

# Future Resources Associates, Inc.

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2000 Center Street Suite 418 Berkeley, CA 94704 415-528-5111

24 September 1982

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

Dear Mr. Denton:

For the past three months my company has been analyzing the Shoreham Nuclear Power Station under contract to Suffolk County, New York. Specifically, we have been contracted to provide an independent opinion as to the validity of the reactor accident sequence probabilities and release magnitudes that are contained in a preliminary draft report carried out by Science Applications, Inc. and supported by Shoreham's owner, Long Island Lighting Company, entitled "Probabilistic Risk Assessment, Shoreham Nuclear Power Station". This draft PRA analysis, which we have reviewed, contains calculations of internal accident sequence probabilities, discussion of accident phenomena, and calculations of magnitudes of potential releases. The County's interest in these issues stems from their need to have an acceptable technical basis for their emergency planning activities.

In the course of our review, we have concluded that one type of accident involving internal flooding may lead to important plant damage states with a significantly higher probability than is calculated in the draft PRA. Indeed, this group of sequences might, in our opinion, be among the dominant sequences contributing to residual public risk at Shoreham. The sequences under discussion were analyzed by SAI in the draft PRA, but we believe that because of an error the accident probabilities have been underestimated. The sequences involve routine on-line maintenance of important safety equipment at level 8, the bottom level of the Shoreham reactor building where much important safety equipment is located. If during on-line maintenance there were to be an accidental opening of the isolation valve that separates the specific component being maintained from the rest of the system, then under some circumstances a local flood would result, which could become a serious and disabling flood if the isolation valve cannot be reclosed in adequate time. This flood, while it would disable emergency equipment, still would not cause an accident unless there were to be an additional loss of heat removal capability through loss of the power conversion system. The issue is how probable these types of sequences are.

We have done a rough calculation of our own of the likelihood of the sequences. The results are found in our draft report (attached) prepared for Suffolk County. Section 3.3 and Appendix D of our report contain our technical discussion. (However, a copy of SAI's draft PRA report on Shoreham is probably needed to put our discussion in the proper context.) While we believe that this set of

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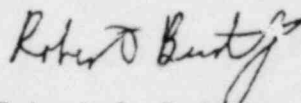
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sequences could be an important contributor to overall residual risk at Shoreham, we have been unable to quantify the risks ourselves, because we haven't done a complete analysis (either probabilistic or deterministic), nor were we able to test the sensitivity of our conclusions to various engineering assumptions. Furthermore, while we suspect that this issue might be important also at other reactors, especially at other BWR-Mark 2 reactors with similar designs but possibly at other reactors too, we have not addressed that issue ourselves.

I do not believe that the internal flooding sequences under discussion have been adequately analyzed either deterministically or probabilistically. It is possible, in fact, that Shoreham contains features not yet uncovered that would compound the severity of a minor internal flooding incident, turning a relatively benign event into one with severe consequences to the reactor or even to the public: for example, there may be operator procedures, hardware, or control system features that might erroneously isolate the power conversion system upon inception of some internal flooding scenarios, thereby compromising an important heat sink exactly when it is needed most.

If careful analysis reveals that these sequences pose problems not yet considered, we can think of several easy fixes that could provide added protection to the utility's investment and to the public at relatively low cost. In any event, I believe that the issue requires additional analysis which has been beyond the scope of my own company's work for Suffolk County. If I can be of any assistance to NRC, please do not hesitate to contact me.

Sincerely yours,



Robert J. Budnitz  
President

Enclosure: as stated

cc: F. Jones, Suffolk County  
R. DeYoung, NRC/IE