



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

June 19, 1979

*PDR 6/27 Ireland*

*a) dec. control  
b) assign 1&2  
c) start a list of report  
stuff for 3, 4 & 5.*

MEMO TO: R. J. Mattson, Director, Division of Systems Safety  
FROM: R. O. Meyer, Leader, Reactor Fuels Section, CPB/DSS  
SUBJECT: LESSONS LEARNED IN THE FUELS AREA FROM TMI-2

Copy to:  
Cudlin }  
Chandler } note 3, 4 & 5  
Telford }  
Calvo }  
Conran }  
Vuglewede - #1 & 2  
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In response to your recent request, I am providing the following to be considered as lessons learned from TMI-2. Since all potential improvements will be evaluated for costs and benefits, I think it is worth noting that these improvements do not appear expensive.

1. Instruments

(a) The "flight recorder" concept would be invaluable in our imperfect world. In-core instruments should be read continuously without artificial restrictions on range for a period of at least several hours.

(b) Fuel failure instruments that were calibrated to discriminate between incipient failures, large-scale gap activity, and (excessively) high-temperature releases would be valuable information for the operator. Present instrumentation might suffice, but it is not reviewed or incorporated into Tech. Specs. for that purpose.

(c) On-line gamma spectrometry could serve for routine coolant sampling, fuel failure detection, and diagnostics during an accident. B&W, ironically, is testing such a system at Oyster Creek under an EPRI program. Hardware is cheap (about \$60K).

2. LOCA Analysis

We currently do not require the assumption of coplanar flow blockage because we do not believe in (a) long overlapping "Windle" sausage balloons or (b) rod-to-rod interactions. In light of the liquid-level boildown in TMI-2, we should reconsider the need to assume coplanar flow blockage in LOCA analyses.

3. Organization

It was clear during the TMI-2 core damage analysis that CPB was not well informed about fuel behavior under conditions more severe than an Appendix K LOCA. We have not followed that field closely because core-disruptive and meltdown accidents are followed by the Advanced Reactors Branch. Even if Class-9 accidents are not added to the licensing reviews, CPB should handle this work so that we will know about the cliff beyond our licensing limits and therefore know more about the margin.

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On a related subject, suggested more by the DC-10 accident than by TMI-2, we run an increased risk of not recognizing chronic fuel design defects because we do not handle LERs; that is the responsibility of another branch. While we have very good working relations with the Reactor Safety Branch, which follows power reactor fuel experience, it is not practical for us to duplicate their work and thereby gain the insight and experience that we should have.

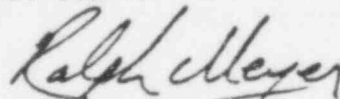
Fragmentation of the NRR fuels work and handling it piecemeal in three separate NRR Divisions is inefficient and troublesome. I think it is time to incorporate the DSS, DOR and DPM fuels experts into a single Reactor Fuels Branch, which would be the true counterpart of the Fuel Behavior Research Branch. Similar consolidation of effort in other technical areas is probably also desirable.

#### 4. The Research Connection

Planning meetings need to be held in the fuels area with RES and NRR management participation up to A/D. Although this would seem to be an obvious requirement, I believe it has occurred historically only once. Such a meeting is made difficult by having the NRR fuels work spread out under so many managers and coordinators. This kind of planning is particularly important to reap the harvest from the TMI-2 "experiment." In this regard the Fuels Section should be allowed (required) to spend time working with the Fuel Behavior Research Branch to prepare an experimental PIE program plan for TMI-2. That plan should be discussed face-to-face with all relevant BCs and A/Ds, and then modified or approved.

#### 5. More on the Organization

I believe the TMI-2 and the DC-10 accidents underscore the need for stronger management involvement with incipient problems. Therefore, I see increasing problems with the growth of programmatic responsibilities of the personal staffs of high-level managers outside of the line organization. As an example of this, consider that safety problems are usually discussed more candidly in research and TA proposals than in other forums. The implementation of such proposals predominantly by technical assistants and support staffs tends, I fear, to insulate the director from the problems that are brewing. I think there is a need to enhance the feeling of the line managers that they are the director's personal staff.



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cc: K. Kniel            R. Denise  
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