Clifford K. Beck, Chief
Hazards Evaluation Branch

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Robert Waterfield
Hazards Evaluation Branch

COMMENTS ON PROPOSED INSTRUMENTATION CRITERIA FOR PART 50

The following statements are submitted for consideration. Some are paraphrases of those which you put down, while others are additions to the list which introduce new ideas for promoting safety. I feel that all of your statements are needed in the regulations, as well as my own, in order to properly cover this complex phase of reactors.

1. At least 2 level channels must be connected to produce independent scrams.

   a. If 3 or more channels are provided, scram can depend on simultaneous signal from 2 channels.

2. At least 2 period channels, completely independent of the level channels, must be available to provide independent scrams on reactors which are started once a day or oftener. Other reactors can be operated with 1 period channel.

3. In addition to the instrumentation system, an independent shutdown system must be provided, which does not utilize the same poison components.

4. Below 1 Mw, both level and period scrams must be used at all times.

5. Above 1 Mw, level scrams must be provided at all times, and a period scram should be provided up to 10% of full power, if at all practical.

6. The period scram can be omitted further below full power provided that the minimum period which can be achieved by continuous rod withdrawal until the reactor reaches the level scram is not less than the control rod delay time. (This forces a balance of 3 factors: period drop-out level, withdrawal rate, and scram delay time; it limits the power overshoot.)

7. During start-up or low level operation, at least one level scram channel must be set at all times no more than one decade above the actual level, and raised as needed.

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8. In general, automatic control is desirable, since it makes possible more rapid but safe power level changes, and more accurate control at a given level. However, it should include a method of monitoring the difference between the programmed level and the actual level, and providing for independent corrective action, at least in the form of an alarm, when the difference exceeds some small value, such as 10%. An ideal system would cause automatic run-in or scram when the level rises above the upper limit, and run-in or just audible alarm when the level falls below the lower limit. Such a comparison arrangement will detect failures in either the servo system or the nuclear instrumentation system.

9. There should be definite periodic checks of instrument response (throughout their entire range), ability to trip, and delay time.

10. An accurate record should be made of all alterations in instruments, even individual components, and periodic as-built drawings circulated to insure safe, compatible operation of all assemblies.

11. In general, changing the range of an indicator should not deactivate or make a change in the value of level scram setting, unless it is justified in the hazards report. A likely justification would be to keep advancing the level scram on a low or intermediate range instrument during startup.

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