PAUL S. SARBANES
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WASHINGTON, DC 20510
202-224-4524

United States Senate

WASHINGTON, DC 20510-2002

August 12, 1998

Mr. Dennis K. Rathbun
Director
Office of Congressional Affairs
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Rathbun:

REC'D BY SECY

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Enclosed is a copy of correspondence I received from Mr. Timothy Margulies. The letter raises some serious concerns about the Calvert Cliffs Nuclear Plant in Maryland. I would certainly appreciate it if you would carefully review this matter and provide me with an appropriate response.

Your attention to this matter is greatly appreciated.

With best regards,

Sincerely,

Paul Sarbanes

Paul Sarbanes
United States Senator

PSS/lsb
enclosure

DOE -

1213 River Bay Road
Annapolis, Maryland 21401
August 6, 1998

Senator Paul S. Sarbanes
SH-309 Hart Senate Office Building
Washington, D.C. 20510-2002

Dear Senator Sarbanes:

I have completed an independent set of radiological risk and cost-benefit calculations for the Calvert Cliffs site considering as low as reasonably achievable policy and the U.S. Nuclear Regulatory Commission's design back-fit approach for regulatory analysis decision-making. These results which are summarized in the enclosed paper address severe accident consequences. I offer these to your staff to further support that safety improvements can be justified from both engineering and cost-benefit perceptual viewpoints to help ensure public health and safety. Thank you very much for your attention to this matter.

Very truly yours,

Timothy S. Margulies

Timothy S. Margulies, Ph.D.

Enclosure

327610
327927
327929

Severe Accident Resources For Calvert Cliffs Nuclear Plants

T. Margulies

Probabilistic risk calculations with cost estimates were made to evaluate potential cost-beneficial justifications for safety improvements to engineering systems at the Calvert Cliffs site. The approach is consistent with an "as low as reasonably achievable" radiation protection policy endorsed by the International Commission on Radiological Protection [1].

The two power generating units reside approximately 35 miles south of Annapolis, Maryland each supplying 845 mega-watts. Unit I began operating in 1975 and Unit II in 1977; hence, their licenses given by the U.S. Nuclear Regulatory Commission permitting them to operate expire in the years 2014 and 2016, respectively.

The dominant safety issues addressed concern severe accident scenarios such as a station black-out or containment bypass (Event V), each with approximately a one chance per one-hundred thousand likelihood of occurrence. Station black-out refers to the conditions that the alternating electrical supply onsite and offsite are unavailable for running cooling pumps and safety systems. Event V pertains to an "Achilles heel" of the containment where check valve failures would release coolant and radioactivity directly to the environment outside containment.

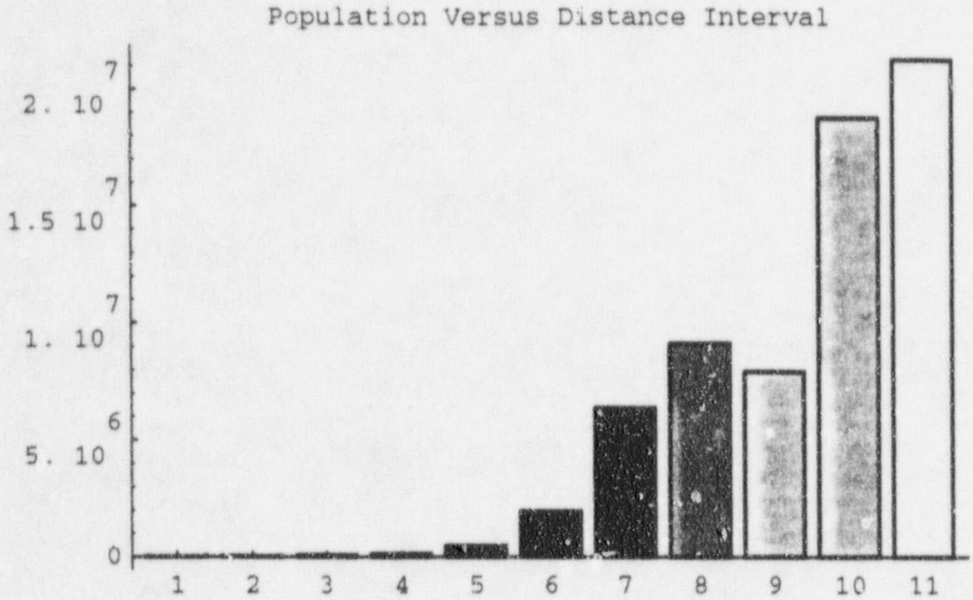
The transport calculations sample meteorological conditions, and include wind direction probabilities while simulating radiological exposures to over three million people within fifty miles of the plants and extending to people within 350 miles. Refer to the first bar chart showing the population distributed at various distances surrounding the site. An approach of the U.S. Nuclear Regulatory Commission to evaluate whether to augment existing designs for light water reactors to reduce population dose (Title 10, Code of Federal Regulations, Part 50:Appendix I, FR Vol. 40, No. 87, 19439, May 1975) is applied. The Nuclear Regulatory Commission's value for a cost-benefit analysis initially set radiation costs as $ 1000 per person-rem. Recent proposals have been made to increase this by a factor of two to five. The annual levelized cost results for various interest rates for the units are provided in the attached figures. These calculations corroborate previous analyses which neglect wind direction frequency, supported by the Chernobyl and Three Mile Island accidents during which the wind direction continually shifted and did not generally persist uni-directionally [2].

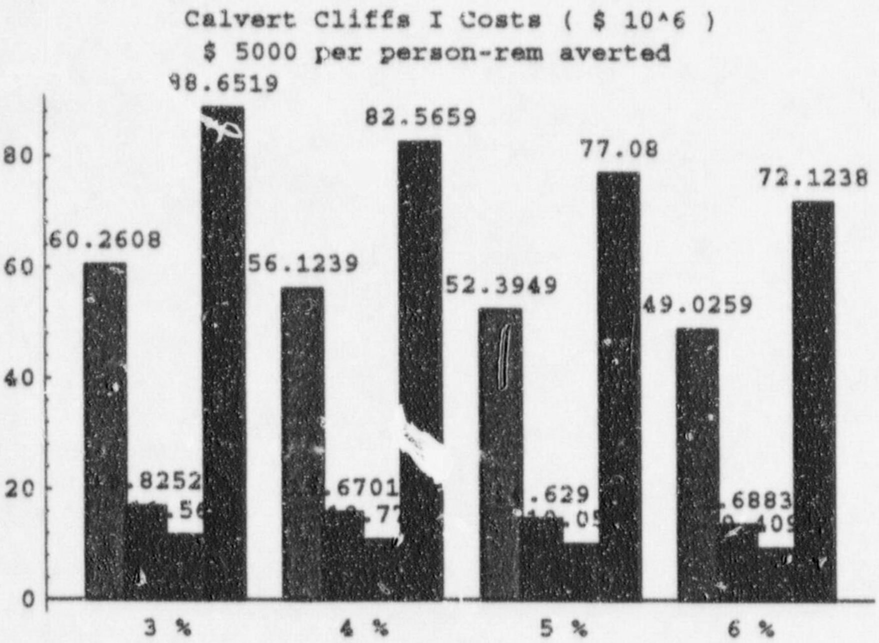
The costs in the following figures represent potential expenditures to improve the safe operation over the remaining lives of the plants and to prevent the severe consequences from reactor accidents. Improvements such as instrumentation and monitoring to minimize a bypass scenario, and supplemental filtering and scrubbing to the present containments are considered viable based on these analyses. Alternative allocations of resources to emergency preparedness measures such as stockpiling potassium iodide for thyroid protection would not have the additional protection benefits of reducing substantial non-inhalation pathway contributions of severe accident radioactivity releases to offsite whole body doses, as well as, protecting land from contamination.

References:

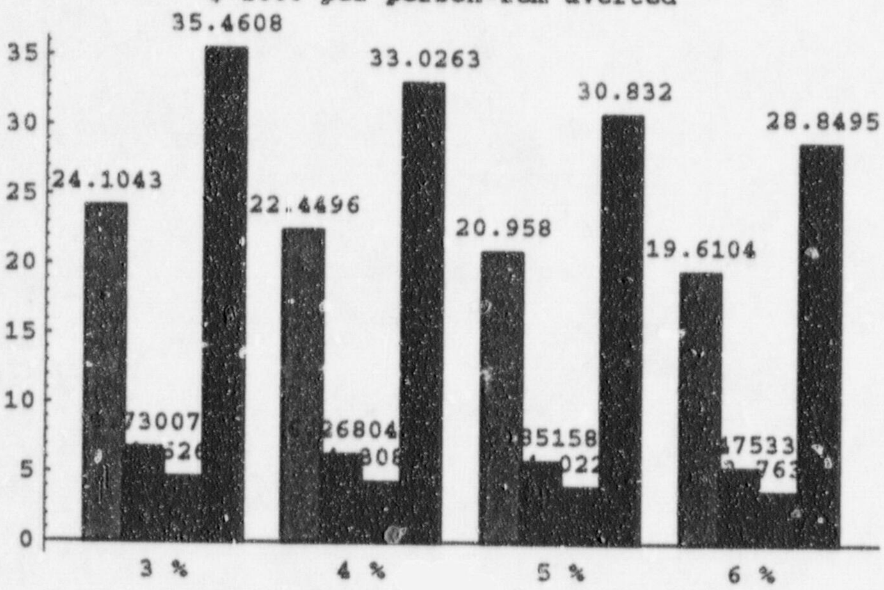
1. ICRP, "Cost-Benefit Analysis in the Optimization of Radiation Protection," Annals of the ICRP, No. 37, Vol. 10, No. 2/3, 1983, Pergamon Press .

2. "Cost-Benefit Risk Analyses: Radioactive Waste Systems for Light Water Reactors," T. Margulies, U.S. Environmental Protection Agency, Manuscript, 1998.

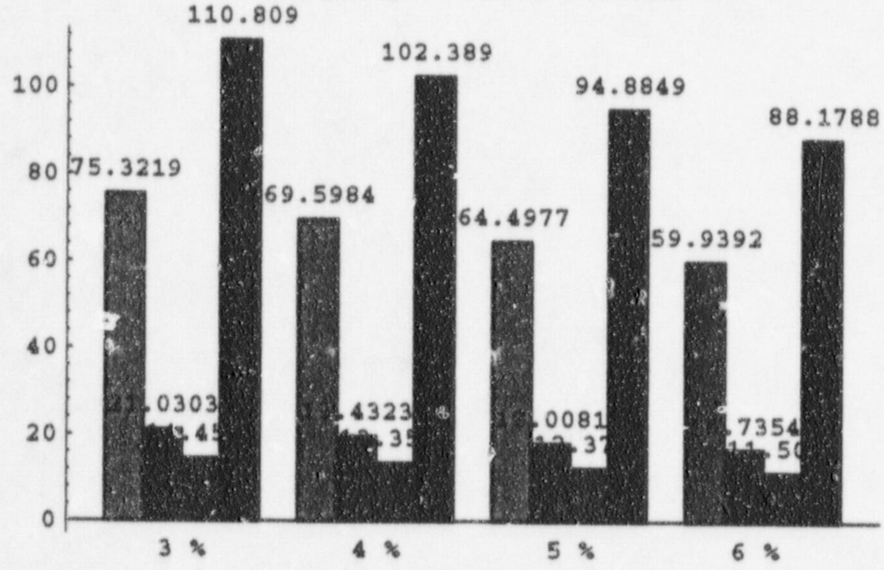

Population Versus Distance Interval
2. 10^7
1.5 10^7
1. 10^7
5. 10^6
0
1
2
3
4
5
6
7
8
9
10
11

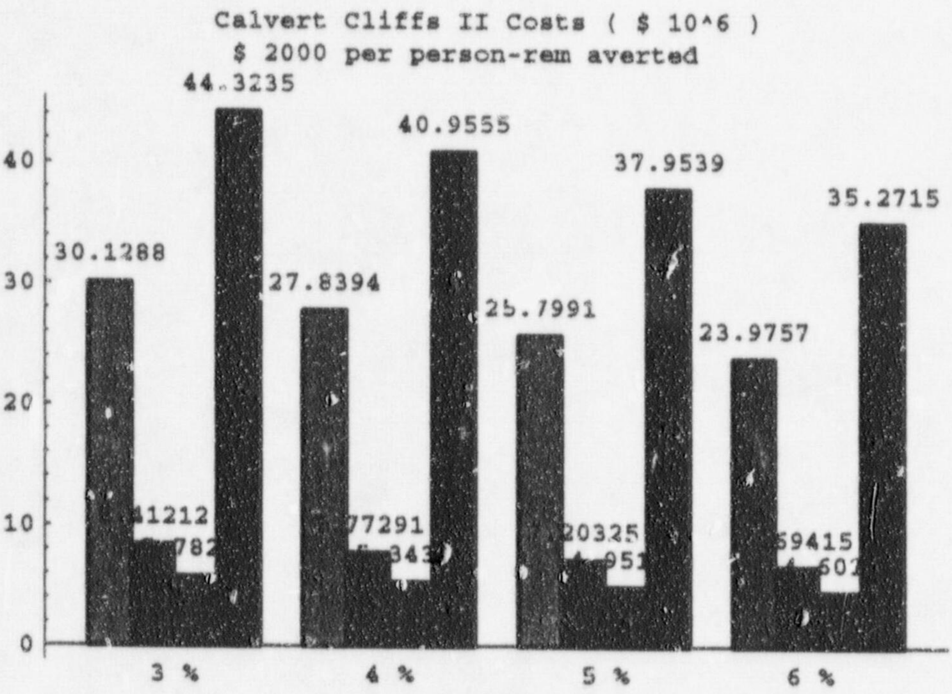

Calvert Cliffs I Costs ($ 10^6)
$ 5000 per person-rem averted
60.2608
56.1239
52.3949
49.0259
77.08
72.1238
82.5659
.6701
.629
.6883
.8252
80
60
40
20
0
3 %
4 %
5 %
6 %

Calvert Cliffs I Costs ($ 10^6)
$ 2000 per person-rem averted



Calvert Cliffs II Costs ($ 10^6)
$ 5000 per person-rem averted





Calvert Cliffs II Costs ($ 10^6)
$ 2000 per person-rem averted
44.3235
40.9555
37.9539
35.2715
30.1288
27.8394
25.7991
23.9757
40
30
20
10
0
3 %
4 %
5 %
6 %