

8/10/89

NOTE TO: Ashok Thadani  
FROM: Ted Quay *TQ*  
SUBJECT: DPV CONCERNING ZION PURGE OPERATION

Without going over each specific item in detail, Mr. Licciardo's DPV stems from his misapplication of an instantaneous release of fission products to the containment (and to the environment) through the open purge valves. The LOCA Regulatory Guides (1.3 and 1.4) were intended to establish the source term to be used for evaluation of the containment design features for mitigation of the radiological consequences of the LOCA. The "instantaneous" source term used in accidents such as LOCA was established to ensure containment isolation features incorporated either fast acting valves or features that would ensure that containment integrity was not compromised during operation (e.g., dual doors on personnel locks). Use of the instantaneous source term prevented a case-by-case analysis of each containment incorporating slow isolation features. This simplified approach was never intended to be applied to purge valves except for those purge systems that incorporated extremely slow closing valves. No opening in containment could be justified using the instantaneous source term. Consequently, no purge/vent system design could be found acceptable using a simplified instantaneous release assumption. Without purge vent capability plant operations would be tremendously restricted. The SRP recognized the lack of realism of the "instantaneous" release assumption and established that 1) purge/vent systems needed extremely fast acting valves (and in most cases, this means air operated so that power failure results in closure without reliance on any ac/dc power source such as the diesels); and 2) a more realistic source term, maximizing the fission product content of the primary coolant during operational conditions, (spike coolant activity for a PWR-60 uCi/gm) should be employed.

A number of years ago, Limerick had a two inch "vent" line that had extremely slow acting isolation valves (closure time on the order of two minutes). NRC imposed the instantaneous source term on the evaluation of the doses from this line for two reasons. The first is that for a 2" line there is no reason not to incorporate a fast acting valve. Second, the risk from failure to isolate the containment increases the longer a line is left open due to LOCA produced debris. The Zion DPV analysis argues that substantial core damage occurs fast. The information provided by Wayne Hodges disputes this. Complete core damage does not occur instantaneously and even assuming the fast releases of substantial amounts of fission products, the DPV ignores progression of fuel damage with heatup and consequently, any transport time to the break. The first pound of primary coolant released to the containment (and for

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that matter to the environment) is assumed to contain the same amount of fission products as a bond released from the primary system much later in the blowdown phase. Taking this argument to the extreme, all the fission products would be released during the blowdown phase which in some cases could be as short as ten seconds.

Although the SRP specifies 5 seconds, AEB accepted closure times up to 15 seconds based on informal discussions we had with Research on their severe accident analyses. We were told that even up to 20 seconds that no substantial releases would occur.

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