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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

no credit for pictures
1996 — 94% inspected

no credit for 28 inspections from
1998 — 72% pictures

2000 — 65% "

no credit for
meaningful inspection from pictures

1996 : 5 3/4 yrs = 69 months

Conclusion – there should have been a failure by now.

1998: 3 3/4 yrs = 45 months

28% uninspected.
Original crack length – 45°
to get to 3X in 45 months

2000: 19 months
35% uninspected, Original flaw size – 21
to get to 3X in 19 mo

B-16

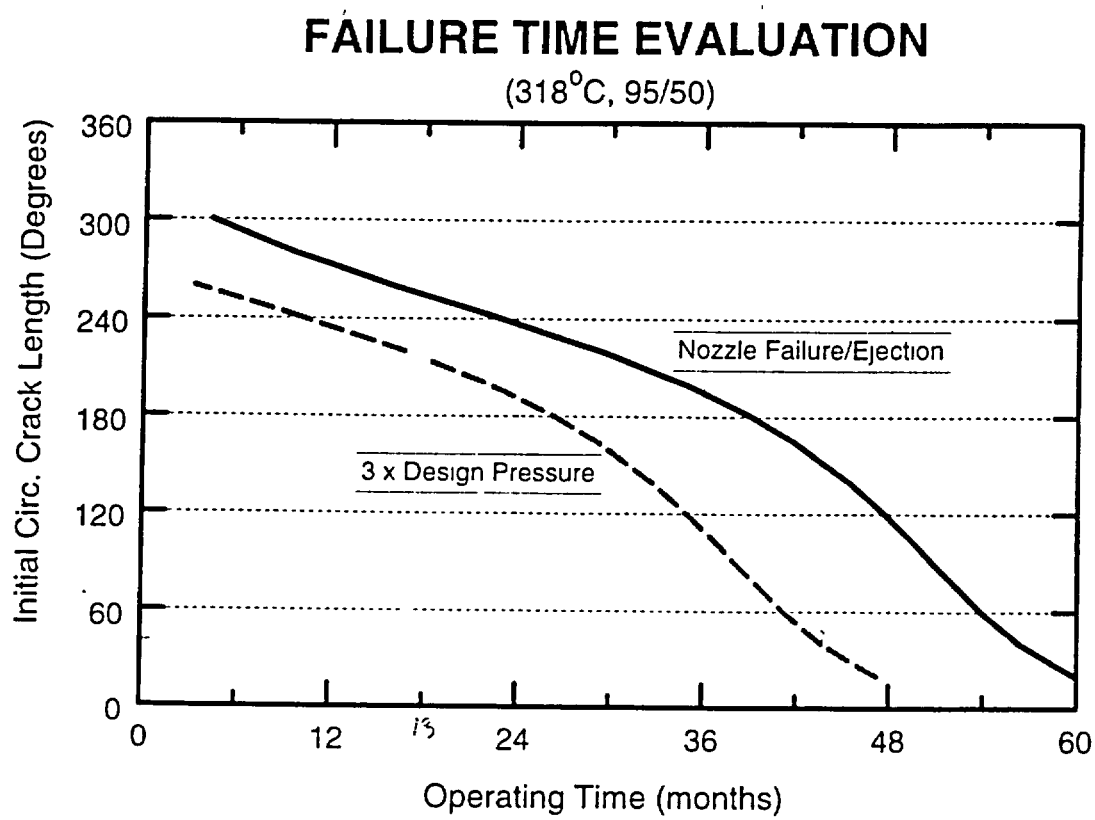

Figure 24 Variation of time to failure as a function of initial crack length, for the base case of 318°C, 95/50, crack growth rate.

6.7.3.2 Uncertainties and Sensitivity Studies

in the absence of definitive data, the use of parametric values of crack growth rate can provide an understanding of the impact of various assumptions on the evaluation within the context of relevant values of the parameters. For the case of CRDM nozzle cracking, the effect of initial flaw size on the operating time to achieve the critical flaw sizes has been considered in Figure 24. The key parameter with a high level uncertainty is the crack growth rate.

At least three issues affect the selection of the crack growth rate, the environmental conditions, the operating temperature and the statistical basis for the selected crack growth rate. For OD circumferential cracking in CRDM nozzles, Section 6.2.1 concluded that PWSCC conditions are a reasonable approximation to the conditions thought to exist in the annulus between the nozzle and the RPV head, and as such crack growth data for PWSCC conditions are used in this analysis. [As noted in Section 6.2.1, field confirmation of the annulus conditions should be pursued by the industry to eliminate any uncertainty regarding the annulus conditions.]

As described in Section 6.3, the effect of operating temperature on the crack growth rate can be assessed using an Arrhenius extrapolation. For the case of CRDM nozzle conditions, MRP-48 (Ref. 15) indicates that RPV heads are operating in the temperature range from 286°C to 318°C (547°F to 605°F). The base case described in Section 6.2.7.2.2 used 318°C (605°F).