SCR NO: N-2014-33816

Event Title: PROJ 16-31555 Design Requirements for Grounding of Construction Power for HWMB-WA (Within PA) sourced from 0-53600-T11 (External Power Supply) are not available.

Condition Description and How Discovered:

Condition:

Explicit design requirements / design basis document are not available or not established for design of Construction Power (DEC 121376) grounding system where external power supply (NEF – Utility Power) is to be used for HWMB-WA construction power inside DNGS PA.

Details:

As per DEC 121736 (MEC 119821) the construction power supply for the D2O Storage – West Annex Facility (HWMB-WA) will be sourced from Transformer 0-53600-T11 (1500 KVA, 8.32 KV/4.2 KV ~ 600 V /347 V). The Transformer 0-53600-T11 is powered from an external utility grid (Hydro One) substation DS1 (44KV~8.32KV) located outside the DNGS PA. The 0-53600-T11 construction power supply is provided by another design, EC 124116.

The design EC 121736 for HWMB-WA construction power supply and associated grounding was designed as per standard design practices and electrical codes. As per current design the 0-53600-T11 (Y-Y, 3 P + N) supplies the loads of the construction trailers and construction services via a network of distribution frames located within the DNGS PA. As per CSA 22.1 code, the neutral of the power supply is required to be grounded at each of the distribution frames. Since these frames and loads are located within the DNGS PA, the neutral of distribution frames are grounded to the DNGS ground grid.

During preparation of another HWMB-WA design EC, DEC 120472 for the main power supply to HWMB-WA facility, the DS5 substation related documents were also reviewed. The ground grid isolation was discussed and recorded in the minutes of the preliminary design COMS meeting for DCP# 11729: DS5 substation & upgrade (OPG Project #10-73821) date 15 March 2012.

The following are extracts from the minutes of Preliminary Design COMS meeting for the DN Power Distribution System Upgrade (Mar. 15/ 2012).

"Grounding system has been raised due to the different voltages of the station power (4.16kV) and new town power (13.8kV). The grounding for new town power shall be isolated from the grounding of station CLIV power (4.16kV) and the existing 8.32kV town power. Each of building projects shall design its own compatible grounding system. This project is able to provide technical data of new 13.8kV system to assist the design of building grounding system."

As per the above COMS records, the Darlington station ground grid and DS5 – external utility ground grid shall be isolated.

As this requirement was not identified within HWMB-WA modification design requirements (MDRs) nor any other design basis document, the Design Agency for the HWMB-WA facility and HWMB-WA construction power supply, reviewed several design documents including the grounding system design manual (NK38-DM-57600), issued formal Requests for Information (RFIs) to OPG and arranged meetings with OPG design to establish the design requirement for grounding with this type of power supply configuration.

The Design Agency has also requested OPG on several occasions to provide written direction or a design requirement document to address this ongoing issue of connecting or not connecting the grounds of two different power sources at DNGS. There are some more conceptual design proposals to use the NEF – utility power supply for other projects under different design ECs. There is a high probability of different design approach for designing the grounding system for external utility power supply and may impact the DNGS grounding configuration in the absence of analyzed design requirements or a design basis document for this type of external power supply and multiple grounding configurations at DNGS.

A similar issue of unclear grounding design requirement has been reported by SCR No N-2014-22830 on 6 August 2014 by the RFRISA project engineering team without any firm resolution.

References:

1. Master EC119821: 0-38000 Master -TMOD For Construction Services
2. Design EC121736: 0-53000-Design-TMOD For Construction Power and Construction Trailer
3. Design EC124116: 0 - 53600 - Design - RFRISA – Transformer T11 Upgrade
4. Transformer 0-53600-T11 Ground Electrode (Loop) Connections to Source Ground Grid and to Main Station Ground Grid," NK38-REP-53600-0512770, 2014-10-02.

Immediate Action Taken:

1. Discussed with OPG Nuclear Refurbishment Design
2. Initiated this SCR

Recommended Actions to Resolve Condition:

1. OPG design engineering to provide analyzed design requirements / design basis documents to address the issue of ground grid separation, or not, when using an external power supply (i.e. from NEF – Hydro One utility grid) for electrical loads within DNGS PA (i.e. HWMB-WA construction power).

2. Revise design EC 121376 as per documented design requirement.