		Page 1
CALCULATION CHANGE NOTICE	**CCN NO.** <u>XX-E-013</u> – <u>004</u> – **CN006**	
	Base Calc No. Rev No. Sequence No.	

CALCULATION TITLE – From *CALCULATION TITLE* field in EIS:
Post-Fire Safe Shutdown (PFSSD) Analysis

COMPUTER CODE: **VERSION:**

Administrative?	☐ YES ☑ NO	**ASSOCIATED ENGINEERING CHANGE #:**	012513

REGULATORY REVIEWS:
☐ Attached   **Evaluation #** _____
☑ Attached to: <u>CP 012513</u>
☐ Not Applicable   N/A Only if Administrative

USAR STATEMENT:
☐ Requires a change to the USAR:
☑ Does NOT require a change to the USAR

ANY DOCUMENTS IMPACTED?
☐ YES   If yes, enter: SWO #, or Condition Report #, if applicable.
☑ NO   _____

Status: ☑ COMMITTED   ☐ FINAL   ☐ VOID   ☐ SUPERSEDED

ORIG	*DigsigOrg 2.8, 0.7* NA-Vendor Calculation *Printed Name*	*Date*	**ORIG**	*Printed Name* *Date*
	NA *Signature*			*Signature*
	QUALIFICATION REQUIRED: **ES9280479**			**QUALIFICATION REQUIRED:** **ES9280479**
VERF	*DigsigVer 2.8, 0.7* William M. Wilkins *Printed Name*	02/24/2020 *Date*	**VERF**	*Printed Name* *Date*
	William M. Wilkins (signature) *Signature*			*Signature*
	QUALIFICATION REQUIRED: **ES9280479**			**QUALIFICATION REQUIRED:** **ES9280479**
APP	*DigsigApp 2.8, 0.7* Jeff Suter *Printed Name*	02/26/2020 *Date*	**APP**	*Printed Name* *Date*
	Jeff Suter (signature) *Signature*			*Signature*
DigsigCert 3.5 1.75			*DigsigCert 3.5 1.75*	

Vendor supplied document – WCNOC PE Stamping is not
required per WCNOC-162 Rev. 05, Section 8.1.13.

**RPE Certification (For ASME Section III Stress Reports/Design Reports,
refer to AP 05D-001 for qualification requirements)**

CALCULATION SUBJECT (Statement Of Problem) - Enter this in *SUBJECT* field in EIS:

CP 012513 XNB02 replacement impact to revise relay designations for transformer protection features. Additionally, discussion of load tap changer feature of new transformer included with clarification it is not PFSSD.

CALCULATION DATABASE INPUT		

CCN NO. XX-E-013 – 004 – **CN006**

Base Calc No. Rev No. Sequence No.

Link new systems to the calculation/CCN in EIS.	
Systems Affected:	NB, MA
Develop relationships between interdependent calculations in EIS.	
Additional Calculations Providing Input to this calculation:	None
Additional Calculations Impacted by this calculation:	None
Develop relationships between the calculation/CCN and controlled reference documents in EIS.	
Additional Controlled Documents Inputs to this calculation:	None
Additional Controlled Documents Impacted by this calculation:	None
The reference documents listed below are those that cannot be linked to the calculation/CCN and shall be entered in the INDUSTRY REFERENCE field in EIS, e.g., ASME Codes, ANSI Standards, letters, etc.	
Additional Other Reference Documents:	CP 012513, Enercon Calc. WCN-025-CALC-019
Link new components to the calculation/CCN in EIS.	
Additional Components:	None

REFER TO DESKTOP GUIDE FOR PROCESSING CALCULATIONS IN EIS

ATTACHMENT 1

CCN NO. ___XX-E-013___ – _004_ – _CN006_

Base Calc No.   Rev No.   Sequence No

CCN Page No.	Calc. Page Affected DVR/SCRN/ Other		CCN Page No.	Calc. Page Affected /DVR/SCRN /Other		CCN Page No.	Calc. Page Affected /DVR/SCRN /Other		CCN Page No.	Calc. Page Affected /DVR/SCRN /Other
1-3	None									
4(Att. 1)	Appendix 1; p63 Appendix 2; p8 Appendix 4; p17,24									
OAR	None									

ATTACHMENT 1

CCN NO.   XX-E-013   –   004   –   CN006

             Base Calc No.   Rev No.   Sequence No

Vendor calculation WCN-025-CALC-019, Rev 1

CCN NO.   XX-E-013   –   004   –   CN006

             Base Calc No.   Rev No.   Sequence No

	CALCULATION COVER SHEET	**CALC NO.**	**WCN-025-CALC-019**
ENERCON *Excellence—Every project. Every day.*		**REV.**	**1**
		PAGE NO.	**1 of 8**

Title:	UPDATE TO WCNOC CALCULATION XX-E-013, PFSSD ANALYSIS	**Client:**	WCNOC
		Project Identifier:	WCN-025

Item	**Cover Sheet Items**	**Yes**	**No**
1	Does this calculation contain any open assumptions, including preliminary information, that require confirmation? (If **YES**, identify the assumptions.)	☐	☒
2	Does this calculation serve as an "Alternate Calculation"? (If **YES**, identify the design verified calculation.) **Design Verified Calculation No.** _____	☐	☒
3	Does this calculation supersede an existing Calculation? (If **YES**, identify the design verified calculation.) **Superseded Calculation No.** _____	☐	☒

Scope of Revision:

Revised Sec. 5.0 and Appendix A to address DCP 12513 90% Comments.

Revision Impact on Results:

This calculation documents the changes for the replacement of transformer XNB02.

Study Calculation ☐		**Final Calculation** ☒	
Safety-Related ☐		**Non-Safety-Related** ☒	

(Print Name and Sign)

Originator:	**Alex Wurtz**	Alex Wurtz Digitally signed by Alex Wurtz Date: 2020.02.20 13:47:40 -06'00'	**Date:**	**2/20/2020**
Design Verifier[1] (Reviewer if NSR):	**Stacey Graybeal**	*Stacey Graybeal* Digitally signed by Stacey Graybeal Date: 2020.02.20 14:09:35 -06'00'	**Date:**	**2/20/2020**
Approver:	**Austin Tran**	*[signature]* Digitally signed by Austin Tran DN: cn=Austin Tran, ou=Enercon Services, Inc., email=atran@enercon.com, c=US Date: 2020.02.20 14:13:33 -06'00'	**Date:**	2/20/2020

Note 1: For non-safety-related calculation, design verification can be substituted by review.

[Professional Engineer seal: AUSTIN TRAN, LICENSED, 26514, KANSAS, PROFESSIONAL ENGINEER]

Digitally signed by Austin Tran
DN: cn=Austin Tran, ou=Enercon Services, Inc., email=atran@enercon.com, c=US
Date: 2020.02.20 14:14:22 -06'00'

CALCULATION REVISION STATUS

REVISION	DATE	DESCRIPTION
0	01/30/2019	Initial Issue
1	2/20/2020	Revised Sec. 5.0 and Appendix A to address DCP 12513 90% Comments.

PAGE REVISION STATUS

PAGE NO.	REVISION	PAGE NO.	REVISION
3,6-8	0		
1,2,4,5	1		

APPENDIX/ATTACHMENT REVISION STATUS

APPENDIX NO.	NO. OF PAGES	REVISION NO.	ATTACHMENT NO.	NO. OF PAGES	REVISION NO.
A	4	1			

1.0 Purpose and Scope

Wolf Creek is performing a systematic replacement of their large oil-filled transformers to address aging concerns and to implement design improvements in support of long term station operation. ESF Transformer XNB02 is to be replaced prior to the replacement of ESF transformer XNB01.

DCP 012513 is replacing XNB02 and the new transformer will have a Load Tap Changer (LTC) to control the voltage supplied to 4.16kV bus NB02 even if the 13.8 kV input voltage level changes. The DCP is also replacing/deleting relays in the PA201 13.8kV switchgear panel and the relays are addressed by XX-E-013. The purpose of this calculation is to document the impact on Wolf Creek calculation XX-E-013 due to these changes. This calculation is non-safety related per the ENERCON requirements. The Wolf Creek update will be considered "special scope" per the site requirements.

2.0 Summary of Results and Conclusions

Wolf Creek calculation XX-E-013 does not have any computations. It is a document used to identify the components required to support the Post Fire Safe Shutdown (PFSSD) functions. Based on the results of this calculation the addition of the LTC controls will not impact the PFSSD function of XNB02. Two overcurrent relays (287/T2 Phase B and Phase C) are removed from the calculation (287/T2 Phase A is replaced with one new relay to monitor all three phases). Also, components 263-1/T2, 263X-1/T2, 263-2/T2 and 263X-2/T2 are removed from the calculation (no longer required for the "sudden pressure" alarm/trip function). New fault pressure trip relays 263FP K4A and 263FP K4B are added because they provide a trip input for breaker NB00209 (XNB02 input breaker to NB02). Cable 16NBK16AA supplies 125VDC to the sudden pressure monitor that contains the two relays at

XNB02. Failure of this cable does not cause the relays to change state and cause a loss of power to XNB02. Therefore, cable 16NBK16AA is not a PSFFD related cable. Drawing E-1F9426 is impacted by this change and will be revised by DCP 012513 via WIP-E-1F9426-002-A-1. The proposed changes to XX-E-013 as a result of DCP 012513 are acceptable.

3.0 References

3.1 Wolf Creek Calculation XX-E-013, PFSSD Analysis, Rev. 4
3.2 E-074-00001, Outline (Trans-Sealed), Rev. W09
3.3 DCP 012513, XNB02 Replacement, Rev. 0
3.4 E-1F9426, Post Fire Safe Shutdown Logic Diagram Support Function – Electrical, NB002 Off-Site Power Availability, Rev. 2
3.5 E-1F9910, Post Fire Safe Shutdown Fire Area Analysis, Rev. 16
3.6 E-009-00061, Arrangement Diagram, PA02, Rev. W15
3.7 E-009-00198, Connection Diagram (Metal Clad Switchgear, Cust. Unit PA201), Rev. W12
3.8 E-15000, Electrical Cable and Raceway List, Rev. 67
3.9 E-1R4431, Raceway Plan Turbine Building Area-3 EL. 2033'-0", Rev. 2
3.10 E-1R4331, Raceway Plan Turbine Building Area-3 EL. 2000'-0", Rev. 1
3.11 E-1R4321, Raceway Plan Turbine Building Area-2 EL. 2000'-0", Rev. 2
3.12 E-1R4322, Exposed Conduit Turbine Building Area-2 EL. 2000'-0", Rev. 5
3.13 E-13NB11, Schematic diagram 13.8 KV XNB02 Feeder BRKR. 252PA0201, Rev. 6
3.14 E-13NB16, ESF Transformers Auxiliary Power and Control Schematic Diagram, Rev. 1

4.0 Assumptions

There are no assumptions used in the calculation.

5.0   Design Inputs

Reviews of existing change notices against XX-E-013 were performed to determine if any of the documents impact the changes being performed by DCP 012513. Results are as follows:

- XX-E-013-004-CN001 – VOID

- XX-E-013-004-CN002 – FINAL – DCP 14209 removes the HMCP breakers from MCC cubicles NG03DBF6 and NG04DBF6, which were added as PFSSD components in CCN XX-E-013-002-CN014 per DCP 13800. These breaker cubicles provide power and control functions for Train A and B emergency diesel generator room supply fan motors DCGM01A and DCGM01B, respectively. Due to breaker coordination issues, DCP 14209 will modify the power supply to supply 480 VAC power to the diesel generator room supply fan motors DCGM01A and DCGM01B directly from new load center breakers NG0308 and NG0408, respectively. Breakers NG0308 and NG0408 will supply power to the fan control functions within NG03DBF6 and NG04DBF6, respectively. Therefore, MCC cubicles NG03DBF6 and NG04DBF6 will remain as PFSSD components. The changes per this update do not impact the evaluation performed by this calculation.

- XX-E-013-004-CN003 – COMMITTED – Change Package 14658 is replacing cable from EDGs speed signal generators to the EDGs speed switches. Appendices 1, 2 and 3 are updated to reflect these changes. The changes per this update do not impact the evaluation performed by this calculation.

- XX-E-013-004-CN004 – FINAL - CP 15070 is changing the 120VAC source from system NG to NN for the control room a/c unit inlet and

exhaust dampers GKHZ0029A/B (Train A) & GKHZ0040A/B (Train B). The changes per this update do not impact the evaluation performed by this calculation.

- XX-E-013-004-CN005 – COMMITTED – CP 20021 is replacing XNB01 and the change impacts the PFSSD components for XNB01. The changes per this update do not impact the evaluation performed by this calculation.

6.0   Methodology

This calculation is a tabulation of cables and components that are required to support the PFSSD power sources and functions. XNB02 is a power source that is required to support the PFSSD functions. The impact of the LTC controls on the PFSSD power supply function was reviewed and determined to not impact the PFSSD power supply function of XNB02. PFSSD components associated with XNB02 are listed in calculation XX-E-013.   Some of the components are being removed by DCP 012513. The calculation was reviewed and components 287/T2(B) and 287/T2(C) are removed from the plant and will be removed from the calculation. Relay 287/T2(A) is changed to 287/T2(A,B,C) because the new digital relay monitors all three phases. Fault pressure monitors 263-1/T2 and 263-2/T2 are being removed from the plant and will be removed from the calculation. Auxiliary relays 263X-1/T2 and 263X-2/T2 are being disconnected/ "abandoned-in-place" and will be removed from the calculation. A new sudden pressure monitor at XNB02 contains trip relays that are used to trip the 252PA0201 breaker on a fault pressure signal, 263FP relays K4A and K4B. These relays will be added to the calculation. The changes to the relays also impact drawing E-1F9426.   This drawing update will be addressed in DCP 012513 via WIP-E-1F9426-002-A-1.   PK3207 via cable 16NBK16AA supplies

125VDC to the sudden pressure monitor. Failure of this power source or cable does not cause the relays to change state and loss of XNB02. Therefore, PK3207 and cable 16NBK16AA are not required for PFSSD.

7.0   Calculations

N/A

8.0   Computer Software

NONE

APPENDIX A – Markups to Calculation XX-E-013 Rev. 4   (4 pages)

APPENDIX 1 PFSSD FUNCTION EVALUATIONS (PFSSD SUPPORT)	CALCULATION
	REVISION NO. 4

PA0210 is included in the PFSSD design because PA0210 control section provides control power for PA02. No PFSSD loads other than PA02 control power are supplied by PA0210.

Off-site power availability requires that off-site power cables and cables associated with XNB01 and XNB02 protective relays remain free of fire damage. The power cables are associated with the circuit breakers in the preceding table. Off-site protective relays and potential transformers required for PFSSD are identified in Appendix 4 and Appendix 3.

The above discussion addresses safety-related power required for post fire safe shutdown. A limited number of components derive their power from non-safety related busses (PA01 and PA02). The non-safety related power is normally supplied from the unit auxiliary transformer (XMR02). On a failure of XMR02 or the power to XMR02, a fast bus transfer to the start-up transformer (XMR01) occurs. The power path from XMR02 is not included in the PFSSD design because the XMR01 power path is in the PFSSD design. Other than 480V MCCs, there are no other non-safety related PFSSD loads powered from PA01 and PA02. Controls required for off-site and on-site power are identified in Appendix 3.

Forced cooling of ESF transformers XNB01 and XNB02 is not required for PFSSD. Each transformer has a self-cooled rating of 12 MVA and a forced air cooled rating of 16 MVA. The maximum design basis accident (DBA) load is approximately 6 MW which equates to 6 MVA assuming a power factor of 1 (actual power factor is between 0.8 and 1.0). Therefore, there is a 100% margin for the DBA loading for the self-cooled rating. PFSSD loading would be equal to or less than the DBA rating since some of the DBA loads are not credited for PFSSD (e.g. containment spray pumps and safety injection pumps). Therefore, there is adequate justification for not including ESF transformer cooling in the PFSSD analysis.

Lower medium voltage – 4.16KV components and relays required for PFSSD are identified in Appendix 4 and Appendix 3.

An evaluation of the potential for a fire-induced loss of off-site power is contained in Appendix 2. This evaluation identified the plant locations where a fire initiated loss of off-site power (loss of non-safety related power) could occur.

Low Voltage System – 480V

XNB02 has a Load Tap Changer (LTC) that is used to maintain a set voltage level on the NB02 bus even though voltage level changes on the 13.8kV switchyard supply voltage may occur. This function is local to the transformer. The power for the LTC and transformer auxiliary loads is supplied from either the auxiliary winding local to the transformer or an external 480VAC power supply. When operated in a "fixed tap" position (fixed tap setting by Operations) the transformer functions as a standard step down transformer and there are no new failure modes. When placed in the "automatic" mode of operation, the LTC controller monitors the 4.16 kV output and adjusts the tap changer position to maintain the NB bus voltage at a set level. A failure of the main LTC controller would result in the LTC controls being shifted to the backup LTC controller and the Control Room being informed of the change via an alarm. The backup LTC controller has limited control function and prevents the transformer from being in an undesirable position. A loss of 480VAC power feeding the LTC/auxiliary loads for XNB02 will result in loss of power to the main and backup LTC controllers. This would keep the tap setting at a fixed position (the same as the "fixed tap" operation) and the transformer functions as a standard step down transformer. Therefore, a loss of power to the LTC controllers will not impact the PFSSD function of XNB02.

APPENDIX 2 LOSS OF OFF-SITE POWER EVALUATION	CALCULATIO
	REVISION NO. 4
	Page 8

TABLE A

OFF-SITE POWER AND EMERGENCY DIESEL GENERATOR CABLES

CABLE	ASSOCIATED BUS / DIESEL GENERATOR				DESCRIPTION
	NB01	DG A	NB02	DG B	
15NBA10AD	X				NB0112 Input to Switchyard Trip Relay Panel MA152A
15NBB03AA	X				XNB01 Phase A Feeder to NB0112
15NBB03AC	X				XNB01 Phase B Feeder to NB0112
15NBB03AE	X				XNB01 Phase C Feeder to NB0112
15NBB03AH	X				XNB01 Neutral/Ground Over Current Relay 151N/T1
15NBB03AJ	X				XNB01 Phase Differential Relay 287/T1
15NBB03AL	X				XNB01 Phase Differential Relay 287/T1
15NBB06AA	X				XNB01 Phase A Feeder To NB0212
15NBB06AB	X				XNB01 Phase B Feeder To NB0212
15NBB06AC	X				XNB01 Phase C Feeder To NB0212
15PGG01AL	X				PG13R Feeder
15PGG01AM	X				PG13R Feeder
16MRM11AA			X		XMR01 Transformer Cooling
16MRX01AG			X		XMR01 Phase Differential Relay 487/T1
16MRX01AH			X		XMR01 Phase Differential Relay 487/T1
16MRX01AJ			X		XMR01 Phase Differential Relay 487/T1
16MRX01AN			X		XMR01 Phase Overcurrent Relay 450-451 G/T1
16MRX01AP			X		XMR01 Neutral Ground Relay 251N-3/T1 XMR01 Neutral Ground Relay 251N-4/T1
16MRX01AT			X		XMR01 Feeder To PA0201
16NBA11AA			X		XNB02 Fault Pressure Switch 263-1/T2 XNB02 Fault Pressure Switch 263-2/T2 XNB02 Fault Pressure Relay 263X-1/T2 XNB02 Fault Pressure Relay 263X-2/T2
16NBA11AB			X		PA0201 Hand Indicating Switch NBHIS0001
16NBA11AC			X		PA0201 Hand Indicating Switch NBHIS0001 XNB02 Lockout Relay 286-1/T2
16NBA11AD			X		XMR01 Lockout Relay 486/T1 XMR01 Lockout Relay 286/T1
16NBB02AA			X		XNB02 Phase A feeder to NB0109
16NBB02AB			X		XNB02 Phase B feeder to NB0109
16NBB02AC			X		XNB02 Phase C feeder to NB0109
16NBB03AB	X				XNB01 Phase Differential Relay 287/T1
16NBB05AA			X		XNB02 Phase A Feeder To NB0209
16NBB05AB			X		XNB02 Phase B Feeder To NB0209
16NBB05AC			X		XNB02 Phase C Feeder To NB0209
16NBB05AD			X		XNB02 Phase Differential Relay 287/T2
16NBB05AG			X		XNB02 Phase A Feeder From PA0201
16NBB05AH			X		XNB02 Phase B Feeder From PA0201

XNB02 Fault Pressure Trip onitor relays 263FP 4A and 4B

CALC NO. WCN-025-CALC-019 REV. 1
APPENDIX A
PAGE 3 OF 4

CALCULATION NO. XX-E-013
REVISION NO. 4
Page 17

APPENDIX 4
PFSSD RELAY LIST

(Sorted by Relay Location / Relay ID)

Annotations:
- These two relays are no longer inservice and can be removed.
- These two relays are removed from the plant.
- Phase A,B,C Differential Current Relay
- 28 /T2 (A,B,C)

Relay ID	S/G	Relay Name	Room	Fire Area	Relay Location	SSD Fun	Sprtd Fun	Hot Stdby	Cold Shdwn	Normal Shdwn	Alt Shdwn	Schematic / One Line	Other Drawing	Power Feeder Breaker	Notes	Logic Diagram (E-1F)	REV
250G/T2	6	Ground Over Current Relay	4401W	TURB	PA0201	S	R, M, H	X	X	X	---	E-13NB05 E-13NB11 E-13PA14	---	PK6204	---	9426	0
263X-1/T2	6	Fault Pressure Relay	4401W	TURB	PA0201	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
263X-2/T2	6	Fault Pressure Relay	4401W	TURB	PA0201	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
287/T2(A)	6	Phase A Differential Relay	4401W	TURB	PA0201	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
287/T2(B)	6	Phase B Differential Relay	4401W	TURB	PA0201	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
287/T2(C)	6	Phase C Differential Relay	4401W	TURB	PA0201	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
1XEF31	1	ESW Pump Motor A Interposing Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-K3EF01	---	NK4122	XX-E-013-001-CN013	9402A	2
1XEF33	1	ESW Pump Motor A Interposing Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-K3EF01	---	NK4122	XX-E-013-001-CN013	9402A	2
1XEF35	1	ESW Pump Motor A Interposing Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-K3EF01	---		---	9402A	2
3XEG01	1	CCW Pump A Auxiliary Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13EG01A	---	NK4101	XX-E-013-001-CN013	9401A 9401B	2
3XEG03	1	CCW Pump C Auxiliary Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13EG01B	---	NK4101	XX-E-013-001-CN013	9401A 9401B	2
62XBB01	1	Pressurizer PORV Block Valve Auxiliary Relay	3301	C-9	RP139	M	---	X	X	X	X	E-13BB39	---	NG01BBR3 NK4101	XX-E-013-002-CN002	9301	3
62XBB03	1	Pressurizer PORV Block Valve Auxiliary Relay	3301	C-9	RP139	M	---	X	X	X	X	E-13BB39	---	NG01BBR3 NK4101	XX-E-013-002-CN002	9301	3
63TDEEG02	1	CCW Pump A Auxiliary Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13EG01A E-13EG01B	---	NK4101	XX-E-013-001-CN013	9401A 9401B	2
63TDEEG04	1	CCW Pump C Auxiliary Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13EG01A E-13EG01B	---	NK4101	XX-E-013-001-CN013	9401A 9401B	2
83XGK03	1	GKHZ0029A/29B Auxiliary Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13GK02C	---	NG03CLF115	XX-E-013-001-CN013	9442	2
83XGK05	1	SGK05A Indication Circuit Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13GK13	---	NG01ACR130	Required to indicate spurious shutdown of SGK05A. Revised in CCN-XX-E-013-000-CN005.	9444	1
K1119	1	Load Sequencer Relay	3301	C-9	RP139	S	R, M, H	X	X	X	---	E-13GK13	---	NG01AAF4	XX-E-013-001-CN013	9444	2

CALC NO. WCN-025-CALC-019 REV. 1
APPENDIX A
PAGE 4 OF 4

CALCULATION NO. XX-E-013
REVISION NO. 4
Page 24

APPENDIX 4
PFSSD RELAY LIST

(Sorted by Relay Location / Relay ID)

Relay ID	S/G	Relay Name	Room	Fire Area	Relay Location	SSD Fun	Sprtd Fun	Hot Stdby	Cold Shdwn	Normal Shdwn	Alt Shdwn	Schematic / One Line	Other Drawing	Power Feeder Breaker	Notes	Logic Diagram (E-1F)	REV
K526	4	Safety Injection Master Relay	3605	C-27	SB032D	S	R, M, H	X	X	X	---	---	M-767-00374 M-767-00350	NK4416 NN0412	---	9432	0
K713	4	Pressurizer High Pressure Relay	3601	C-27	SB032D	M	---	X	X	X	---	E-13BB40 E-13SB05	M-767-00186 M-767-00189	NK4421 NN0412 NK4416	BBPCV0456A opens if K713 is energized. XX-E-013-002-CN002	9301	3
K726	4	Low-Low T_{AVG} or ABHS0064 in 'OFF/RESET' Relay	3605	C-27	SB032D	R, H	---	X	---	X	---	E-13AB08	M-767-00188	NK4416 NN0412	---	9103	0
K727	4	Low-Low T_{AVG} or ABHS0064 in 'OFF/RESET' Relay	3605	C-27	SB032D	R, H	---	X	---	X	---	E-13AB11A E-13AB11B E-13AB11C	M-767-00188	NK4416 NN0412	---	9103	0
K728	4	Low-Low T_{AVG} or ABHS0064 in 'OFF/RESET' Relay	3605	C-27	SB032D	R, H	---	X	---	X	---	E-13AB11C	M-767-00188	NK4416 NN0412	---	9103	0
K734	4	High-1 RCS Pressure Relay	3605	C-27	SB032D	H	---	---	X	---	---	E-13BB12A E-13BB12B	M-767-00186 M-767-00189	NG02BCF2 NG02BBF3 NN0412 NK4416	---	9205	0
K740	4	Safety Injection Signal Relay	[263FP (4A)]			H	---	---	X	---	---	E-13EJ06B E-13SB05 [P 320]	M-767-00189	NG02BEF2 NN0412 NK4416	---	9205	0
K741	4	RWST Low-Low 1 Level Relay	3605	C-27	SB032D	H	---	---	X	---	---	E-13EJ06B E-13SB05 [P 320]	M-767-00189	NG02BEF2 NN0412 NK4416	---	9205	0
K811	4	Block Test Relay	3605	C-27	SB033A	M	---	X	X	X	X	E-13BB40	---	NK4421	---	9301	0
263-1/T1	5	Fault Pressure Switch Relay	Yard	---	XNB01	S	R, M, H	X [3NB16]	X	X	---	E-13NB10	---	PK6108	---	9425	0
263-2/T1	5	Fault Pressure Switch Relay	Yard	---	XNB01	S	R, M, H	X	X	X	---	E-13NB10	---	PK6108	---	9425	0
263-1/T2	6	Fault Pressure Switch Relay	Yard	---	XNB02	S	R, M, H	X [3NB16]	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0
263-2/T2	6	Fault Pressure Switch Relay	Yard	---	XNB02	S	R, M, H	X	X	X	---	E-13NB11 E-13PA14	---	PK6204	---	9426	0

[263FP (4B)]

P 320 is connected to cable 16NB 16AA. This supplies power to the monitor that houses relays at XNB02. PK3207 and associated cable 16NBK16AA are not required for PFSSD. Loss of power or cable failure will not cause a loss of XNB02.

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS	**PAGE 1 OF 5**
	Title: Post Fire Safe Shutdown (PFSSD) Analysis	
	Wolf Creek document #: XX-E-013-004-CN006	Revision #: N/A

ECDE: Enercon

INITIATING DOCUMENT and revision: (e.g., PO, CR, SWO)	CP 012513 R/0

CHANGE TYPE: [X] Calculation   [ ] Specification

SAFETY CLASS: [ ] SR   [X] SS   [ ] NSR

WCNOC Reviewer signature:	*DigsigVer 5, 0.45* *William M. Wilkins*	Date:	02/24/2020
WCNOC Approver:	*DigsigVer 5, 0.45* *signature*	Date:	2/26/2020

Prepared By:	Init / Date
William M. Wilkins	WMW 02/24/2020

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS	PAGE 2 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis	
	Wolf Creek document #: XX-E-013-004-CN006	Revision #: N/A

ECDE: Enercon

No.	Question	Instructions and Guidance	YES	NO	N/A
1	Do assumptions have sufficient documented rationale?	All Assumptions should be stated in clear terms with enough justification to confirm that the assumption is conservative: For example, 1) the exact value of a particular parameter may not be known or that parameter may be known to vary over the range of conditions covered by the Calculation. It is appropriate to represent or bound the parameter with an assumed value. 2) The predicted performance of a specific piece of equipment in lieu of actual test data. It is appropriate to use the documented opinion/position of a recognized expert on that equipment to represent predicted equipment performance. Consideration should also be given as to any qualification testing that may be needed to validate the Assumptions. Ask yourself, would you provide more justification if you were performing this analysis? If yes, the rationale is likely incomplete.			X
2	Are assumptions compatible with the way the plant is operated and with the licensing basis?	Ensure the documentation for source and rationale for the assumption supports the way the plant is currently or will be operated post change and they are not in conflict with any design parameters. If the Analysis purpose is to establish a new licensing basis, this question can be answered yes, if the assumption supports that new basis.			X

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS	PAGE 3 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis	
	Wolf Creek document #: XX-E-013-004-CN006	Revision #: N/A

ECDE: Enercon

No.	Question	Instructions and Guidance	YES	NO	N/A
3	Do all unverified assumptions have a tracking and closure mechanism in place?	If there are unverified assumptions without a tracking mechanism indicated, then create the tracking item either through an ATI or a work order attached to the implementing WO. Due dates for these actions need to support verification prior to the analysis becoming operational or the resultant plant change being op authorized.			X
4	Do the design inputs have sufficient rationale?	The origin of the input, or the source should be identified and be readily retrievable within WCNOC's documentation system. If not, then the source should be attached to the analysis. Ask yourself, would you provide more justification if you were performing this analysis? If yes, the rationale is likely incomplete.	X		
5	Are design inputs correct and reasonable with critical parameters identified, if appropriate?	The expectation is that an WCNOC Engineer should be able to clearly understand which input parameters are critical to the outcome of the analysis. That is, what is the impact of a change in the parameter to the results of the analysis? If the impact is large, then that parameter is critical.	X		
6	Are design inputs compatible with the way the plant is operated and with the licensing basis?	Ensure the documentation for source and rationale for the inputs supports the way the plant is currently or will be operated post change and they are not in conflict with any design parameters.	X		
7	Are Engineering Judgments clearly documented and justified?	Ask yourself, would you provide more justification if you were performing this analysis? If yes, the rationale is likely incomplete.			X

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS		PAGE
	Title: Post Fire Safe Shutdown (PFSSD) Analysis		4 OF 5
	Wolf Creek document #: XX-E-013-004-CN006	Revision #: N/A	
ECDE: Enercon			

No.	Question	Instructions and Guidance	YES	NO	N/A
8	Are Engineering Judgments compatible with the way the plant is operated and with the licensing basis?	Ensure the justification for the engineering judgment supports the way the plant is currently or will be operated post change and is not in conflict with any design parameters. If the Analysis purpose is to establish a new licensing basis, then this question can be answered yes, if the judgment supports that new basis.			X
9	Do the results and conclusions satisfy the purpose and objective of the Design Analysis?	Why was the analysis being performed? Does the stated purpose match the expectation from WCNOC on the proposed application of the results? If yes, then the analysis meets the needs of the contract.	X		
10	Are the results and conclusions compatible with the way the plant is operated and with the licensing basis?	Make sure that the results support the USAR defined system design and operating conditions, or they support a proposed change to those conditions. If the analysis supports a change, are all of the other changing documents included on the cover sheet as impacted documents?	X		
11	Have any limitations on the use of the results been identified and transmitted to the appropriate organizations?	Does the analysis support a temporary condition or procedure change? Make sure that any other documents needing to be updated are included and clearly delineated in the design analysis. Make sure that the cover sheet includes the other documents where the results of this analysis provide the input.			X
12	Have margin impacts been identified and documented appropriately for any negative impacts.	Make sure that the impacts to margin are clearly shown within the body of the analysis. If the analysis results in reduced margins ensure that this has been appropriately dispositioned in the EC being used to issue the analysis.			X

WCNOC	OWNER'S ACCEPTANCE REVIEW CHECKLIST FOR EXTERNAL CALCULATIONS AND SPECIFICATIONS	PAGE 5 OF 5
	Title: Post Fire Safe Shutdown (PFSSD) Analysis	
	Wolf Creek document #: XX-E-013-004-CN006	Revision #: N/A	

ECDE: Enercon

No.	Question	Instructions and Guidance	YES	NO	N/A
13	Does the Design Analysis include the applicable design basis documentation?	Are there sufficient documents included to support the sources of input, and other reference material that is not readily retrievable in WCNOC controlled Documents?			X
14	Have all affected design analyses been documented on the Affected Documents List (ADL) for the associated Configuration Change?	Determine if sufficient searches have been performed to identify any related analyses that need to be revised along with the base analysis. It may be necessary to perform some basic searches to validate this.			X
15	Do the sources of inputs and analysis methodology used meet committed technical and regulatory requirements?	Compare any referenced codes and standards to the current design basis and ensure that any differences are reconciled. If the input sources or analysis methodology are based on an out-of-date methodology or code, additional reconciliation may be required if the site has since committed to a more recent code			X
16	Have vendor supporting technical documents and references (including GE DRFs) been reviewed when necessary?	Based on the risk assessment performed during the pre-job brief for the analysis, ensure that sufficient reviews of any supporting documents not provided with the final analysis are performed.			X
17	If the design includes digital assets, does it adequately address digital and cyber security requirements?	Ensure the design addresses and meets digital and cyber security requirements. Refer to AP 15D-008 and contact the Cyber Security Group to perform additional reviews prior to approval. The CSAT is required to review modifications impacting Cyber Security.	X		

- END -