

Dec. 11, 1979
P.O. Box 415
Winnaboro, S.C.
29180

Commissioner Ahearne
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

I am enclosing a copy of two letters I would appreciate you looking over and let me know what you think of the ideas and thoughts expressed by the chairman of the President's Commission on The Accident at Three Mile Island and myself.

Respectfully

Albert G. Daniels

8003100 018

DARTMOUTH COLLEGE
HANOVER • NEW HAMPSHIRE
03755

THE PRESIDENT

December 7, 1979

Mr. Albert G. Daniels
P.O. Box 415
Winnsboro, S.C. 29180

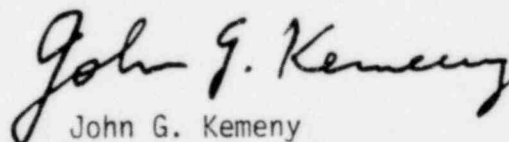
Dear Mr. Daniels:

We did speak to improvements of instruments in the control room on pages 72-73 of our report. We had specifically considered recommending a water-level indicator in the reactor vessel and decided that this might be unreliable.

While I am not an expert on this subject, as I understand it, in the horrendously complex mixture of water and steam that is likely to exist in the reactor vessel during an accident, with very complex flow patterns once the core is disturbed, the water level indicator could be misleading. We opted instead for a recommendation for "instruments that can provide measurement of the full range of temperatures within a reactor vessel under normal and abnormal conditions". Knowledge of the totally abnormally high temperatures that existed in the reactor vessel during the accident should have been the single clearest indicator for the need to pour in large quantities of water.

Personally, I believe that no small number of additions to their control panel will help. It has to be reorganized and modernized. For emergencies one needs to take advantage of (fairly inexpensive) information technology that would clearly display the most important indicators and would suppress the hundreds of alarms that go off during the emergency which are relatively unimportant.

Sincerely yours,


John G. Kemeny

Dec. 11, 1979
P.O. Box 415
Winnboro, S.C.
29180

Mr. John G. Kemeny, President
Dartmouth College
Hanover, N.H. 03755

Dear Mr. Kemeny:

Thank you very much for your very informative letter of Dec. 7, 1979 regarding the President's commission thinking on a water level gauge for PWR reactor vessels. You state that a water level indicator transmitter in the reactor vessel might be unreliable due to the horrendously complex mixture of water and steam that is likely to exist and the complex flow patterns once the core is disturbed. As I understand it, from the account of the accident in your report to the President on page 99, twenty-seven minutes after 5:14 A.M. on the day the accident began, all of the reactor coolant pumps had been shut down. At this time no coolant water was flowing through reactor core, therefore no complex flow patterns were there and the core had not yet been seriously damaged, or disturbed. Further study of your account on page 100 indicates that the reactor remained in this quiescent state for at least one hour with the water level below the top of the core. The water was probably boiling

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but there was no great amount of agitation. A water level gauge should have operated properly, if they had had one, and given positive indication that the core was uncovered. The transcript of the N.R.C. closed meetings on March 30, pages 60 and 61 show the commissioner's still arguing about whether or not the core had been uncovered, and the size of the bubble present in the reactor vessel on March 30. A water level gauge would have given the operator positive, direct indication that the water level was low. I do not think any operator would have disregarded this for more than an hour. Also this information would ^{have} shown him that there was no danger of going to a solid system by injecting additional water. I think he would have left the high pressure injection pumps on if he had known he had low water in the reactor vessel. Neither do I think the high pressure injection pumps would have caused enough flow agitation in the reactor vessel to upset a water level transmitter. He would have continued to get correct water level readings with these pumps running. You are probably correct in thinking it would be difficult to get correct water level indication with the main coolant pumps running. But when water level indication was desperately needed at TMI was while the coolant pumps were shut down, and they would have had it then if they had only had the gauge.

sometimes, like at 4 or 5 o'clock in the morning, we humans don't respond very well to just one bit of evidence, i.e. pegged temperature indicators. There are occasions when we need a preponderance of evidence to force us into drastic action. And what has gone wrong with the old tried and true axiom "it's better to have it and not need it than to need it and not have it." You think you have the problem whipped with regrouping instruments, adding indicators in the shift supervisor's office, re-training operators, etc and will never under any circumstance need water level indication for the reactor vessel.

I still say that if they had had water level indication for the reactor vessel at TMI this billion dollar plus accident would not have happened. You might have things under control to the extent that a similar set of circumstances occurring in the future will not develop into a serious accident even without the water level indication. I do not think it at all unreasonable to install this water level gauge just in case we once again have some strange and unforeseen sequence of events occur where we will need it.

Please give this matter some additional serious thought. I urge you to consider issuing an addendum to your report to the President and call for the addition of this water level indicator.

If it is impossible to add this indication on existing vessels I think we should investigate the possibility of adding stress gauges beneath these reactors to detect a weight change. I understand the bubble in the TMI reactor was about 1000 cubic feet in size. If it was steam, this would have caused a weight change of about 30,000 pounds for the reactor vessel, whether or not we could drill into the foundations and install stress gauge transmitters to reliably detect this weight change to alert the operator that a bubble is developing in the reactor is something an expert in this field will be needed to determine. I don't know, but I think it is something worth looking into.

Respectfully

Albert G. Daniels

P.S. In an effort to solicit support for the addition of the water level gauge I am sending copies of your Dec. 7, 1979 letter and this letter to:

President Jimmy Carter

Mr. Patrick E. Haggerty

Prof. Thomas H. Pigford

Prof. Theodore B. Taylor

Mr. Toby Burnett, Westinghouse, Water Reactor Division

Babcock-Wilcox, Nuclear Steam Generation Group

Nuclear Regulatory Commission



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 14, 1980

Mr. Albert G. Daniels
P. O. Box 415
Winnsboro, SC 29180

Dear Mr. Daniels:

On December 11, 1979 you sent letters to Chairman Ahearne and Mr. Denton requesting comments on two other letters, a December 7, 1979 letter from Dr. John Kemeny to you, and a December 11, 1979 letter from you to Dr. Kemeny. Since you and I have already exchanged correspondence regarding reactor vessel level measurements, Chairman Ahearne and Mr. Denton asked that I respond to your letters to them.

Dr. Kemeny's letter to you states that his Commission considered recommending a water level indicator and decided that this might be unreliable, noting that very complex steam and water flow patterns could make the indicator unreliable. Your response to Dr. Kemeny points out that there were periods of minimum agitation in the TMI reactor vessel when a level gauge would have given reasonably correct and crucial information to the operators, and that corrective action could have been taken. Dr. Kemeny is correct in being concerned that complex flow patterns and agitation could give misleading indications. You are correct in believing that a well-designed system for level detection could provide crucial information.

As my letter to you on December 18, 1979 indicated, the NRC staff has established a requirement that instrumentation be added to nuclear power plants to provide an indication of reactor vessel level. The efforts I outlined in that letter are proceeding, and we remain steadfast in our resolve to reach the objective of having reactor vessel water level indication. We agree with you on the importance of this information. We also see the merits of instruments which can provide measurement of a full range of temperatures, noted by Dr. Kemeny, and have required that these be installed on nuclear power plants.

Dr. Kemeny briefly mentioned his opinions on control panel reorganization and the display of the most important indicators. The NRC has underway a task to evaluate control room designs from a human factors viewpoint, and another task to display the most critical parameters for the operators, as suggested by Dr. Kemeny. We expect reactor vessel water level indication to be among those parameters.

Mr. Albert G. Daniels

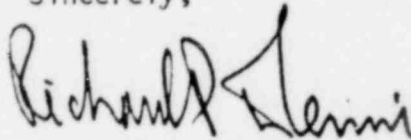
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February 14, 1980

Your letter to Dr. Kemeny also suggests that some consideration be given to weighing the reactor vessel as a means of detecting water losses. Since you so kindly sent me copies of correspondence between yourself and the Babcock and Wilcox Company, I see that this does not need to be addressed further.

I appreciate your intense interest and comprehensive study of this matter. If the above response to your requests is not adequate, please let me know.

Sincerely,

A handwritten signature in cursive script that reads "Richard P. Denise". The signature is written in dark ink and is positioned above the typed name.

Richard P. Denise, Acting Assistant
Director for Reactor Safety
Division of Systems Safety



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NUCLEAR REGULATORY COMMISSION
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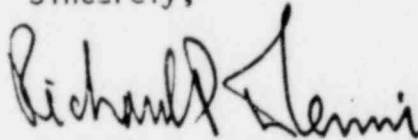
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