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They are not intended for distribution outside the agency.

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Joseph Giantelli (7/24/2008 8:42:42 am)

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Special Inspection at San Onofre Due to Inadequate Electrical Connections

Inadequate installation of electrical terminations has resulted in a generic concern that has affected the safety function of multiple safety related systems required for accident mitigation. The risk associated with these deficiencies satisfies the criteria for implementing a special inspection. A Special Inspection Team is being chartered in response to identification of deficient electrical connections at the San Onofre Nuclear Generating Station with the potential to adversely affect the safety function of multiple safety systems used in accident mitigation.

Outside of Scope

On March 25, 2008, maintenance personnel found the Unit 2, Train B, terminal voltage of the battery at 121V dc; below the TS limit (129.17V dc). The operators declared the battery inoperable and entered the 2-hour action, TS 3.8.4 condition A. Maintenance discovered loose battery breaker bus bolts as the cause of the degraded battery voltage.

Outside of Scope**Additional examples of loose electrical terminations at San Onofre**

On June 25, 2005, during a monthly surveillance of Unit 3 Train B EDG its associated cooling fan failed due to a loose wire.

On September 17, 2007, loose electrical bolt connections were identified affecting the 2D2 electrical DC bus. Specifically, loose bolts on a battery feeder cable and loose intercell connectors were identified. This same DC bus was identified as degraded due to loose electrical connections in March of 2008.

E/22

In 2007, a loose electrical connection was identified affecting emergency chiller supply Breaker E336.

On July 9, 2008, a loose electrical connection was found affecting Unit 3, Train A, EDG cooling fan supply breaker.

Generic Communications

IN 88-27 - DEFICIENT ELECTRICAL TERMINATIONS IDENTIFIED IN SAFETY-RELATED COMPONENTS

IN 2000-14 - NON-VITAL BUS FAULT LEADS TO FIRE AND LOSS OF OFFSITE POWER

Inspection Findings

1) Electrical Connections

2) Loose Connections

TNPO documents

Outside of Scope

SONGS Special Inspection Charter

Additional Information

THERMAL AND ELECTRICAL RESISTANCES OF BOLTED JOINTS BETWEEN PLATES OF UNEQUAL THICKNESS

Experiments were performed to study the contact area between the bolted joint interface of two smooth and flat plates of unequal thickness. The experimental results showed that the size of contact area increases with bolt head/washer radius, but is independent of the bolt torque level. Electrical resistance measurements showed that if the plate surfaces are free of oxide layers, the bolted joint electrical resistance is independent of the bolt torque level, and the model provides excellent predictions. However, if plate surfaces contain oxide layers, the bolted joint resistance depends significantly upon the contact pressure.

IEEE 450 Annex F - Examples of methods for performing connection resistance measurements using a microohmmeter

Outside of Scope

This COMM has been posted to the following communities: All Communications,

Electrical Power Systems, Human Performance, Instrumentation and Controls, New Reactors, Safety Culture

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