

TASK CLOSE OUT DOCUMENT

Task Scope Current assessment of core
status
b-Sequence of events

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Reason felt task is complete:

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COMMENTS ON HISTORY OF CORE DAMAGE

J. R. Dietrich

4/12/79

The question has been asked whether there was additional uncovering and damage to the core after the sequence of events that lasted from about 100 minutes to 200 minutes after the reactor trip.

The behavior of the source range neutron detectors during the 100-200 minute time span is qualitatively consistent with the other evidence of core damage during that period. It appears that these detectors continued to be able to see the source for at least 17 hours after the reactor trip (Mr. Ball believes these BF_3 counters ~~are counters~~ are counting neutrons, and this certainly seems reasonable). If the core were again uncovered during the 17-hour period after reactor trip we should expect to see evidence on these counters comparable to that which they exhibited during the 100-200 minute period. Only two subsequent blips appear after that period, and they are very much smaller than the events recorded during the 100-200 minute period when we know there was core damage. One of these blips occurs at about 585 minutes and the other at about 865 minutes. The first of these two does occur near a minimum in the RCS pressure (at ~500 psig) and while the T_{hot} is still off scale. Either or both of the blips could correspond to some additional core damage, or possibly a shift of the damaged fuel, but hardly an uncovering of the core.

The same remarks could apply to the readings of the intermediate range ion chambers during the 100-200 minute duration of the known damage event. However, Mr. Ball thinks they are reading gammas, and they are off scale in the low direction except during the period of core uncovering. Consequently one does not know whether they would come back on scale during a subsequent core uncovering if one occurred, since the gamma level is decaying.

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Mr. Kaufman's qualitative analysis of events, which takes into account the nuclear detectors, seems to me to be worthy of an attempt at quantitative confirmation if we want to get more understanding of just what happened. There are some aspects of the quantitative nuclear instrument behavior which seem surprising to me, and of course there are some parts of Mr. Kaufman's interpretation for which he had to resort to conjecture.

One of the things difficult for me to understand is the very rapid decrease in readings of the instruments which occur at certain points during the period in question (100-200 minutes after reactor trip). It is hard for me to see how changes in the water density or configuration could produce such large changes so rapidly. I am also puzzled by the flat top of the high-level reading recorded by the intermediate range ion chambers -- if they were indeed reading gammas. In the event of a core uncovering one would expect a relatively flat top on the high-level reading of a neutron-detector. As the water level decreased below the top of the core one would not expect to see an increase in neutron source would be confined pretty much to that portion of the core containing water. The gamma situation should, however, be quite different: one would expect a continuing increase in gamma reading as more and more of the core was uncovered. Of course the flat top could correspond to a constant water level below the top of the core but it seems unlikely that a constant level would be maintained for some 40 minutes as indicated by the traces.

Mr. Kaufman appears to give more emphasis to steam formation within the core than to actual uncovering of the core. This point needs to be looked into quantitatively.

I believe that a quantitative analysis of the data would take a man-week or more of uninterrupted effort, and could best be done at one of the home offices rather than here at the site, although there would no doubt be a requirement for gathering additional information that may not be available elsewhere. I also wonder whether such an analysis may be already under way by others outside the Industry Advisory Group.

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