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DESIGN MARGINS FOR BWR SECONDARY CONTAINMENTS

In connection with our study of all significant offsite doses due to BWR accidents, we have made a complete literature search which provided a firm basis for developing a model for calculating leakage from the secondary containment. This calculational model then provided a means for establishing test procedures and margins to be used in periodic systems tests. We are currently negotiating with Nine Mile Point to incorporate the calculational model and test margins into their Tech Specs, and expect to do the same with a number of other BWR's in the near future. Therefore comments are urgently needed from all recipients of this memorandum.

The model we have developed for analysis of exfiltration from secondary containments of BWR's establishes that, so long as the emergency exhaust fan can maintain a negative internal building pressure, the leak rate of the building is of secondary importance. At the same time, the potential exists for the building leak rate to increase greatly over a period of a few months due to deterioration of seals along sheet metal joints.

This potential derives from the nature of the seals involved and the lack of experience with them. Seals between metal sheets are not subjected to large uniform compressive forces to maintain the seal in the manner used for bolted flanges or packing glans. At the same time, the metal sheets are subjected to large dimension changes due to temperature fluctuations outside the building. Some of these dimensional changes are differential in nature because the building frame to which the sheets are attached does not see as great a change in temperature and does not expand as much.

In addition, the seal materials are partially exposed to the elements, and may therefore, be subject to deterioration which cannot be detected by visual inspection. It may be expected that numerous very small leaks will gradually enlarge without any one of them becoming readily detectable. As a result, building leakage may increase markedly between periodic tests.

Therefore, it seems prudent that the exhaust system be capable of tolerating as much as a 100% increase in the leakage rate of the building between tests without sacrificing its capability for ~~maintaining a negative pressure in the building. The model for~~

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exfiltration analysis shows that the acceptance value for the building leakage rate (for negative 1/4 inch water guage) should be 100%/day at zero mph wind, decreasing to approximately 88%/day at 10 mph. The exhaust system should withstand a door (or intake damper) opened until the flow rate through the system doubles, with the system readjusted so that the building pressure is still equivalent to negative 1/4 inch water guage at zero wind speed. The system should be left in this condition until the next test, so that a 100% deterioration in the building leakage integrity will not allow exfitration to increase above the levels analyzed.

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