	Kendal Work instruction	Environmental Management
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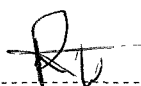
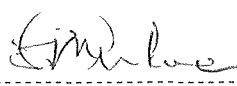
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## **1. Introduction**

The monitoring and measurement of key environmental characteristics is vital to ensure continual improvement of all aspects related to the effective establishment, implementation, maintenance and performance of the environmental management system at Kendal Power Station

## **2. Supporting Clauses**

### **2.1 Scope**

#### **2.1.1 Purpose**

To monitor and measure, on a regular basis, the key characteristics of operations and activities that may have a significant impact on the environment

#### **2.1.2 Applicability**

This work instruction applies to all activities and projects at Kendal power station that could have a significant impact on the site and surrounds

#### **2.1.3 Effective Date**

Effective date is the date when this document will be authorized

### **2.2 Normative/Informative References**

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs

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### 2.2.1 Normative

[1] SABS/ ISO 14001 2015 Environmental Management System (EMS)–Requirements with guidance for use

### 2.2.2 Informative

- [2] National environmental management act, No 107 of 1998
- [3] National water act, No 36 of 1998
- [4] Occupational health and safety act, No 85 of 1993
- [5] \*1015695 Kendal document and records management work instruction
- [6] 32-95 Environmental, occupational health and safety incident management work instruction
- [7] 32-249 Environmental indicator reporting standard
- [8] \*1015692 Environmental communication work instruction
- [9] \*1017357 Non-conformance, corrective and preventive action work instruction
- [10] \* 1015586 Environmental scope and management system documentation
- [11] 17/4/AEL/MP312/11/15 Kendal power station – atmospheric emissions license
- [12] 04/B20E/BCGEI/1048 Kendal power station water use license
- [13] 27/2/1/C211/1/1 Eskom holdings-bulk water use license
- [14] B33/2/220/19/P161 Kendal power station waste disposal permit

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## 2.3 Definitions

Definition	Explanation
<b>Activity</b>	An action either planned, actual (existing) or historical, that occurs or is performed by employees on behalf of the company
<b>Environment</b>	-the earth's land, water and atmosphere, -micro-organisms, plant and animal life, -any part or combination of (3 1 2 1) and (3 1 2 2) and the interrelationship among and between them and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well being
<b>Employee</b>	An individual in the full-time or part-time / occasional employ of Kendal Power Station, including contracted workers as per the OHS Act
<b>Environmental aspect</b>	An element of an organisation's activity, product and service that can have a beneficial or adverse impact on the environment
<b>Environmental impact</b>	The degree of change in the environment resulting from the effect of an activity on the environment, whether desirable or undesirable
<b>Environmental Management Plan/ Programme</b>	A documented plan or programme which captures short, medium and long terms actions aimed at addressing environmental management at the Station
<b>Key Characteristic</b>	An indicator of environmental performance which may include parameters used to define the levels of acceptable environmental performance such as stack emissions, temperature, incidents/nonconformities, chemical consistency, volume, etc These parameters may directly contribute to the Station's environmental Key performance indicators

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## 2.4 Abbreviations

Abbreviation	Explanation
AEL	Atmospheric Emissions License
CARA	Conservation of Agricultural Resources Act, No 43 of 1983
DWS	Department of Water and Sanitation
EMP	Environmental Management Plan/Programme
EMS	Environmental Management System
HWTSY	Hazardous Waste Temporary Storage Yard
KPI	Key Performance Indicator
MDC	Main Documentation Centre
NEMA	National Environmental Management Act, No 107 of 1998
NEMAQA	National Environmental Management Air Quality Act, No 39 of 2004
NEMWA	National Environmental Management Waste Act, No 59 of 2008
OHS Act	Occupational Health and Safety Act, No 85 of 1993
WUL	Water Use License

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## **2.5 Roles and Responsibilities**

- All employees involved at functions or levels that require monitoring and measurement of key environmental characteristics are responsible
  - To fulfil their specific monitoring and measuring functions in a timely manner as per Appendix 1 of this work instruction
  - To report any environmental incidents / non-conformities, or potential nonconformities as defined by 32-95 environmental, occupational health and safety incident management work instruction and \*1017357 non-conformance, corrective and preventive action works instruction

### **The Environmental Department is responsible for:**

- Ensuring on-going monitoring, measurement and reporting of key environmental characteristics as per compliance obligations
- Identifying individual employees who will be responsible for the specific monitoring, measuring and reporting of these key environmental characteristics, ensuring that, where applicable, the latest, relevant environmental legislative and other requirements are in use for monitoring and measurement purposes,

### **The Heads of Departments are responsible for:**

- Ensuring the availability of resources to enable effective monitoring, measurement and reporting of key characteristics Ensuring on-going monitoring, measurement and reporting of key characteristics as described in this work instruction
- Ensuring that monitoring equipment is calibrated as required

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**2.6 Process for Monitoring**

Implementation of this work instruction will be monitored as a minimum during reviews and audits

**2.7 Related/Supporting Documents**

None

**3. Environmental monitoring and measurements work instruction**

**3.1** Environmental KPI's, or key characteristics of a Station KPI, shall be monitored and measured on monthly basis

**3.2** The monitoring program must have the following information as per Appendix A of this work instruction

- Parameter/constituent to be monitored,
- Performance requirements (e g legal limits, internal targets, threshold values)
- Monitoring Frequency,
- Reporting Frequency where applicable,
- Responsibility for monitoring and reporting,
- Method and equipment used for monitoring,
- Reference to records, where applicable,

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- 3.4** Monitoring equipment shall be calibrated and maintained in accordance with the standard to which the station subscribes (such as SANS ISO 9001 or original equipment manufacturers' requirements),
- 3.5** When a monitoring function has been outsourced to a third party/contractor, the contractual agreement must specify
- The key characteristic to be monitored,
  - Monitoring methodologies or standards to be adhered to,
  - Frequency of reporting,
  - Monitoring shall be conducted by a competent person or body,
  - The number of reports to be provided for monitoring undertaken.
- 3.6** Where applicable, the Environmental Department shall ensure that the latest, relevant environmental legislative and permits are used as guidance for monitoring, measurements, and reporting requirements
- 3.7** Analysis and Evaluations of the monitoring results is performed by reviewing, checking, scrutinizing, interpreting and auditing of the results
- 3.8** Communication of the monitoring information will be done using the Internal and External Communication Matrix as per the Communication Work Instruction (\*1015692)

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#### 4. Acceptance

This document has been seen and accepted by

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Lomile Ngqendesha	Outage Manager
Solly Chokoe	Acting Environmental Manager
Karlheinz Von Bentheim	Integrated Risk Manager
Mandla Dube	Human Resource Manager
Vincent Kunene	Finance Manager
Maditaba Kubheka	Training manager
Malibongwe Mabizela	Acting Engineering Manager
Victor Tshamano	Maintenance Manager
Bafana Radebe	Operating Manager
Sibongiseni Mazibuko	Acting Programme Manager
Phumelele Thanjekwayo	Coal & Ash Manager
Nomsa Tshabalala	Production Manager
Mildrad Mahlaba	Chemical Services Manager
Nonhlanhla Khumalo	Performance and Testing Manager
Carol Lepphoto	Materials Management Manager
Mapule Madingoane	C&I units Maintenance Manager
Lammie Maree	C&I Outside plant Maintenance Manager

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## 5. Revisions

Date	Rev.	Compiler	Remarks
July 2021	05	T Vilane	Additional information on Appendix A as per the recommendations from the EMS internal audit findings
May 2020	04	T Vilane	Additional information on Appendix A as per the recommendations from the EMS internal audit findings
March 2018	03	K Mahlangu	Additional Information on Appendix 1 and section 3.7 was added as per element 9 of the ISO 14001 2015 standard Changed the word procedure to work instruction
April 2015	02	T Rabedzwa	Revised template, updated information on Appendix 1
October 2014	01	T Rabedzwa	Additional information in Appendix 1
March 2012	00	T Phungwayo	Entire procedure re-written and procedure reference numbering changed to sequential SAP numbering (revision reverts to 00 due to new sequential numbering system)

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## 6. Development Team

The following people were involved in the development of this document

- Tshilidzi Vilane

## 7. Acknowledgement

None

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**Appendix A: Kendal Power Station Environmental Monitoring Programme**

Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
<b>AIR:</b>								
Fugitive Emissions	Ambient Air Quality	Dust fall out	As per NEMAQA and Emissions Licence	Monthly	Monthly	Environmental Section and Service Provider	Methods prescribed in the SANS 1929 2011 that recommends using the ASTM D1739 in terms of regulation No R827 (National Dust control regulation)	Report received from service provider
Point Source Emissions	Stack Emissions	Particulate Matter	As per Atmospheric Emissions Licence	Continuous	Monthly	Boiler Engineering & Environmental	Continuous Emissions Monitoring System (CEMS)	Emission monitoring reports
Point Source Emissions	Stack Emissions	Gaseous Emissions	As per Atmospheric Emissions Licence	Continuous	Monthly	Boiler Engineering & Environmental	Continuous Emissions Monitoring System (CEMS)	Emission monitoring reports
<b>WASTE:</b>								

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Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
Waste reporting for Waste Information System	Hazardous/Non-Hazardous waste	Waste types & quantities disposed	Eskom work instructions, & NEMWA	Monthly	Monthly/ 6 Monthly	Environmental	Waste register spreadsheet	Waste register spreadsheet
Ash Disposal on Dump	Ash disposed,	Tons of ash disposed	As per Emissions Licence (17/4/AEL/MP312/11/15)	Monthly	Monthly	Operating, Performance & Testing	On line conveyor measurements	STEP reports
Ash Sales	Ash sold	Tons of fly ash sold	As per contractual agreements	Monthly	6 monthly/ monthly	Site based ash buying customers & Environmental	Weighbridge measurements as kept by customers	Weighbridge and sales records, Waste register monthly quantity list
Annual Waste Reporting	Hazardous/Non-Hazardous waste	Waste types & quantities disposed	Eskom work instructions, & NEMWA	Monthly	Annually	Environmental	Waste register	Waste register spreadsheet
<b>WATER:</b>								
Ground Water	Ground Water Qualities	as per NEC contract / scope of work/	DWS WUL conditions	Quarterly	Quarterly	Environmental & service provider	As described in the NEC contract	Electronic & hardcopy report
Surface Water	Quality of Surface water in dirty, clean and emergency dams	as per NEC contract / scope of work/	WUL conditions	Weekly & Quarterly	Weekly & Quarterly	Chemical Services Laboratory, Environmental	SANS Water check proficiency testing / Corporate Standard SANS 241 and as	Chemical Services Laboratory reports and Electronic &

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Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
						& service provider	described in the NEC contract	hardcopy report
Water Treatment Plant	Quality of potable	As per drinking Water Standard and Chemistry standard for portable water (36-704)	As per the drinking water standards and Chemistry standard for portable water	Daily, Weekly	Daily, Weekly & internal to relevant Station sections requirements	Chemical Services Laboratory	As per the required instrument	Chemical Services Laboratory internal reports and data sheets
Water	Water consumption	Quantity	As per Kendal water use licence and Eskom Bulk WUL or plant specifications for flow meter linked to payment	Monthly	Monthly	Service Provider & Chemical Services	Flow meters	Water reports
Dams	Dam levels	Dam levels	Dams not overflow	Daily	Weekly Internal	Chemical Services Laboratory	Visual inspection level indicator	Reports & data sheets
Sewage Treatment Plant	Quality of Final Effluent	Biological parameters	As per permit conditions	Daily	Weekly	Chemical Services Laboratory	Grab sample	Reports & data sheets
Biomonitoring	Effluent dams, wetlands, streams	As per WUL conditions	As per WUL conditions	Twice a Year	Twice a Year	Rocherville Laboratory	Grab sample	Monitoring reports
<b>LAND:</b>								
Resource use	Coal quality	As per AEL requirements	As per contractual agreement with Colliery	Daily	As per AEL requirements	Chemical Services Department	Grabs Samples	Coal Quality Reports

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Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
					& Daily internally			
Site Inspections	Erosion, land degradation, Biodiversity, dams, wetlands, streams, drainage systems & rehabilitation success	Evidence of erosion/bare patches in seeded areas, littering, waste bins/skips or pollution	As per NEMA, NWA and internal work instruction and management programmes	Monthly as per checklist	No external reporting required unless a pollution incident is found (then follow Station work instructions)	Environmental	Visual Inspection Checklist Records	Site Inspection Checklist/ reports
Hazardous Chemical Substance	Underground fuel tanks	Pressure test	As per requirements	Annually	N/A	Materials management	As per service provider's pressure test Methods	Pressure test certificate
Game Management	Game	General well being	Requirements from Mpumalanga Parks Board	Requirements from Mpumalanga Parks Board	N/A	Environmental	Visual inspections/ count	Inspections checklist
Dissolved Oxygen (DO)	Condensate Polishing Plant (CPP) inlet	DO	<20 ppb	Daily	Weekly and Adhoc	Performance and Testing	Online Analyser	Reports
Condenser Efficiency	Condenser	Vacuum Decays	>0 25kpa	Weekly	Weekly	Performance and Testing	Online Instruments	Reports

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Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
Helium Test	Condenser Turbine	Helium	0kpa	Before and after outage and Adhoc	Before and after outage, Adhoc	Performance and Testing	Helium Leak Detecting Machine	Check sheets and Report
Air Heater Leakage	Primary Air Heater (PAH) and Secondary Air Heater (SAH)	% O <sub>2</sub> Leakages	PAH <30% SAH <20%	2 Monthly	2 Monthly	Performance and Testing	O <sub>2</sub> Portable Analyser	Reports
O <sub>2</sub> Verification	SAH	% O <sub>2</sub>	O <sub>2</sub> <0.5 % Deviation Between the Online Analyser and Portable Analyser	Weekly	Weekly	Performance and Testing	O <sub>2</sub> Portable Analyser	Reports
Ash Sampling	Submerged Scraper Conveyor( SSC), Electrostatic Precipitators( ESP) Primary Chain Conveyors,	Carbon Content in Ash	<2%	Daily	Daily	Performance and Testing	Grab Sample	Reports
<b>Plant:</b>								
Valves Test	Boiler and Turbine	Passing valves	As per Valves passing work instruction *1032161	Before and after outage and Adhoc	Before and after outage and Adhoc	Performance and Testing	Infrared Thermal Scan	Checklist and Reports
Load Line	Milling Plant	Mill Performance	As per Mill load line Work Instruction *(1023213)	After Service	After Service	Performance and Testing	Online Analyser	Reports
Pulverised Fuel(PF) Sampling	Milling Plant	PF	As per PF Sampling work instruction *(1030483)	Twice a Year	Twice a Year	Performance and Testing	PF Sampler Machine	Reports

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Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
Milling Internal/Classifier	Milling Plant	Wear rate/ball Charge Measurements	As per Mill Internal Inspection Work Instruction *1036039	Every 9000 hours Service and Adhoc	Every 9000 hours Service and Adhoc	Performance and Testing	Measuring Tape, Steel Ruler and Profiler	Reports
Auxiliary cooling Heat Exchangers	Auxiliary Cooling	Heat Exchanger Performance	As per Work Instruction Heat Exchange *(1035608	Monthly	Monthly	Performance and Testing	Thermocouples and Thermometers	Reports
Water Flow Verification	Water Piping Systems	Water Flow	As per Kendal Water Use Licence	Adhoc as per request	Adhoc as per request	Performance and Testing	Portable Water Flow Meters	Reports
Fire Pumps Capability Test	Fire System	Pumps Efficiency	As per work instruction Fire Pump *1019933	Yearly	Yearly	Performance and Testing	Portable Water Flow Meters and Pressure Gauges	Planned Maintenance( PM)
Ash Plant Mass Meters Calibration	Ash Plant	Ash Quantities	<1% Error	3 Monthly	3 Monthly	Performance and Testing	Self-Calibration	Certificates
Coal Plant Mass Meters Calibration	Coal Plant	Coal Quantities	<1% Error	Monthly	Monthly	Performance and Testing	Self-Calibration	Certificates
Still Air Tests	ESP Plant	ESP Performance	As per Work Instruction Still Air Tests *1023217	After Every Outage	After Every Outage	Performance and Testing	Fluke Multi-meter	Reports
Collection Electrodes (CE) Rapping and Discharge Electrodes (DE) Rapping	ESP plant	CE& DE Rapper Performance	14/14 CE Rappers Should Run and 16/16 DE Rappers Should Run	Monthly	Monthly	Performance and Testing	Plant Management System	Reports
Voltage Current (VI) Curve	ESP plant	ESP Performance	As per Work Instruction ESP VI curve *1023193	After Every Outage	After Every Outage	Performance and Testing	Controller	Report

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Key Characteristic	Area/Activity to be Monitored	Parameter to be Monitored	Criteria Used	Monitoring and Measurement Frequency	Analysis, Evaluation and Reporting Frequency	Analysis and Evaluation Responsibility	Method and / or Equipment Used	Applicable Record
ESP Transformer Commissioning	ESP Plant	ESP Performance	As per Work Instruction Still Air Tests *1023217	Adhoc	Adhoc	Performance and Testing	Controller	Report
Condition Monitoring (Vibrations and Tribology)	Gearboxes, Motors, Pump and Fans	Vibrations and Oil Analysis	As per Work Instruction Conditioning Monitoring *1033494	Vibrations is Monthly and Tribology Quarterly	Vibrations is Monthly and Tribology Quarterly	Performance and Testing	Portable Analysers for Vibrations and Oil Samples for Oil	Reports
Thermography	Switchgears, High Voltage Motor Terminals and Pulleys Bearings	Temperature	As per Work Instruction Thermal Imaging *1035514 and Pulley Bearings *1023192	Monthly	Monthly	Performance and Testing	Infrared Camera	Reports

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