

IA-E-109

To: Milt Levenson  
Subject: RCS Behavior  
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Of: TNI - IAG

The following is an assessment of RCS behavior in the "perculating" mode before large amounts of noncondensibles build up:

Initial Conditions

1. Secondary side solid -- cold water
2. Pressurizer vented to containment atmosphere, either by relief valve open or through 3/8" sample line re-plumbed to containment.
3. Primary system solid
4. Core flood tanks floating -- either under N<sub>2</sub> head or on head tank
5. Little or no non-condensibles
6. RC pumps off
7. Assume little or no natural circulation

~ 2"

Behavior

1. Heat generation in core will form steam
2. Steam will form bubble in top of vessel
3. Steam bubble will displace water and raise pressurizer level (~~and head tank level if in place.~~)
4. When bubble uncovers top of hot legs, steam will (eventually) slide out hot leg, forming bubble at top of candy cane quite rapidly (roughly 5000 - 10000 cfm).
5. The increasing bubble volume continues to drive water into pressurizer (~~and core flood, if on head tank.~~)
6. The increasing bubble volume in candy cane uncovers cold tubes in steam generator until such time as the condensing rate in steam generator equals or exceeds the steaming rate in the core.
7. Then,
  - a. If the system is heavily damped, a steady state steaming in core/condensing in steam generator condition will result.

Or

- b. If the system is undamped which is more likely the bubble in the steam generator and candy cane will collapse rapidly, and the process will begin at Step 3 above again and repeat itself, ad infinitum.

In this mode before significant non-condensibles build up, I do not believe there will be any perculating through the pressurizer, only a rising and falling of water level in the pressurizer.

*Non-condensibles formed during this time will be swept to the top of the candy cane where they will form a bubble at the top of the bend.*

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