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Procedure for the Evaluation of OTNOC D4-11-DP-024

Title	Procedure for the Evaluation of OTNOC		
Document no.	D4-11-DP-024	Rev. No.	0.0
Process Owner	Environment Co-ordinator		
Doc Author	G Stapleton	Created Date	06/07/2021
Doc Review	Environmental Co-ordinator	Reviewed Date	08/07/2021
Doc Approval	Plant Manager	Approved Date	08/07/2021
Review Period	3 years	Effective Date	08/07/2021

Document Revision History			
Revision	Summary of Changes	Date	Approval
0.0	Procedure Drafted	08/07/2021	G Stapleton

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1. Purpose

The purpose of this procedure is to describe the procedure for evaluation the occurrence of, and response to, Other Than Normal Operating Conditions (OTNOC) at Delimara 4.

2. Scope

This procedure outlines the manner of evaluating periods where the plant operates at other than normal operating conditions (OTNOC). Operating in this conditions is sometimes unavoidable (starting and stopping the units for example) but reasons and impacts of this type of operation should be understood to try and recognise any patterns that may give early warning to plant or environmental issues.

The scope also includes remedial measures when operation of plant is in OTNOC.


3. References and Definitions

CCR	Central Control Room
HMI	Human Machine Interface
OTNOC	Other Than Normal Operating Conditions This can include: Start up of a GT Shutdown of a GT Testing or commissioning periods Periods of extended exceptional low-load operation of a GT due to unexpected malfunction of plant systems (<25MW on a GT).
D4-11-RD-13 OTN Operations	

4. Responsibility

The responsibility for the implementation of this procedure rests with the Plant Manager at the station.

He/she shall utilise the services of others including internal resources and external contractors (as required) in the carrying out of the work.

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5. Procedure

5.1 Daily Checks

The D4 power plant status and its operation is continuously monitored via its HMI displays in its CCR and regularly inspected through daily walk-arounds and check sheet completion performed by plant Operations Technicians to confirm that the plant is performing within the required parameters. Any abnormal readings are recorded and referred to the Operations Team Leader and maintenance team for further investigation and corrective action. Refer to procedure D4-11-DP-004 Operation of Delimara 4 Power Station to Minimise Environmental Impacts.

5.2 Monthly Checks

At the beginning of each month, the various start up and shutdown operations as well as any other OTNOC operating periods for each GT are collected from the plant monthly report.

Using the times of these events, each event is entered into a spreadsheet that looks at the emissions during the period. Refer to Figure 1 below.

Each event is reviewed for the maximum and average NO_x, particulates, CO₂, SO₂ and CO emitted during the event.

Each event is captured in a table and an explanation for the event entered. Additional comment is entered if the emissions are higher than expected during the period.

Review of the table allows for patterns to be seen if they exist to allow for early warning of any emerging trends during OTNOC periods.

5.3 Emergency response

Alarm systems are in place to detect abnormal performance conditions that require immediate attention. This is monitored continuously by the plant control systems and visualised on its HMI displays in D4 CCR.

Example Scenario A: Abnormal operation conditions that has the potential to result in plant damage.

- Response: Corrective maintenance, potentially plant shutdown.

Example Scenario B: Abnormal emission values

- Response: Diagnoses of emission source to determine whether scenario A applies, e.g. issue with combustion process; or maintenance process, e.g. change of damage sensor.

6. Records

All OTNOC factors are integrated into reporting outputs.

The D4 record of evaluation of OTNOC is located at the following location:

BMS → Environment → Records → D4-11-RD-13 OTN Operations.

	51										
	Max					Average					
	NOx	Particulate	CO2	SO2	CO	NOx	Particulate	CO2	SO2	CO	
	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm3	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm3	Comment on any unusual readings
15/01/2020 05:28	106.17	0.04	758.69	6.08	66732.42	62.55	0.02	114.22	1.17	65847.06	Normal start
10/01/2020 03:16	106.12	0.43	783.18	4.77	66669.34	44.93	0.41	132.60	0.44	59799.93	Normal start
16/03/2020 07:39	104.98	2.74	754.81	8.24	67117.39	54.14	0.76	238.28	2.47	57440.18	Normal start
27/03/2020 13:39	106.19	2.48	793.65	3.34	65198.14	60.09	0.47	415.68	0.28	58425.87	Normal start, extended time to settle HRSG
10/04/2020 21:05	106.24	5.65	796.14	4.55	66889.21	104.62	0.76	605.04	0.84	65544.68	Extended period @6MW - compressor wash

	51										
	Max					Average					
	NOx	Particulate	CO2	SO2	CO	NOx	Particulate	CO2	SO2	CO	
	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm3	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm³	mg/Nm3	Comment on any unusual readings
03/05/2020 16:20	106.24	0.11	617.12	4.58	67235.80	57.19	0.06	61.20	0.60	59186.29	Normal shutdown
14/10/2020 06:03	36.37	0.02	3.37	1.17	66021.12	30.82	0.01	2.75	0.75	56340.50	Trip
01/11/2020 00:27	105.84	0.08	707.59	0.36	67290.17	47.09	0.02	63.41	0.34	50198.92	Normal shutdown
16/12/2020 16:28	105.86	0.00	748.12	6.17	64947.71	67.96	0.00	144.13	1.97	41977.72	Normal shutdown
20/01/2021 19:05	39.33	3.88	13.54	0.28	64518.15	33.05	3.18	3.42	0.24	56775.91	Trip

Figure 1 - A sample extract of the data that is recorded and analysed as discussed in section 5 above.