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U.S. Nuclear Regulatory Commission
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Subject: Duke Energy Corporation
Catawba Nuclear Station Units 1 and 2
Docket Nos. 50-413 and 50-414
Special Report Fire Protection Program:
Hydrogen Piping in the Refueling Water Storage Tank Trench was not designed in accordance with Branch Technical Position (BTP) CEMB 9.5-1 as required by the Catawba Facility Operating License

Pursuant to Facility Operating License Section 2F, License Conditions 2.C.(8) for Unit 1 and 2.C.(6) for Unit 2; attached is a Special Report concerning Hydrogen Piping in the Refueling Water Storage Tank Trench which was not designed in accordance with the Branch Technical Position (BTP) CEMB 9.5-1 as required by the Catawba Facility Operating License.

The only commitments associated with this Special Report are those listed in the "Planned Corrective Actions" section.

Questions regarding this Special Report should be addressed to J.W. Glenn at (803) 831-3051.

Very truly yours,

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Special Report

Hydrogen Piping in the Refueling Water Storage Tank Trench was not designed in accordance with Branch Technical Position (BTP) CEMB 9.5-1 as required by the Catawba Facility Operating License.

Abstract:

On September 16, 1999, with Unit 1 operating in Mode 1 (Power Operation) at 58% power and Unit 2 operating in Mode 1 (Power Operation) at 100% power, it was determined that Hydrogen Piping in the Refueling Water Storage Tank Trench was not designed in accordance with BTP CEMB 9.5-1 as required by the Catawba Facility Operating License. The root cause of the event was determined to be an oversight in the original design of the plant. Corrective action is to install excess flow valves in the system piping as required by Section C.5.d.5 of BTP CEMB 9.5-1.

Catawba Nuclear Station Unit 1 and Unit 2 Facility Operating License NPF-35 and NPF-52 require that Duke Energy Corporation implement and maintain in effect all provisions of the approved Fire Protection Program, as amended. It was subsequently determined that the problem described in this report constitutes a noncompliance with this license condition. Consequently, this occurrence was reported within 24 hours of realization, pursuant to the provisions of Facility Operating License Section 2F (Reference Event #36311, October 19, 1999). This written follow-up is being provided within 30 days of the occurrence.

Background

Catawba Nuclear Station Units 1 and 2 are four loop Westinghouse Units. The Catawba Fire Protection [EIIS:KP] Program is subject to the provisions of the Catawba Facility Operating License Condition 2.C.(8) for NPF-35 (Unit 1) and License Condition 2.C.(6)for NPF-52 (Unit 2). Catawba SSER Number 2 states that the Hydrogen Piping is designed per Branch Technical Position CMEB 9.5-1. Section C.5.d.5 of that document requires hydrogen system piping in safety related areas to be designed to seismic class 1 requirements, or to be sleeved such that the water (i.e. guard) pipe is vented to the outside or that the system be equipped with an excess flow valve so that in case of a line break, the hydrogen concentration will not exceed 2%. The hydrogen piping in the Refueling Water Storage Tank trench does not meet either of these three requirements.

The piping is a part of the Site Hydrogen Bulk Storage System [EIIS:LI]. This piping originates at the site hydrogen bulk storage house, travels underground through the yard, enters the Refueling Water Storage Tank trench, and travels on into the Auxiliary Building.

Event Description

09/16/99	This design discrepancy was identified during an audit (Assessment SA-99-38) of the maintenance and operational practices involving hydrogen systems.
10/19/99	Engineering determined that this was a deviation from the Catawba Fire Protection Plan and an NRC Red Phone Notification was made.

Causal Factors

It is apparent that this was an oversight during the design phase of the plant as evidenced by the fact that other hydrogen lines that are located in safety related areas are either seismically designed (hydrogen supply piping within

the Auxiliary Building) or supplied with an excess flow check valve (Reactor Coolant Drain Tank blanket system piping). The oversight was likely to have resulted from the complexities involved with coordinating the efforts of several different and independent design groups during the design phase of the plant. The simultaneous independent efforts included the design and layout of the hydrogen supply system, the design of the Refueling Water Storage Tank trench, and the development of the Fire Protection Program.

This problem is considered historical since it happened before initial operation of the plant; therefore, this is not a recurring problem. There were no EPIX reportable equipment failures associated with this problem.

Corrective Actions

Planned

1. Excess Flow Check Valves will be installed to bring the system into compliance with section C.5.d.5 of BTP CEMB 9.5-1.

Safety Analysis

A Hydrogen System piping failure due to a seismic event could result in a hydrogen fire or a hydrogen build-up to an explosive range in the Refueling Water Storage Tank trench. The concern is an adverse interaction with the safety related Refueling Water System line located in the trench, or with the Refueling Water Storage Tank.

A Hydrogen System piping failure in the Refueling Water Storage Tank trench due to a seismic event could result in a hydrogen leak within the trench. Hydrogen escaping from a breech will typically ignite at an escape pressure of about 400 psi. Hydrogen gas in hydrogen piping located in the Refueling Water Storage Tank trench is regulated to 100 psi, therefore precluding the potential for immediate ignition of the hydrogen through a pipe wall breech.

A Hydrogen System piping failure in the Refueling Water Storage Tank trench due to a seismic event could release the

entire volume of the Hydrogen Bulk Storage System into the Refueling Water Storage Tank pipe trench, assuming no operator intervention. However, there are no ignition sources in the trench itself, so that a hydrogen concentration in the explosive range would not ignite. The trench is designed to prevent water intrusion but is not designed to be gas tight, thus precluding the accumulation of hydrogen to an explosive concentration.

A portion of the Refueling Water Storage Tank trench is covered by a Steam Generator Drain Tank basin enclosure tent. The Steam Generator Drain Tank basin enclosure tent is not air-tight. This tent is mechanically vented directly to the atmosphere. Since hydrogen is extremely light, any hydrogen that escaped the Refueling Water Storage Tank trench would immediately rise and be vented to atmosphere.

The health and safety of the public were not affected by this event.

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