UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
WISCONSIN ELECTRIC POWER COMPANY	)	Docket Nos. 50-266
	)	50-301
(Point Beach Nuclear Plant,	)	(Repair to Steam Generator Tubes)
Units 1 and 2)	)	

AFFIDAVIT OF TIMOTHY G. COLBURN

I, Timothy G. Colburn, being duly sworn, depose and state:

1. I am presently the Project Manager assigned to the Point Beach Nuclear Plant, Units 1 and 2, Docket Nos. 50-266 and 50-301, in the Office of Nuclear Reactor Regulation, Division of Licensing, Operating Reactor Branch No. 3 of the Nuclear Regulatory Commission.

2. The purpose of this statement is to address the issues raised in Contentions 1, 2a, 2c, 3b, 3c, 4 and 5 by Wisconsin's Environmental Decade ("Decade") in its July 21, 1982 Motion Concerning Litigable Issues.

Contention 1

> Degradation of as few as one to ten steam generator tubes in a pressurized water reactor such as at Point Beach Nuclear Plant ("Point Beach") could induce essentially uncoolable conditions in the course of a loss-of-coolant-accident ("LOCA").

3. Degradation of steam generator tubes is not synonymous with failure or rupture of the tubes but only means that the tubes have had a measurable reduction in wall thickness from that of the originally installed tube.

4. Degradation is defined in the Licensee's Technical Specifications (T.S.) for Point Beach Units 1 and 2 as "service induced cracking wastage, wear, or genenal tube corrosion occurring on either inside or outside of a tube." The Licensee's T.S. further define a degraded tube as "a tube that contains imperfections cause by degradation (emphasis added) greater than 20% of the nominal tube wall thickness".

5. All of Decade's basis statements supporting Contention 1 relate to failure of steam generator tubes, not degradation, with the exception of the third basis statement which references Regulatory Guide 1.83.

6. The next sentence following the statement referencing Regulatory Guide 1.83 Decade uses in support of Contention 1 reads, "This guide describes a method acceptable to the NRC Staff for implementing these General Design Criteria (General Design Criteria 14, 31, 15 and 32) by reducing the probability and consequences of steam generator tube failures through periodic inservice inspection for early detection of defects and deterioration."

7. The General Design Criteria described above, notably 14, "Reactor Coolant Pressure Boundary," and 31, "Fracture Prevention of Reactor Coolant Pressure Boundary," require that the reactor coolant pressure boundary have an extremely low probability of abnormal leakage, of rapidly propagating failure and of gross rupture. Regulatory Guide 1.83 provides an acceptable method for implementing these criteria. The supportive statement by Decade deals with release of secondary steam to the containment and doesn't imply uncoolable conditions will exist in the core.

8. NUREG-0651, used by Decade as a basis to support Contention 1, states that "Recent studies have shown that as few as ten tubes would need to have ruptured during a LOCA (assuming a leakage rate of 130 gal/min per ruptured tube) before the cladding temperature would be significantly affected." This means that 1300 gal/min total in-leakage would be required (130 gal/min per tube x 10 tubes) to significantly affect cladding temperature.

9. As pointed out in Appendix A to the Staff's November 30, 1979 SER (previously introduced in the record), a guillotine rupture of a tube at a location 1/2 inch below the top of the tubesheet would yield a calculated in-leakage of 9.2 gal/min per tube assuming a secondary-to-primary differential pressure of 800 psid following a LOCA. The leakage calculated for similar conditions at a location in the tubesheet where the crevice gap is .008 inches was only 5.5 gal/min per tube. If a leak occurred in a sleeved tube following a LOCA at the location of the mechanical joint the in-leakage would be likewise constrained and of a similar magnitude as that stated above. Because the small narrow crevice between the tube and tubesheet limits in-leakage during postulated LOCA conditions (assuming a circumferential crack of a steam generator tube), the narrow annulus region between the sleeve and tube in the vicinity of the mechanical joint similarly limits the in-leakage per tube which would result from a circumferential crack near or at the location of the joint during postulated LOCA conditions. The Licensee estimates the resulting in-leakage to be 12.5 gal/min per tube even if no expansion of the sleeve occurred during installation. Thus, at least 100 tubes would have to simultaneously fail in the above manner during a LOCA to be of concern.

10. Tube collapse is a more likely mechanism for tube failure during a LOCA than tube rupture due to the direction of the resulting differential pressure forces. The resulting in-leakage during a LOCA from tube collapse has been calculated to be much less than would be experienced during a tube rupture due to the smaller cross-sectional area available as a leakage path from tube collapse compared with a tube rupture.

11. Tube collapse does not have as high a potential to produce multiple tube failures as tube rupture because tube collapse will not cause tube-whip interaction of the affected tube with adjacent tubes as might a tube rupture in the free-standing region of the steam generator.

12. A sleeved tube will be less likely to experience tube failure along its sleeved length than an unsleeved tube due to the added support the sleeve lends to the tube.

Contention 2(a) and 2(c)

> Rupture of steam generator tubes during normal operation may release radiation to the environment from the plant's secondary side in excess of maximum permissible doses to the extent that:
>
> (a) Iodine. The iodine levels in the primary cooland exceed Westinghouse Standard Technical Specifications for reactor cooland iodine activity.
>
> (c) Safety Valve. The secondary side safety valves set point is exceeded and does not properly reseat for an extended period.

13. The NRC Staff's Safety Evaluation concludes that the Westinghouse Standard Technical Specifications for reactor coolant iodine activity should be adopted for Point Beach Unit 2 as they have for Point Beach

Unit 1. The Licensee has acknowledged to the Staff that they would accept this as a requirement, and the Standard Technical Specifications for iodine activity will be adopted for Unit 2 as they have been for Unit 1 upon assurance of the sleeving license amendment.

14. The failure of a safety valve is not linked to sleeving steam generator tubes. Sleeved steam generator tubes are not more likely to rupture during normal operation than unsleeved steam generator tubes.

15. The Staff Safety Evaluation Report (NUREG-0916) noted a procedural error on the part of the Ginna operators which contributed to the leakage experienced on the steam generator safety valve. That is, the power operated steam generator relief valve, which is isolable, was isolated prior to the affected steam generator pressure reaching the lift setpoint for the spring-loaded safety valves. The Staff felt that this unnecessarily challenged the spring-load safety valves, which are not isolable, five times. NUREG-0916 p. C-6 Comment on event at Time 9:53 a.m.

16. NUREG-0916 states that the performance of the spring-loaded code safety valve which lifted five times was not unexpected or unsatisfactory given the exposure to the steam-water mixture and the state of the art of the valve. NUREG-0916 p. 6-12 and 6-14. The valve did close fully after leaking for about 50 minutes.

17. Given a tube rupture event occurs, the correct procedure to relieve steam generator pressure would be to cycle the power operated steam generator relief valve as necessary to relieve pressure rather than challenge the non-isolable spring-loaded steam generator code safety valves. The power operated relief valve can be isolated if the valve fails to seat fully.

Contention 3(b)

> The process of sleeving steam generator tubes increases the probability of tube failures generally, and, of even greater significance, it substantially increases the risk of failures in the unconstrained free standing region of the steam generator specifically in, among other things, the following manner:
>
> > (b) Annulus. The annulus between the original tube and the sleeve may give rise to a corrosive environment in the unconstrained free standing region of the steam generator in cases where the original tube is or may be suffering in the future from a through-wall crack permitting secondary water impurities (including copper and iron oxides from the feedwater heaters that are an unintended by-product of the conversion to all volatile treatment) to seep into the narrow space and concentrate to eventually corrode the sleeve as well.

18. Concentration of impurities, if any, which may or may not preferentially accumulate in the annulus between the original tube and the sleeve will not affect the concentration of corrodents or corrosion products in the free standing region of the steam generator.

19. Sleeving will not introduce corrodents or impurities into the secondary side of the steam generator in any greater quantity or concentration than presently exists.

20. The Licensee's reported efforts at sludge lancing and crevice flushing indicate that the level of solid impurities and corrosion products is not increasing as a result of switching to all-volatile chemistry treatment because the residual amount of solids obtained by these methods is not increasing.

Contention 3(c)

> The process of sleeving steam generator tubes increases the probability of tube failures generally, and, of even greate significance, it substantially increases the risk of failures in the unconstrained free standing region of the steam generator specifically in, among other things, the following manner:
>
> > (c) Quality Assurance. The dependence on a larger number of transient workers to install the sleeves will make it impossible to assume that the installatin in the field matches the performance of test installations in the laboratory and will increase the probability of the kinds of problems indicated in [Contentions 3(d) and 3(e)].

21. Contentions 3(d) and 3(e) relate to sleeves becoming under-expanded or overexpanded at the reference joint. The failure of hydraulic equipment at San Onofre 1 which resulted in a number of sleeves not being inserted all the way into the tubesheet is not related to tubes becoming under or over expanded. This condition was identified and corrected at San Onofre 1 by their quality assurance check prior to startup.

22. Failure of equipment at San Onofre 1 cannot be implied to be the fault of transient workers.

23. The use of drugs or alcohol by workers at one job site does not necessarily imply that drugs and alcohol will be used by workers at some other site.

24. Westinghouse and the Licensee have provided a description of the training programs for the transient workers and the description of their duties with respect to equipment installation of remote and semi-remote

equipment. The workers will be trained and supervised by Westinghouse personnel. The workers will be pre-screened by Westinghouse prior to hiring.

25. The NRC Staff is requiring an acceptable post-process sampling plan to verify the correct installation of the sleeves and proper joint formation. The Licensee submitted its plan by letter dated July 26, 1982, which the NRC Staff is evaluating.

26. Regardless of how many transient workers are used, each will receive the same training, including the use of full scale rehersal mockups prior to performance of duties. Each worker will be under direct supervision of Westinghouse personnel. The workers will be monitored by closed-circuit TV while performing their duties.

Contention 4

> Pre-existing explosive plugs in tubes with through-wall defects, or which are incipient failures, may rock loose in the course of a LOCA accident condition providing a pathway for secondary-to-primary in-leakage, by itself or in combination with tube failure pathways, in excess of allowable leak rates for model 44 steam generators or otherwise sufficient to retard reflood of the core.

27. The Licensee has previously submitted by letter to all parties its notice that it does not intend to sleeve tubes which have previously been plugged with explosive plugs.

28. Explosive plugs have shown some small indications of leakage (a few drops per minute) and have required further repair (usually seal welding). The maximum force that could be exerted on an explosive plug during a LOCA would be the same as the secondary-to-primary differential

pressure, approximately 800 psid, assuming a large through wall defect of the explosively plugged tube. A drilling operation is required for removal of explosive plugs due to the large forces used initially in expanding the explosive plug (several KSI). The maximum force an explosive plug will see during a LOCA is much less than used in installing the plug and should not be enough to cause it to rock loose.

Contention 5

> Loose parts left behind from steam generator repair work may impact upon and rupture tubes in teh unconstrained free standing region, including the region where there is no double primary-to-secondary boundary of sleeve and tube during normal or accident conditions. This will increase the leakage rates which worsen the problem identified in [Contentions 1 and 2].

29. The sleeving repair effort will take place on the primary side of the steam generators. No sleeving repair work will take place on the secondary side of the steam generators. Thus, tubes cannot be damaged on the secondary side by loose parts left as a result of the sleeving process.

30. Were loose parts to be introduced into the Point Beach steam generators at some future date from some other repair or inspection effort, the presence of sleeves in some tubes would make it less likely that these tubes rather than unsleeved tubes would leak because of loose-part damage. The sleeves will provide added support to the original tube along the sleeved portion. Loose parts would preferentially locate at or near the top of the tubesheet due to gravitional forces. The sleeves extend above the top of the tubesheet for several inches.

I certify that the foregoing statements are true and correct to the best of my knowledge and belief.

Timothy G. Colburn

Timothy G. Colburn

Subscribed and sworn to before me
this 6th day of August, 1982

Jeanne Hunt

Notary Public

My Commission Expires: 7/1/86