SAFETY EVALUATION REPORT

SOUTH TEXAS PROJECT UNITS 1 AND 2

TORNADO MISSILE PROTECTION FOR

ISOLATION VALVE CUBICLE

AUXILIARY SYSTEMS BRANCH

I. INTRODUCTION

Nuclear power plants must be designed to withstand the effects of tornado and high wind generated missiles so as not to impact the health and safety of the public in accordance with the requirements of General Design Criteria 2 and 4. The current licensing criteria governing tornado missile protection are contained in Standard Review Plan (SRP Section 3.5.1.4 and 3.5.2. These criteria generally specify that safety-related systems be provided positive tornado missile protection (barriers) from the maximum credible tornado threat. However, SRP Section 3.5.1.4 includes guidance on use of probabilistic risk assessment (PRA) methodology in lieu of the deterministic approach for assessing tornado missile protection. The acceptance criterion in this regard is similar to that identified in SRP Section 2.2.3 which deals with identification of design basis events using probabilistic methods. The tornado missile acceptance criterion is as follows:

"The probability of significant damage to structures, systems and components required to prevent a release of radioactivity in excess of 10 CFR Part 100 following a missile strike, assuming, loss of offsite power, shall be less than or equal to a median value of 10^{-7} per year or a mean value of 10^{-6} per year."

The following discussion of tornado missile protection is concerned with the isolation valve cubicles and the safety-related equipment within them.

The South Texas plant has four separate isolation valve cubicles (IVCs) each of which contains a portion of a main steam and a feedwater line. The main steam and feedwater isolation valves and main steam safety and relief valves associated with the steam and feedwater lines are also located within the cubicles. Each IVC is missile protected from all sides by heavy concrete walls. The tops of the cubicles however are open. A tornado missile(s) could enter one or all of the cubicles through the open top and damage the components therein.

The applicants elected to demonstrate compliance with the tornado missile protection criterion for the IVCs by PRA methodology rather than provide positive protection for the roof opening. The applicants provided a detailed PRA in a submittal dated September 13, 1983. Additional information to support the PRA was provided in submittals dated November 14 and December 20, 1983.

Due to the specialized nature of the study, we have contracted with the National Bureau of Standards (NBS) to assist in the review of the applicants' analysis. NBS provided a technical evaluation report (TER) regarding the probability of a tornado missile strike upon the IVCs. Concerns which were identified during our review were satisfactorily resolved by the applicants' response dated December 20, 1983 as indicated in our consultants TER supplement dated December 23, 1983. In this supplement the consultant also addressed concerns associated with missiles generated by non-tornadic and non-hurricane winds. The consultant's TER as supplemented forms a part of our SER.

II. EVALUATION

As previously stated, the South Texas Plant is designed with four separate IVCs, each of which is missile protected from all sides by heavy concrete walls. Each cubicle is completely protected except for the roof which is open. The height of the IVC walls is 55 feet above plant grade.

The applicants' PRA considered all of the SRP Section 3.5.1.4, November 24, 1975 Missile Spectrum A as potential missiles including the utility pole and the automobile. Revision 2 of the SRP however, allows the exclusion of the utility pole and the car at elevations up to 30 feet above all grade levels within 1/2 mile of the facility structures under review. As the height of the IVC wall is 55 feet above plant grade the missiles which we consider to apply from Missile Spectrum A are the wood plank, the steel rod and the steel pipes. Our examination of elevated areas within 1/2 mile of the facility structures disclosed only the dike area around the ultimate heat sink which could be considered as a possible launch point for the automobile or the utility pole. The applicants have assured us that there will be no utility pole storage along the dike area. Additionally, the only vehicular traffic along the dike

would be transient in nature in order to conduct inspection, and this traffic will be controlled.

In order for a missile to strike any of the components in a given IVC, it must approach the roof opening at a steep angle, within a given solid angle. The roof opening of each IVC is approximately 745 square feet thus presenting a relatively small target. Additionally, the safety-related target areas within the IVCs are much smaller than the IVC open roof areas. The fact that there are four separate cubicles substantially decreases the probability of single missile being capable of damaging more than the components in one cubicle. Multiple missiles however, could enter separate cubicles. We consider this a low probability event, as discussed further below.

Rather than utilize a deterministic argument, as discussed above, the applicants chose to provide a PRA evaluation. The applicants' PRA was provided in their submittal of September 13, 1983. We and our consultant have reviewed this submittal. The review resulted in additional concerns which were identified to the applicants. The applicants provided responses to those concerns in a submittal dated December 20, 1983.

Our consultant's evaluation of the applicants' PRA considered the validity and conservatism of the approach, assumptions, and data used in the applicants' analysis to establish the probability of tornado and hurricane-borne missile damage to the IVC equipment. Also included in the evaluation is an assessment of the correctness of the results obtained in the study.

We have reviewed our consultant's TER and his supplement thereto contained in letter dated December 23, 1983 which resolved the open items identified in the TER.

We concur with the findings and resulting estimate of the probability of damage to essential equipment in IVC of 3×10^{-9}. We further agree that this value is correct to within at least one order of magnitude uncertainty. Therefore additional positive tornado missile protection need not be provided for the IVCs since the probability of exceeding 10 CFR 100 dose criteria due to tornado missiles is less than the 10^{-7} per year acceptance criterion.

Based on the above, we conclude that the applicants have satisfactorily demonstrated compliance with General Design Criteria 2 and 4 with respect to tornado missile protection for the IVCs. The design of the IVCs is therefore acceptable without the addition of further protection for the roof area.