

N62. FRENCH THINKING ON THE COMPARATIVE MERITS OF ALLOYS 690 AND 800

Alloy 690 has performed very well in the laboratory as tubing material for steam generators and is by far the most tested of candidate replacement materials. However, some European utilities have preferred the alternate, alloy 800, offered by Siemens/KWU and used in KWU PWR steam generators. Some utilities prefer this material because of the operating experience available for it. For example, the Belgian Doel-3 PWR, a plant supplied by Framatome, has selected KWU steam generators with alloy 800 tubing as replacements. Experience with the alloy in Canadian CANDU heavy water reactors has also been very positive. French and U.S. utilities, on the other hand, have opted for alloy 690 as the tubing material for future steam generators. The French feel that both 690 and 800 are far superior to the current Inconel 600 in primary coolant, and that either should help ensure that primary water stress corrosion cracking does not occur.

Alloy 690 has important advantages over 800 on the secondary side. For example, to resist secondary side cracking, alloy 800 must undergo final cold working in the factory. The resulting residual stresses are reduced through shot-peening. The deformation of expansion zones on a heavily cold worked material induces larger stresses. In a normal environment the differences between 800 and 690 are slight but 690 provides an additional margin in accident situations. For example, if raw water containing chlorine enters the steam generator, the attack on steam generator tubing is better resisted by 690. Experience with alloy 800 in Canada is not representative of PWRs because the sludge level and tubing performance level are lower in CANDUs. As for the experience in large German PWRs, the German PWR operators have moved from phosphate condensate polishing to all-volatile treatment (AVT) only recently. There is only 10 years of experience with AVT at the oldest German stations.

For more, see Nucleonics Week, December 13, 1990, McGraw-Hill Publications, New York.