Unit 2

System Status: NOPT OSNO OSTS
User Status: CRTD MRC STA ACRO

SONGS

Notification: NN 200695732

Description: Evaluate for breaker misalignment risk
Created on: 12/07/2009 **Reported By:**
Responsible:
Priority: 4 Medium **Required Start:** 01/27/2010 12:53 **End:** 05/26/2010 12:53
Order No: **Code:**
Task Exists? [Y]

Func.Loc.: S2.4KVS.2A0619 2A0619 2A06 TO 3A06 TIE BREAKER
Equipment:
Assembly:
Quality Class: II
Location: CB **Room:** 302A **Elevation:** 050 **Column:** 16.0K3
Planner Group: Maint Electrical
WorkCenter: M_E Maint. Electrical
Plant: 1000 SONGS - Services
Reliability Classification: CRITICAL-B

ARC Review Status: C Completed **Feedback Req'd?** []
M Rule: **Sig Level:** 4 Low Level Issue

Breakdown [] **Malfunction Start:** **Breakdown Duration:** H
End:

Description:

12/07/2009 16:09:44 (b)(6)
/ NN 200692347 identified an issue with a crack on the 'C' phase load
/ bottle. This issue had a POD developed that addressed this concern.
/ Further evaluation identified additional areas of concern that need to
/ be addressed. Specifically, with complete failure of the flange, would
/ the bushing still have sufficient alignment with the breaker to allow
/ for proper connection. Per measurements taken, the ID of the insulator
/ is 2.09" and the OD of the conductor is 2.00".
/
/
/
/
/

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Func.Loc.: S2.4KVS.2A0619 2A0619 2A06 TO 3A06 TIE BREAKER
Location: CB **Room:** 302A **Elevation:** 050 **Column:** 16.0K3

Sort No.: 0001
Code Group: N-TS-IOD Immediate Operability Determination
Short Text: DNC, 800422395
Task Code: NO30 IOD-Equipment OPERABLE
WorkCenter: EM_SYE Electrical/I&C Systems
Responsible: (b)(6)

Sort No.: 0002
Code Group: N-POD Prompt Operability Determination
Short Text: POD on 2A0619 Bottle Flange Crack
Task Code: PO40 POD Closed
WorkCenter: EM_EE Electrical Engrg
Responsible: (b)(6)

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Func.Loc.: S2.4KVS.2A0619 2A0619 2A06 TO 3A06 TIE BREAKER

Part: _____ Damage: _____

Cause: _____ Activity: _____

Part: _____ Damage: _____

Cause: _____ Activity: _____

Part: _____ Damage: _____

Cause: _____ Activity: _____

Part: _____ Damage: _____

Cause: _____ Activity: _____

SONGS

Notification: NN 200695732

Func.Loc.: S2.4KVS.2A0619 2A0619 2A06 TO 3A06 TIE BREAKER
Location: CB **Room:** 302A **Elevation:** 050 **Column:** 16.0K3

Task Details:

Sort No.: 0001
Code Group: N-TS-IOD Immediate Operability Determination
Short Text: DNC, 800422395
Task Code: NO30 IOD-Equipment OPERABLE
WorkCenter: EM_SYE Electrical/I&C Systems
Responsible: (b)(6)
Status: TSRL
Planned Start:
Planned End:
Complete:

Task Long Text:

NN 200695732

NOTES:
1) Parts 1 through 4 will be completed by the STA.

2) Part 5 may be completed by Operations (STA) or Engineering (Responsible Engineer) when the SSC has been restored to a fully qualified status. IOD (Immediate Operability Determination)

This is an Immediate Operability Determination (IOD).

1. Deficiency Identified and the Affected Functional Location:
S2.4KVS.2A0619
NN 200692347 identified an issue with a crack on the 'C' phase load bottle. This issue had a POD developed that addressed this concern. Further evaluation identified additional areas of concern that need to be addressed. Specifically, with complete failure of the flange, would the bushing (bottle) still have sufficient alignment with the breaker to allow for proper connection. Per measurements taken, the ID of the insulator is 2.09" and the OD of the conductor is 2.00".

2. Identify the Specified Safety Function(s); include mission time (if applicable):

3. Conclusion:

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Description: Evaluate for breaker misalignment risk

Determine OPERABLE/INOPERABLE

_____XX____ Operable

_____ Inoperable

Basis (provide discussion):
This NN was written because a second, unseen crack was discovered during forensics in a bottle that was removed from another 2A06 cubicle. Therefore two cracks on a bottle flange calls into question whether the flange will fail. Failure of the flange would be manifested in two ways; 1) Horizontal slippage (movement) of the bottle when being engaged to the tulip (breaker being racked in). The concern is incomplete electrical connection because of partial horizontal engagement of the tulip to bottle. This could lead to the connection being incapable of carrying design current.

2) Radial dislocation of the bottle such that the tulip will not slip over the bottle, or will partially slip over the bottle. The concern here is incomplete electrical connection, incapable of carrying design current, or loss of the ability to rack the breaker in altogether.

For the first concern: Per POD to NN 200692347, the Finite Element Analysis assumed the tulip to bottle engagement forces being taken entirely by the buss bar, i.e. the bottle flange was not relied upon to prevent horizontal movement. The FEA concluded negligible horizontal movement of the bottle from breaker racking forces. No evidence of horizontal differential movement between the bottle and the bottle flange have been see on any of the inspected 2A06 breaker positions (with broken bottles or not).

For the second concern, it appears unlikely that the flange could become physically dislocated concentrically, even with multiple cracks provided the flange bolting remains intact. No evidence of loose bolting has been seen in any of the inspected 2A06 positions (with broken bottles or not). Further, even without the flange, the insulator to bottle fit is tight and the insulator appears strong enough to keep the bottle centralized. Thus, breaker can be racked in racked in without excessive tulip to bottle forces.

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Based upon the above analysis, it is concluded that 2A0619 remains Operable

Because this assessment is based upon engineering judgment, a POD will be assigned to Engineering.

(The above was discussed with Design Engineering V.Barone)

4. Extent of Condition (Required for Inoperable)

EOC Created (YES or NO)? NO - EOC already created under NN 200692347

Describe "other train/other unit" findings (if performed):

5. IOD Closure Information

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Notification: NN 200695732

Func.Loc.: S2.4KVS.2A0619 2A0619 2A06 TO 3A06 TIE BREAKER
Location: CB **Room:** 302A **Elevation:**050 **Column:** 16.0K3

Task Details:

Sort No.: 0002
Code Group: N-POD Prompt Operability Determination
Short Text: POD on 2A0619 Bottle Flange Crack
Task Code: PO40 POD Closed
WorkCenter: EM_EE Electrical Engrg
Responsible: (b)(6)
Status: TSCC
Planned Start: 12/09/2009 22:50
Planned End: 12/09/2009 22:50
Complete: 12/09/2009 22:50

Task Long Text:

NN200695732

This POD supersedes the previous POD on this issue for 2A0619 which was performed on NN 200692347. This POD does not alter the conclusion of the previous POD, however it adds additional information related to the possible failure modes of the breaker cubicle bottles.

PROMPT OPERABILITY DETERMINATION TEMPLATE
(Refer to SO123-XV-52)

PART 1: DEGRADED/NONCONFORMING/UNANALYZED CONDITION

A. Describe the as-found condition and the equipment affected, assuring that the problem and scope have been clearly identified.

On 12/04/2009, while performing a preventative maintenance inspection on 4.16 KV breaker position 2A0619, a crack was discovered in the mounting flange of one of the cubicle- mounted, primary disconnect contacts (also known as a breaker cubicle bottle). It was discovered that the lower (load side), Phase-C bottle inside the breaker cubicle had a visible crack in the mounting flange of the bottle. Phases-A and B of the lower bottles were also inspected and no indication of any crack in the flanges was noted.

B. If it is confirmed at this stage that no degraded, nonconforming or unanalyzed condition exists, record as such and provide justification.

N/A

PART 2: SPECIFIED SAFETY FUNCTION(S) OF THE AFFECTED SSC

The 2A06 Switchgear is part of the Class 1E, on-site power system that distributes 4.16 KV power to the safety related ESF loads under normal and accident conditions. This system is described in UFSAR section 8.3.1 and Tech Spec 3.8.1. The 2A0619 breaker is a bus-tie breaker which allows the 2A06 and 3A06 busses to be cross connected in the event of a loss of power to either bus. The safety function of the breaker cubicle bottle is to provide an electrical connection between the breaker disconnects in the front of the cubicle and the associated bus bars in the rear of the breaker cubicle.

PART 3: BASIS FOR DETERMINING IMPACT ON SPECIFIED SAFETY FUNCTION(S)

The 2A0619 breaker position will remain capable of performing its specified safety function provided the following criteria are met:

1. The development of cracking in the bottle flange will not allow the bottle to move away from the breaker disconnects (during racking operations or during a seismic event) such that adequate engagement of the breaker tulips is lost.

2. The development of cracking in the bottle flange will not impact the seismic restraint of the breaker truck within the breaker cubicle.

3. The development of cracking in the bottle flange will not compromise the electrical insulating properties of the bottle assembly.

4. The development of cracking in the bottle flange will not generate debris which could fall into neighboring portions of the cubicle and cause unacceptable electrical or mechanical interactions.

5. The development of cracking in the bottle flange will not create an unacceptable misalignment with the breaker tulips which prevents proper racking of the breaker truck.

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Description: Evaluate for breaker misalignment risk

A. Technical Basis

For Item 1 above, Design Engineering has performed a preliminary evaluation which indicates that adequate engagement of the breaker tulips would be maintained during a seismic event and during breaker racking. The evaluation considered the stiffness of the bus supports and the forces applied to the breaker cubicle bottles during breaker racking and during a seismic event. The evaluation assumed a complete loss of the bottle flange such that the only support for the bottle would be the bus work at the rear of the cubicle, the breaker tulips at the front of the cubicle and the insulating block through which the bottle runs. The conclusion of the evaluation was that adequate engagement of the breaker tulips would be maintained during a seismic event and during breaker racking.

Item 2 above was discussed with the breaker manufacturer (ABB). The vendor indicated that the connection between the breaker tulips and the cubicle bottles is not credited for
seismic restraint of the breaker truck in the cubicle. The truck is seismically restrained by the racking mechanism on the breaker truck and the guide rails on the cubicle floor.

Item 3 above was discussed with the breaker manufacturer and it was concluded that the insulating block through which the bottle runs will still support the breaker cubicle bottle and provide the required electrical insulation even if the mounting flange completely fails.

Item 4 above was discussed with the breaker manufacturer and it was concluded that the bottle flanges are contained within an insulating block assembly which has a rear cover, so any broken pieces of flange which may become loose would be captured. Additionally, there are no exposed energized conductors or other sensitive components located below the area of the bottle flanges. As such, even if broken pieces of flange developed, and even if they escaped the insulating container, they would not impact the operation of the breaker or switchgear.

Item 5 above was discussed with the breaker manufacturer
who indicated the breaker tulips are designed to accommodate a misalignment of approximately 3/16# (0.187#) in any direction. The ID of

the bottle insulating block was measured to be approximately 0.090# larger than the OD of the bottle. Based on this, the maximum misalignment from bottle movement within the insulator would be less than the 3/16# range of the tulips. Additionally, with a complete failure of the bottle flange, the bottle would be free to move back into alignment as soon as the curved breaker tulips make contact with the curved edge of the bottle. As such, failure of the bottle flange will not create an unacceptable misalignment with the breaker tulips which prevents proper racking of the breaker truck.

The analyses above conservatively assume that the bottle flange completely fractures in multiple locations and that the flange completely falls away from its associated bottle. So far, inspections in 2A06 have identified 5 bottles with cracks in their mounting flanges. In all cases, the mounting flange was still captured by its 3 associated mounting bolts, and there was no evidence that flange material had broken away. Also, none of the 5 bottles were reported to show evidence of the copper tube slipping within the ID of the bottle flange, so it appears that the flange cracks have not caused a complete loss of the interference fit between the copper tube and the flange ring. Based on this, the analysis assumption of a complete flange failure is very conservative.

Based on the above, there is a reasonable assurance that the observed cracking on the 2A0619 breaker mounting bottle will not prevent the breaker from performing its credited safety function.

B. Status (As Found)
Specified Safety Function(s) Satisfied - All
Specified Safety Function(s) NOT Satisfied - None

PART 4: CONTINUED DEGRADATION

It is possible that additional cracking of the 2A0619 bottle flange may occur over time, however as discussed above, even a complete loss of the structural integrity of the flange would not prevent the breaker from performing its safety function.

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PART 5: COMPENSATORY MEASURES

N/A
Included (describe)

PART 6: EXTENT OF CONDITION (Required for Inoperable)

N/A.

EOC Created (YES or NO)? No.

Describe "other train/other unit" findings (if performed):
N/A

Prepared by : (b)(6) 12/09/09
T3EN13 qualification for (b)(6) valid till 9/25/10

Peer Checked by: (b)(6) 12/09/09
T3EN13 qualification for (b)(6) valid till 9/25/10

Qualifications verified in EQIS by (b)(6) on 12/09/09

Reviewed and approved by Shift Manager.