

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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VICE PRESIDENT-NUCLEAR

United States Nuclear Regulatory Commission
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Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
SAFETY EVALUATION OF STEAM GENERATOR
TUBE RUPTURE ACCIDENT

Virginia Electric and Power Company Licensee Event Report (LER) No. 87-038 dated January 7, 1988 informed the NRC of the potential for steam generator tube bundle uncover following a reactor trip. This condition was discovered while performing a review of the Surry steam generator post-trip response to a postulated tube rupture event. Uncovering the break location has the potential effect of reduced iodine partitioning and could result in an increased calculated offsite thyroid dose for the postulated steam generator tube rupture event.

Due to the potential impact of tube uncover on offsite dose calculations, Westinghouse was notified by our letter of December 14, 1987 about this potential analysis non-conservatism. Subsequently, Westinghouse notified other utilities operating Westinghouse plants of a potential unreviewed safety question due to increased doses resulting from uncover of the steam generator tubes following a reactor trip. Also, Westinghouse proposed a program to the Westinghouse Owner's Group (WOG) to resolve the tube uncover issue. The proposed project scope includes development of a liquid entrainment fraction based on recent test data and evaluation of the radiological consequences of tube uncover utilizing the liquid entrainment fraction. The proposed program has been strongly endorsed by the Analysis Subcommittee of the WOG for action by the WOG general session in June of this year. Shortly thereafter, we anticipate an information meeting between WOG and the NRC staff to present the technical aspects of the program. This program has a tentative completion schedule set for mid-1989.

Virginia Electric and Power Company representatives met with the NRC staff in December 1987 to discuss the results of our preliminary review of the steam generator tube uncover issue. This review had indicated that tube uncover times varying from 9 to 14 minutes could be calculated following a steam generator tube rupture depending on the assumptions concerning available auxiliary feedwater and safety injection flowrates. This initial effort resulted in radiological consequences that were greater than those presently identified in the UFSAR but below 10 CFR 100 limits and SRP 15.6.3 criteria.

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At the staff's request, we have given further consideration to various single failure scenarios and the effects of operator actions. Rather than perform many sets of sensitivity studies, we chose to perform a bounding calculation conservatively assuming that the steam generator tubes remain uncovered for 30 minutes with an iodine partition factor of 1.0 (i.e. assuming no partitioning). In addition, conservative steam generator tube rupture break flows and steaming masses were used. The results of these calculations for the case of the concurrent iodine spike indicate that the Exclusion Area Boundary (EAB) doses are within the 10 CFR 100 limits but are above the Standard Review Plan (SRP) 15.6.3 criteria (a small fraction of 10 CFR 100).

The radiological consequences of a postulated steam generator tube rupture event would be far less than those predicted by the conservative analysis described above for the following reasons:

1. The actual operating levels of coolant activity at Surry are at most a few percent of the limits imposed by the Technical Specifications. This represents an analysis conservatism of greater than one order of magnitude.
2. There are experimental data which indicate that a very small fraction of the primary coolant is entrained in the steam and released to the environment when the break is uncovered.
3. The meteorological conditions assumed in the analysis were worst case conditions which are predicted to occur less than 5 percent of the time. Further, the worst case conditions are assumed to persist for the duration of the transient. Actual meteorology is expected to be a factor of 2 to 10 times better than the assumed accident meteorology.
4. The analysis assumes the maximum (1 gpm) primary to secondary leakage allowed by the Technical Specifications to the intact generators. Actual operating leak rates are a fraction of the limit.
5. The thyroid dose conversion factors (DCFs) assumed in the analysis were specified in TID-14844. For accidents with primary coolant activity specified in terms of fuel defect level, the use of Regulatory Guide 1.109 DCFs will result in a dose reduction of approximately 20 percent; the use of ICRP 30 DCFs will result in a 50 percent reduction.
6. The above analysis assumed that offsite power is not available and the iodine is released to the environment via the steam generator safety and/or PORVs rather than to the turbine condenser. Partitioning in the condenser hotwell and deposition on internal condenser surfaces would provide a significant reduction in the quantity of iodine released to the environment.

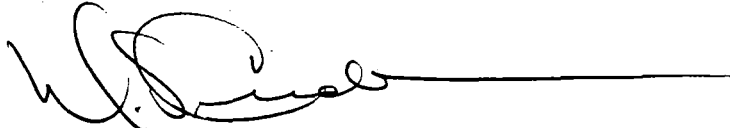
Since our analysis using simplified bounding methods does not demonstrate radiological results within the SRP 15.6.3 criteria, Virginia Electric and Power Company intends to actively participate in the WOG program along with other utilities to seek generic resolution of this potential safety concern. When the WOG methodology is finalized, we will evaluate the Surry steam generator tube rupture accident analysis and resubmit the results for NRC review.

Although an unreviewed safety question as defined in 10 CFR 50.59 has been identified for Surry Power Station, we conclude that continued operation of the station based on the continuing WOG reanalysis of the impact of steam generator tube uncover is justified for the following reasons:

1. The radiological consequences for the conservative case, thirty minute tube uncover, were within the 10 CFR 100 limits.
2. The application of more realistic assumptions is expected to result in calculated offsite doses which also meet SRP 15.6.3 criteria.
3. The actual operating levels of coolant activity at Surry are at most a few percent of the limits imposed by the Technical Specifications. This represents an analysis conservatism of greater than one order of magnitude.
4. As discussed previously, there are experimental data which indicate that a very small fraction of the primary coolant is entrained in the steam and released to the environment when the break is uncovered. Use of this data will be addressed in the WOG effort.

If you have any questions, please contact us immediately. We are available to discuss this issue at your earliest convenience.

Very truly yours,



D. S. Cruden

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