Duvha Power Station Outage Scope of Work	Unit	01
	Genix ID	16134
	Date	2023-07-27

Outage type	MO	**Outage start date**	2023-07-27
Department	Boiler Engineering	**System**	Boiler Ash hoppers
Scope review date			

Details	System Engineer	Engineering Specialist	Engineering Line Manager
Name & Surname	Langa Nhlabathi		Ndweleni Tshivhase
Signature			
Date	2022/12/21		~~2022/12/22~~ 2022/12/21

Details	SCOPE APPROVAL	SCOPE ACCEPTANCE	SCOPE ACCEPTANCE
	Engineering Manager	Outage Coordinator	Outage Manager
Name & Surname	Thembi Madonsela	Mzamo Ngomane	Wandile Khumalo
Signature			
Date	2022/12/21	2022/12/21	

SCOPE COMPILATION REFERENCES				
SOURCE & Ref No.	**Yes**	**No**	**N/A**	**Comments**
Previous outage service reports			X	
Return to service data packages			X	
Maintenance Strategy with Rev number				Still to be compiled
SAP defects (attach list as appendix)		X		To be compiled at start of outage
GHRMS (STEP) reports (Generation Heat Rate Management System)			X	
Online Condition Monitoring			X	Not applicable
Pre-outage performance test results	X			Inspections to be done at start of outage
Post outage performance test results	X			Inspections to be done at RTS
GPSS/ Plant Performance data on UCLF incurred	X			No UCLF recorded from plant
OMS / IIRMS recommendations (Audits Reports)			X	None
Risk controls (IRM system)			X	None
Previous audits and reviews (e.g. ERAP)			X	None
Engineering Change Requests (Projects)			X	None for execution
LOPP strategy reports			X	None
URS			X	None
Philosophy (Outage)	X			
Condition Monitoring Report			X	Not applicable
VA/PHD Viewer trends			X	Not applicable
Corrective Actions	X			Part of scope
CARAB reports		X		None
Statutory Requirements			X	None
Grid code requirements	X			Plant safety regulations
Waivers and Exemptions			X	Not applicable
Calibration requirements			X	Not applicable
Previous Outage SOW variations		X		None
Post Mortems Actions from previous outages		X		None
Pre–Outage plant walks		X		To be done before plant shutdown
Risk based inspection (RBI) report			X	None
Simulation, TOIs, OON, SI		X		None

SUBSYSTEM	**Y / N**	**Page №**

CONTENTS

1. GOAL

This outage prepares the unit to achieve the following performance targets with respect to the plant system this scope of work covers:

- UCLF of zero (0)
- UAGS of zero (0)

2. OJECTIVES

2.1 TECHNICAL CRITERIA

- Zero forced shut down for rework after the outage
- Zero trips as a result of outage poor workmanship

2.2 SCOPE VARIATIONS

- None

2.3 FINANCIAL PERFORMANCE

Outage is still to do the financial consolidation from the previous outages.

2.4 TIME MANAGEMENT

- A complete outage project planning to be done during the start of the outage.

3. SUMMARY OF THE SCOPE

The scope provides actions for the repairs of the defective plant. This also includes the inspections of the plant for possible future failures. The intention is to do maintenance repairs to restore the plant to as good as new.

The scope is performed on a time based outage schedule. The plant repairs are to increase the availability and reliability of the plant.

3.1 BATTERY LIMITS

PLANT	START	END	EXCLUSIONS	INCLUSIONS	P&ID DRAWINGS
Boiler Ash hoppers	Boiler zero meter level	Boiler 8 mL	HP Piping, boiler tubes	Dipper plates & support brackets, splash plates, sealing & auxiliaries	0.57/53044

3.2 GENERAL ARRANGEMENT AND LOCATION DRAWINGS

№	DRAWING NUMBER	TITLE
1	*0.57/53044*	UNIT 1-6 ASH HOPPERS PIPING AND INSTRUMENTATION
2	*0.57/51623*	HINGED SEALING PLATES ON FURNACE HOPPER OUTLET SECTIONS

4. APPLICABLE CORPORATE/GENERATION/INTERNATIONAL GUIDELINES ANDSTANDARDS

№	REFERENCE NUMBER	DOCUMENT TITLE
1		

5. APPLICABLE DUVHA POWERSTATION STANDARDS AND PROCEDURES

№	REFERENCE NUMBER	DOCUMENT TITLE
1	240-72261425	Outage Philosophy for Duvha Power Station

6. GENERAL CONSIDERATIONS

ACTIVITIES	SPECIFICATIONS
PRE-REQUISITES / PRE-CONDITIONS	
Permit to work	PSR
SAFETY	
Permit to work	PSR
ENVIRONMENT	
ISO 14001	ISO 14001
QUALITY	
ISO 9001	ISO 9001

Process Quality Process/Procedure (PQP/QCP) Work on the turbine shall be carried out in accordance with the relevant approved PQP. The PQP shall be compiled by the contractor based on this scope of work and submitted to Duvha p/s Engineering at least 2 months before the outage for approval. The QCP shall include the work that will be performed both outside the Power Station as well as on site	
Hold and witness points ➢ H&W points that form part of the QCP and have been approved prior to the start date, shall not be by-passed under any circumstances without the written concession of an authorised member of the Engineering Department. It is the Contractors responsibility to inform the Plant Engineer or his representative at the daily progress meetings when an activity will be ready for QC.	
Check Sheets Inspections to be carried out in accordance with check sheets as attached in master quality plan (QCP). All disassembly and assembly values to be recorded in relevant check sheets. No incomplete check sheets will be accepted unless the prior exemption in terms of the technical notification is obtained from Engineering. NCR will be issued for incomplete check sheets. Repair or replace all damaged/worn components out of specification or obtain a concession from engineering staff. All abnormalities to be recorded and reported with technical notifications.	OEM requirements specifications to be used on specifications unless approval to be obtained from Engineering
Quality technicians QC Technicians will be delegated by Plant Engineers to ensure quality standards and quality assurance is exercised during the repairs, replacement or refurbishment.	
Experience of staff All Engineers, technicians, supervisors and quality assurance related staff should have adequate experience to work on specified activities. All artisans should have adequate experience on specified activities and it is the responsibility of the contractor to provide assurance to Eskom that the artisan has the required experience to perform work at Duvha p/s.	Short CV's of all supervisors, quality technicians, and artisans stating qualifications and relevant experience must be provided at least two weeks before commencement of outage.
General Requirements	
The importance of correct equipment spares and procedures should be included in structured toolbox talk sessions with all contractors.	

Spares It should be kept in mind that lead time of turbine spares required during major overhauls can be as much as 12 months. Therefore all the spares required will be ordered in time. Spares ordered and used will be reported by always quoting the ESKOM stock number (if applicable) as well as the Group and item number from the spares manuals.	
Documentation Full service reports must be compiled and submitted to the Duvha Library documentation centre for safe keeping and approval 40 days after unit is synchronised on load	
Equipment Lifting equipment: An up to date test certificate will be available for all lifting equipment that will be used. Measuring equipment: An up to date calibration certificate must be available for all measuring equipment that will be used. Special tools will be serviced before the outage, will be available on site and will be on good working condition. A list if all special tools must be compiled before the outage and submitted to Engineering. The special tools must be readily available for inspection by QC and Engineering.	
Use of SAP PM to record history and costs SAP PM will be used to record history of work done and the related costs to at least the second level of headings as listed in this document.	
EXISTING DEFECTS	
A list of all defects loaded before the submission of this SOW are attached	Attached defect list

7. DETAIL SCOPE OF WORK:

SUBSYSTEM		1. ASH HOPPER				
COMPONENT ACTIVITIES					GOV. DOCUMENTS	
№	COMPONENT FLOC (KKS CODE)	COMPONENT DESCRIPTION	ACTIVITY TYPE (INSPECTION / TEST / REFURBISH / REPLACE)	WORK SPECIFICATIONS	CHECK SHEET NO.	INTEV. POINTS (H/W/R)
1.1		ASH HOPPER	Inspection	Ash Hopper Internal & External Inspection Submit detail report to project controller.		W
1.2		ASH HOPPER	Clean	Clean out clinkers from ash hoppers 1-4 and remove to dumping site.		W
1.3		ASH HOPPER	Strip	Strip out splash plates		R
1.4		ASH HOPPER	Renew	Renew splash plates		R
1.5		ASH HOPPER	Remove	Remove Dipper plates and lock plates		R
1.6		ASH HOPPER	Renew	Renew Dipper plates and lock plates		R
1.7		ASH HOPPER	Renew	Renew Dipper plate support brackets should there be any damaged		R
1.8		ASH HOPPER	Repair	Repair & clean reject pipe nozzles inside ash hopper		R
1.9		ASH HOPPER	Renew	Renew division wall protection caps (10mm Plate)		R
1.10		ASH HOPPER	Strip	Strip Hopper inlet pipes and bends for (HP cleaning)		R
1.11		ASH HOPPER	Renew	Renew inlet pipes and bends after cleaning		R
1.12		ASH HOPPER	Inspect	Inspect & repair/Renew Hopper overflow pipe domes/cage 4 off		R
1.13		ASH HOPPER	Renew	Renew all ash hopper refractory		R
1.14		ASH HOPPER	Inspect	Inspect & repair overflow pipes 350mm pipe, bends and flanges		R
1.15		ASH HOPPER	Renew	Renew damaged inner sluiceway liner should it be required		R
1.16		ASH HOPPER	Repair	Inner sluice liners to repair with Abrasive Epoxy wear		R

SUBSYSTEM		2. SEALING TROUGH				
COMPONENT ACTIVITIES					GOV. DOCUMENTS	
№	**COMPONENT FLOC (KKS CODE)**	**COMPONENT DESCRIPTION**	**ACTIVITY TYPE)**	**WORK SPECIFICATIONS**	**CHECK SHEET NO.**	**INTERV. POINTS (H/W/R)**
2.1		SEALING TROUGH	Build	Build new sealing trough and deliver to site		R
2.2		SEALING TROUGH	Repair	Remove old sealing trough completely		W
2.3		SEALING TROUGH	Renew	Install new sealing trough		R
2.4		SEALING TROUGH	Renew	Renew drain valves 100mm valves		R
2.5		SEALING TROUGH	Inspect	Fill sealing trough with water, identify leaks and patch		R

SUBSYSTEM		3. HOPPER SEALING DOORS				
COMPONENT ACTIVITIES					GOV. DOCUMENTS	
№	COMPONENT FLOC (KKS CODE)	COMPONENT DESCRIPTION	ACTIVITY TYPE (INSPECTION / TEST / REFURBISH / REPLACE)	WORK SPECIFICATIONS	CHECK SHEET NO.	INTERV POINTS (H/W/R)
3.1		Inner door	Inspections	Remove hopper door casing		W
3.2		Inner door	Inspections	Split hopper door casing and flange bottom half		R
3.3		Isolating valve	Replace	Renew inspection door, hinges and locking device		R
3.4		Inner door	Adjust	Inspect & repair inspection covers on side of casing		W
3.5		Inner door	Repair	Remove hopper inner door & frame 1-4		R
3.6		Inner door	Repair	Renew hopper inner door & frame 1-4		R
3.7		Inner door	Repair	Renew inner door seals 1-4		R
3.8		Inner door	Repair	Renew cylinder water isolating valves		R
3.9		Inner door	Repair	Renew inner door indicator		R
3.10		Inner door	Repair	Inspect and renew grizzly bar’s if needed		R
3.11						
3.12						
3.13						

SUBSYSTEM		4. TARGET NOZZLES				
COMPONENT ACTIVITIES					GOVERNING DOCUMENTS	
№	COMPONENT FLOC (KKS CODE)	COMPONENT DESCRIPTION	ACTIVITY TYPE (INSPECTION / TEST / REFURBISH / REPLACE)	WORK SPECIFICATIONS	CHECK SHEET NO.	INTERV POINTS (H/W/R)
4.1		Target Nozzles	Clean	Perform HP Cleaning on front target nozzles		R
4.2		Target Nozzles	Clean	Perform inspections on front target nozzles & note on report		W
4.3		Target Nozzles	Clean	Perform HP Cleaning on rear target nozzles		R
4.4		Target Nozzles	Inspection	Perform inspections on rear target nozzles & note on report		W
4.5		Target Nozzles	Repair	Strip out front target nozzles HP clean and renew		R
4.6		Target Nozzles	Repair	Strip out rear target nozzles HP clean and replace		R

SUBSYSTEM		5. HOPPER OUTER SLUICEWAY				
COMPONENT ACTIVITIES					GOV. DOCUMENTS	
№	COMPONENT FLOC (KKS CODE)	COMPONENT DESCRIPTION	ACTIVITY TYPE (INSPECTION / TEST)	WORK SPECIFICATIONS	CHECK SHEET NO.	INTERV POINTS (H/W/R)
5.1		Covers	Open	Open sluiceway covers, install screens in sluiceway and barricade area off		R
5.2		Liners	Inspect	Sluiceway liners to inspect. Submit a detail report		W
5.3		Nozzles	Inspect	Sluiceway liners to repair with Abrasive Epoxy wear		W
5.4		Sluiceway	Repair	Remove damage sluiceway liner and replace with new one		R
5.5		Sluiceway	Repair	Strip out sluiceway nozzles and replace with new nozzles		R
5.6		Sluiceway	Repair	Renew sluiceway nozzles water isolating valves 100mm		R
5.7		Sluiceway	Repair	Remove screens from sluiceway and close sluice covers		R
5.8		Sluiceway	Repair	Renew damage sluiceway covers (6mm plate cover size 750x1m)		R

SUBSYSTEM		6. ASH HOPPER VALVES				
COMPONENT ACTIVITIES					GOV. DOCUMENTS	
№	COMPONENT FLOC (KKS CODE)	COMPONENT DESCRIPTION	ACTIVITY TYPE (INSPECTION / TEST / REFURBISH / REPLACE)	WORK SPECIFICATIONS	CHECK SHEET NO.	INTERV POINTS (H/W/R)
6.1		Valve	Repair	Remove front target nozzle valves (100mm) valves (8)		R
6.2		Valve	Repair	Remove rear target nozzle valves (100mm) valves (4)		R
6.3		Valve	Repair	Remove rear target nozzles in line NRV (150mm) (4)		R
6.4		Valve	Repair	Remove boiler normal make up valves (250mm) (2)		R
6.5		Valve	Repair	Remove boiler emergency valve (1560mm) (2)		R
6.6		Valve	Repair	Remove sealing trough filling valves (100mm) (4)		R
6.7		Valve	Repair	Remove cooling water isolating valves (150mm) (4)		R
6.8		Valve	Repair	Remove sluice water isolating valves (150mm) (4)		R
6.9		Valve	Repair	Remove valves around boiler (100mm) (4)		R
6.10						
6.11		Valve	Repair	Renew front target nozzle valves (100mm) valves (8)		R
6.12		Valve	Repair	Renew rear target nozzle valves (100mm) valves (4)		R
6.13		Valve	Repair	Renew rear target nozzles in line NRV (150mm) (4)		R
6.14		Valve	Repair	Renew boiler normal make up valves (250mm) (2)		R
6.15		Valve	Repair	Renew boiler emergency valve (1560mm) (2)		R
6.16		Valve	Repair	Renew sealing trough filling valves (100mm) (4)		R
6.17		Valve	Repair	Renew cooling water isolating valves (150mm) (4)		R
6.18		Valve	Repair	Renew sluice water isolating valves (150mm) (4)		R
6.19		Valve	Repair	Renew valves around boiler (100mm) (4)		R

SUBSYSTEM		7. INSPECTION DOORS/GRATINGS & LAMP POSTS				
COMPONENT ACTIVITIES					GOV. DOCUMENTS	
№	COMPONENT FLOC (KKS CODE)	COMPONENT DESCRIPTION	ACTIVITY TYPE (INSPECTION / TEST	WORK SPECIFICATIONS	CHECK SHEET NO.	INTERV POINTS (H/W/R)
7.1		Door	Repair	Strip out and repair door hinges and locking device, replace with new (4)		R
7.2		Door	Repair	Renew door seals (4)		R
7.3		Door	Repair	Close doors and test for leaks during commissioning		R
7.4		Grating	Repair	Grating to renew on walkway, 1.5M Duvha to supply material		R
7.5		Lamp posts	Repair	Lamp post to repair and weld at 2M level		R
7.6		Hand railing	Repair	Hand railing on walkway around Hopper to renew.		R

8. BUDGET BILLS OF MATERIAL

(SOW OF WORK VARIATION WILL BE ISSUED ONLY IF REFURBISMENT OR REPLACEMENT COMPONENTS EXCEED BUDGET. OTHERWISE CUTTING INSTRUCTION WILL BE USED TO COMMUNICATE WHICH COMPONENTS MUST BE REPLACED OR REFURBISHED)

№	**REPLACE/ REFURBISH**	**COMPONENT DESCRIPTION**	**COMPONENT / MATERIAL SPECIFICATION**	**OPERATING PARAMETERS**	**PART / NUMBER**	**STOCK NUMBER**	**DESIGN QUANTITY**
8.1		Dipper plates					40
8.2		Splash plates					40
8.3		Inspection door seals					4
8.4		Inner door seals					4
8.5		Sealing trough ball					2
8.6		Sealing trough drain valves					2
8.7		Cooling water filling valves					2
8.8		Hopper sluice water Isolating valves					2
8.9		Normal make up valves					2
8.10		Emergency make up valves					2
8.11		Cooling water filling isolating valves					2
8.12		Hopper sluice water isolating valves					2
8.13		100 mm valves around the boiler					4
8.14		150 mm valves around boiler					2