40	58	1.25E-06	5.01E-06	2.83E-06	5.01E-06	2.50E-06	9.71E-08	1.30E-06	4.93E-07	3.00E-06	2
16	59	5.02E-06	3.41E-06	1.00E-06	5.02E-06	2.51E-06	1.37E-07	1.32E-06	5.86E-07	3.00E-06	1
49	60	4.55E-06	5.39E-06	2.91E-06	5.39E-06	2.70E-06	2.71E-07	1.48E-06	8.55E-07	3.00E-06	1
27	61	2.30E-06	5.33E-06	5.70E-06	5.70E-06	2.85E-06	3.78E-07	1.61E-06	1.04E-06	3.00E-06	1
62	62	4.25E-06	7.43E-06	8.03E-06	8.03E-06	4.02E-06		2.01E-06	4.02E-06	3.00E-06	2
21	63	6.36E-06	8.23E-06	1.87E-06	8.23E-06	4.11E-06		2.06E-06	4.11E-06	3.00E-06	1
59	64	1.73E-06	8.73E-06	4.59E-06	8.73E-06	4.37E-06		2.18E-06	4.37E-06	3.00E-06	1
43	65	5.49E-06	8.90E-06	1.87E-06	8.90E-06	4.45E-06	1.23E-07	2.29E-06	7.40E-07	3.00E-06	1
8	66	1.11E-05	9.02E-06	2.43E-06	1.11E-05	5.54E-06	2.08E-07	2.87E-06	1.07E-06	3.00E-06	2
25	67	1.21E-05	1.37E-05	4.41E-06	1.37E-05	6.83E-06	5.71E-07	3.70E-06	1.98E-06	3.00E-06	2
18	68	9.05E-06	1.75E-05	1.08E-05	1.75E-05	8.74E-06	1.89E-06	5.32E-06	4.07E-06	3.00E-06	1
36	69	2.32E-05	2.81E-05	4.67E-06	2.81E-05	1.41E-05	1.42E-07	7.10E-06	1.41E-06	3.00E-06	2