(5) Design of MCCs 1A35-SA and 1B35-SB

Introduction

The team identified an unresolved item (URI) regarding whether the design of MCCs 1A35-SA and 1B35-SB met the requirements for fire barriers to protect SSD equipment from maloperation.

Description

The team observed that MCCs 1A35-SA and 1B35-SB included breakers and control power cables for MOVs that were relied upon to remain open for SSD during a fire in the MCCs (See Sections .03.b.3 and .03.b.4 above.) These breakers were located in the MCCs next to breakers that were not relied upon for SSD during such a fire. Since there were no qualified fire barriers inside the MCCs, the team considered whether a fire starting inside the MCCs could credibly cause spurious actuation (i.e., maloperation) of SSD equipment.

The team noted that the licensee's IPEEE assumed that the most limiting condition resulting from a fire starting inside one of these MCCs was a loss of power to the MCC due to tripping of the power supply to the MCC. However, the team noted that a spurious actuation resulting in a loss of the charging system would be a more limiting condition than loss of power to the MCC. A licensee engineering manager considered that it was not credible that a fire starting inside an MCC could result in spurious actuations of breakers in the MCC, because the power supply to the MCC would automatically trip before such spurious actuations could occur.

The team reviewed design drawings and descriptions of the MCCs. Each MCC contained breakers that were arranged in vertical columns. Each column was separated from the adjacent columns by solid sheets of steel. Each column included about four breaker cubicles and a vertical cable pathway. Each breaker cubicle was separated from the cubicles above and below it by solid sheets of steel, but each breaker cubicle had an opening to the vertical cable pathway. The power and control cables for the breakers in a column generally entered the MCC at the top, but some entered at the bottom. In some columns, all power and control cables for all breakers in the column were in close proximity near the top of the MCC, with essentially no physical separation or fire barrier.

Licensee engineers stated that the design of these MCCs, with SSD breakers co-located with non-SSD breakers, was common at Shearon Harris and at other nuclear power plants. This breaker arrangement resulted from the design requirements for internal events, where there were two separate trains of electrical power such that the plant could safely shut down with only one train being powered. Consequently, where two MOVs in series had a safety function to be able to close, each was powered from a different electrical train of power to ensure that at least one would be able to close. Two MOVs in series were used in many applications, including containment isolation, CSIP suction cross-connects, CSIP discharge cross-connects, and the VCT outlet to the

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CSIPs. Each of the two MOVs in series was powered from a different electrical train and a different MCC . However, for SSD during a fire, these same MOVs had a different safety function - to remain open. If either one spuriously closed, it would shut off a required SSD flowpath. Licensee engineers contended that they could not design the plant to preclude having breakers for MOVs in the same fire area for which they were relied upon to remain open for SSD.

Analysis

If a fire initiating in an MCC could credibly cause spurious actuations of SSD equipment in the MCC, the observed condition would be contrary to NRC requirements and could have more than minor safety significance because it could affect the Mitigating Systems objectives of the Reactor Safety Cornerstone. The condition could affect the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. The condition could also have generic applicability.

Followup Action

URI 50-400/02-11-05, Credibility of a Fire Inside an MCC Causing Spurious Actuations, is opened for further NRC review of this design condition.