



Work Instruction

Kusile Power Station
Project

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1. Introduction

ISO 9000:2015 Quality Management System – Fundamentals and Vocabulary defines a defect and non-conformance as non-fulfilment of a requirement. In other words, there is no distinction. Kusile only makes a distinction during different phases of the project. During construction non-conformances are raised that relate to Specification (URS), Standards, Specifications, Codes, Contractual Requirements, Project Requirements. These non-conformances follow the Non-Conformance Quality process and are managed by the Quality Department. Minor non-conformances are raised as punch list items and are managed by the Construction Department during construction. Once the Safety Clearance is issued, non-conformities that are identified follow the defect management process.

This Work Instruction outlines the detailed defect management process to be followed at the Kusile Power Station Project from the time defects are identified, reported, and rectified throughout the project life cycle (mainly after Safety Clearance to end of the Inherent Defect Notification Period)

2. Supporting Clauses

2.1 Scope

This document covers the defect management process, the roles and responsibilities for the management of defects at Kusile Power Station Project.

2.1.1 Purpose and Objective

The purpose of this work instruction is to detail the process to be followed when managing defective works, as well as associated roles and responsibilities of key stakeholders in order to address defect timeously and effectively.

The objective of this work instruction is to provide an administrative and managerial framework to be implemented by the Contractors, Engineers, Project Manager, / Delivery Managers, Commissioning, Construction and Generation in pursuit of fulfilling the obligations arising in the respective contractual agreements.

2.1.2 Applicability

This document shall be applicable to the Contractors, Kusile Execution Team involved with the defect management process and Generation at Kusile Power Station as per Contractual Requirements.

2.1.3 Effective date

This document shall be effective from date of authorisation.

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] FIDIC and NEC Contracts as applicable to Kusile Power Station Project
- [2] 240-129703805 Handover Process Work Instruction
- [3] 240-85495283 Commissioning and Handover Management Procedure
- [4] 240-125815990 Commissioning and Completion of Kusile Power Station Project
- [5] 240-124499000 Kusile Project Records Control Work Instruction
- [6] 240-124499452 Kusile Project Document Management Work Instruction
- [7] 240 -132303282 Kusile Risk Management Plan
- [8] 240-124861234 Defect Notification/Clearance Form
- [9] 240-124877157 Request for Inspection
- [10] 240-151699757 Kusile Defect Management Register

2.2.2 Informative

- | | |
|--------------------|--|
| [11] 240-131634789 | Kusile Project Quality Plan |
| [12] ISO 9001:2015 | Quality Management Systems |
| [13] ISO 9000:2015 | Quality Management Systems – Fundamentals & Vocabulary |
| [14] 240-132036925 | SPO Document and Records Processing Guideline |
| [15] 240-131639382 | Kusile Communication Interface Memorandum (CIM) |
| [16] 240-43898815 | Document Transmittal Form |
| [17] 240-132156363 | Non-Conformance Process |
| [18] 240-44948953 | Work Prioritization Procedure |

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2.3 Definitions

Term	Definition
Contractor	A person or firm that undertakes a contract to provide construction activities for the Kusile Power Station Project
Critical Component	Components whose failure has serious consequences (Refer to Appendix B) and where the aim must be to defend against all plausible failures.
Defect	<p>A part of the works which is not in accordance with the User Requirements Specification (URS), Standards, Specifications, Codes, Contractual Requirements, Project Requirements etc. from CTO until end of Inherent Defect Notification period:</p> <ul style="list-style-type: none"> • KKS Defect: Any defect associated with plant labelling or coding. • General Defect: Any defect other than a KKS Defect and should be issued before expiry of the Defect Notification Period. • Commissioning Defect: Any defect that arises after safety clearance and prior to the issuance of Taking-Over Certificate during commissioning activities. • Latent Defect: Any defect that arises after expiry of the Defect Notification Period, issuance of Performance Certificate. Latent defect should be issued and corrected within time period as stipulated within the specific Contract. • Inherent Defect: Any defect that arises after expiry of the Latent Defect Notification Period and should be corrected within time period as stipulated within the specific Contract
Defect Notification Period (FIDIC)/ Defect Correction Period (NEC)	<p>FIDIC Contracts: The time as defined in the contract data of a specific contract, within which the Contractor makes good of notified defects, calculated after the Taking-Over Certificate</p> <p>NEC Contracts: Any defect notified until the defects date is made good within the defect's correction period. The defect correction period begins at the completion for defects notified before completion and when a defect date is notified for other defects.</p>
Defect Management Tool	A tool that enables the reporting and monitoring of defects. Defect Notification and Clearance Form (240-124861234) latest version, Kusile Defect Management Register (240-151699757) supported by Power BI on SharePoint.

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Term	Definition
Hand-Over	<p>The process of handing over the responsibility for all, or part of the project, or its deliverables from the Engineer/Project Manager to Generation. It is also the handover of the statutory accountability of the plant and equipment, including all relevant documentation required to operate and maintain the plant. Typically this takes place shortly after the issuance of the Taking-Over Certificate.</p> <p>Handing over should not be confused with the NEC requirements or FIDIC for Taking Over nor the completion and guarantees between the Project Manager and the Contractor. Hand over will be done according to a combination of P & ID systems (functional group), including documentation package information as per Kusile User Requirements Specification (URS).</p>
Kusile Defects Management Register	Project official register to be used by all responsible parties as discussed herein (240-151699757).
Inherent Defects Notification Period	A period for notifying Inherent Defects in the works or a section. Inherent defects should be issued after the expiration of Latent Defect Notification Period and are to be corrected within a time period as stipulated within the specific Contract.
Latent Defect Notification Period	A period for notifying Latent Defects. Latent Defects are issued after expiration of the Defect Notification Period, issuance of Performance Certificate. Latent defects should be issued and corrected within a time period as stipulated within the specific Contract.
Non-Conformance Report	<p>A report detailing non-fulfilment of a requirement (Contract requirements, statutory and regulatory requirements and any other requirement stated by the Project). A Non-Conformance Report (NCR) is raised during construction.</p> <p>Any existing NCR(s) at the time of take over shall be converted into defects and listed as outstanding defects on the Taking-Over Certificate</p>
Non-Critical Component	Is a component that requires some level of preventive maintenance rather than permitting it to fail. The objective is to control reliability at an appropriate level, generally by preventing the most common types of failures

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Term	Definition
Root Cause Analysis (RCA)	<p>Is a systematic process for identifying root cause of problems or events and an approach to responding to them. An RCA requires that the root cause of failure is identified, corrective action(s) to correct the failure and preventative action(s) to prevent re-occurrence are identified.</p> <p>The Engineer/Lead Discipline Engineer will indicate on the defect form if RCA must be conducted by the Contractor issued with the defect.</p>
Punch List Items (Construction Defects)	Work not in accordance to contractual requirements identified during construction and before issuance of the Safety Clearance Certificate
Performance Certificate (FIDIC)/ Defect Certificate (NEC)	<p>FIDIC Contracts: Certificate issued to the Contractor after Defect Notification Period and in accordance with the respective Contract Conditions.</p> <p>NEC Contracts: Defect Certificate issued by the Supervisor at the latter of the defects date and the end of the last defects correction period.</p>
Engineer/ Project Manager	The person appointed as the Engineer (FIDIC) or the Project Manager (NEC).
Safety Clearance Certificate	A certificate issued by the Engineer/Project Manager to the Contractor that is mutually agreed with Generation and the Contractor's Representatives that from the time and date stated the specified machinery, equipment or section of plant is under the Engineer's/Project Manager's control and can be energized. Further access to machinery, equipment or section of plant is only permissible through the Engineer/Project Manager plant / work permit system
SharePoint	A web-based collaborative platform that integrates with Microsoft Office
CIM	It is a document that provides details of email distribution list for communications between the Employer and the Contractor
SPO	Electronic document management system which captures, manages and provides access to documents/records
G-Drive	It is a Kusile local based data storage system

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2.4 Abbreviations

Abbreviation	Explanation
BMH	Bulk Material Handling
BOP	Balance Of Plant
CIM	Communication Interface Memorandum
CTO	Construction Turn Over
DC	Document Controller
DNP	Defect Notification Period
EDMS	Electronic Document Management System
FIDIC	Federation Internationale des Ingenieurs – Conseils (International Federation of Consulting Engineers)
GCD	Group Capital Division
Gx	Generation
OMAC	Oversight Management Assurance and Compliance
KET	Kusile Execution Team
KKS	Kraftwerk-Kennzeichen System
LDE	Lead Discipline Engineer
NCR	Non-Conformance Report
NEC	New Engineering Contract
CIM	Communication Interface Memorandum
RFI	Request For Inspection
RCA	Root Cause Analysis
SPO	Smart Plant Operator
TOC	Take Over Certificate
URS	User Requirement Specification

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2.5 Roles and Responsibilities

Roles	Responsibilities
Commissioning Department	<ul style="list-style-type: none">• Ensures that the defects are rectified within the reasonable time/whenever opportunity arises.• Keeps comprehensive list of defects which cannot be corrected while plant is in operation. These defects shall be corrected during the next outage opportunity.• Conducts plant walk downs with the Contractor in order to verify rectified defects.• Ensures that remaining punch list items are converted to defects and appended to the Take-Over Certificate.• Monitors plant performance after rectification of the defect.• Retains copy of the defect notification form in the Construction Turn-Over (CTO) file.
Contractor	<ul style="list-style-type: none">• Acknowledges receipt of the defect and proposes disposition including root cause, corrective and preventative actions in accordance with the Contract.• Indicate on the disposition on whether an outage is required to resolve the defect and state the duration of the outage.• Conducts plant walk downs with the Engineering/Construction, Commissioning, Quality and/or Generation in order to verify rectified defects.
Contracts Management	<ul style="list-style-type: none">• Reviews and validates the defect notification form before being administered or registered by Quality Department and ensures that the defects are categorized correctly in terms of the applicable project stage and dates.• Issues defects to the responsible Contractor or instruction to Document Control Management to transmit defects to responsible Contractor.• Issues applicable contractual notices as per the FIDIC or NEC to the Contractor.• Issues Take-Over Certificate (TOC) to the Contractor with the list of outstanding defects whenever applicable.• Monitors the implementation of the defect resolution within the agreed timelines.• Acknowledges the defect clearance form after the defect has been rectified.

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Roles	Responsibilities
Document Controller	<ul style="list-style-type: none"> Ensures that the defects are transmitted to the Contractor using a transmittal form upon instruction from Contracts Manager. Ensures that defects are communicated through official communication channel using Communication Interface Memorandum (CIM). Processes all defects on Smart Plant Owner Operator (SPO) System. Provides SPO numbers on all new defects. Process/ Store closed defects on SPO.
Initiator	<ul style="list-style-type: none"> Identifies the defects and ensures that the defect notification form is fully completed ensuring that the defect is verified by Lead Discipline Engineer (LDE) and validated by Contracts Manager.
Lead Discipline Engineer (LDE)/ Engineering Department	<ul style="list-style-type: none"> Verifies the validity of defects before they are issued to the Contractor. Indicate whether the RCA is required on the defect notification form. Ensures that the defect raised is prioritized correctly according to criteria. Reviews the Contractor's proposed disposition and root cause analysis. Conducts plant walk downs with the relevant parties and the Contractor in order to verify rectified defects. Can withdraw a defect upon investigation that proves otherwise.
Quality Department (Quality Assurance)	<ul style="list-style-type: none"> Communicates the completed and registered defect form to the responsible Contracts Manager, Unit/BMH/BOP Delivery Manager, Project Engineering Manager, Commissioning Management and only to the Kusile General Manager if the defect is priority 1. Ensures completeness and accuracy of the Kusile Defect Management Register. Ensures that defects are tracked on the Kusile Defect Management Register. Produces monthly/weekly defects reports. Ensures storage, retrieval, and preservation of defect records
System Engineer (Gx)	<ul style="list-style-type: none"> Raises defects as identified during the Defect Notification Period and Latent Defect Notification Period in accordance with the Contract via KET Engineering. Indicate whether RCA is required or not on the defect notification form. Conducts reviews on the proposed disposition and root cause, where it affects commercialized units, or as and when required. Allows reasonable access to the plant to allow Contractor(s) to rectify defects after Hand - over. Conducts plant walk downs with KET Engineering, Construction, and/or the Contractor to verify rectified defects.

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Unit/BMH/BOP Delivery Manager	<ul style="list-style-type: none"> • Drives the rectification of defects and ensures that they are addressed within the reasonable time/whenever opportunity arises by the responsible Contractor. • Maintains a comprehensive list of defects which cannot be corrected while plant is in operation. These defects shall be corrected during the next outage opportunity. • Conducts plant walk downs with the Engineer/Project Manager and the Contractor to verify rectified defects.
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2.6 Process for Monitoring

Adherence and compliance to this document shall be monitored by the process owner (Quality Department). This document will be subjected to both internal and external audits as dictated by the project risk and the audit schedule.

The Defect Management tool shall be utilised for monitoring and tracking of defect status (raised/closed), timeline trend (age analysis) and responsible package. Data is reported weekly for Business Review Report.

2.7 Related/Supporting Documents

240-124861234 Defect Notification and Clearance form, latest version

3. Defect Management Process

- The Initiator identifies the defect and complete the Defect Notification Clearance form.

Note: Only defects identified after issuance of the Safety Clearance Certificate will be managed using this process. Defects identified during Construction will be managed through existing construction processes.

- The initiator has to make sure that all required fields in the form are completed

3.1 Defects Identification

Table 1: RACI Matrix -Identification Process

Process Step	Initiator	LDE/Process Owner	Contract Manager
The defect is identified			
-Filling of the defect notification form	R	C	C

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- Indicate the Project Stage and dates on the form	R		A
- Indicate the defect priority as per stipulated criteria on the notification form		R	
- Indicate whether RCA is required	R	A	
- Obtain signatures on the form	R		
- Send the form to Quality for processing	R		A

Legend: R = Responsible, A = Accountable, C = Consulted, I = Inform

3.2 Defect Prioritisation

- All defects will be prioritised according to Safety, Component Failure, Legal and Compliance
- If a defect is prioritised as Priority 1, then a risk assessment is completed by the Engineer/Lead Engineer using the Kusile Risk Management template 240-141635019
- Prioritisation should not be based on urgency but rather the potential impact the defect can have on plant performance, safety of personnel and Legal_&_Compliance obligations
- The Contractor must resolve defects according to the recommended resolution timelines stipulated in this work instruction

Table 2: Prioritisation Table

Priority	Safety	Component	Legal& Compliance	Recommended timelines
1	Fatality/Major Disabling Injury is imminent/has occurred	Critical component failure is imminent/has occurred	Contravention imminent/has occurred	Within 1 month
2	Minor disabling injury	Critical or non-critical component significantly deficient	Contravention highly likely	Within 3 months
3	Minor medical treatment	Critical/Non-critical component deficient but no immediate or foreseeable threat to the component performing design function.	Minor legal compliance issues	Within 6 months to a year

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4	Minor first aid	Maintenance issue on non-critical component and which will have no immediate or foreseeable threat to plant performance.	No legal compliance issues	Within a year
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3.3 Defect Administration Process

Table 3: RACI Matrix -Defect Administration Process

Process Step	Initiator	LDE/Process Owner	Contract Manager	Quality	Delivery Manager	Commissioning Manager	Project Eng Manager	Doc Controller	Contractor
Defect Administration									
-Check for completeness of the form				A					
- Allocate the defect number & capture on the defect register				R					
- Allocate SPO number to the defect				I				R	
- Communicate the issued defect to the Contract Manager	I	I	I	R	I	I	I	I	
- Formally issue the defect to the Contractor			A	I				R	
- Acknowledges/Rejects the formally issued defect		I	I	I					R

Note: Rejected defects will be handled via Contract Management processes and the defect register will be updated accordingly to reflect the rejection and the correspondence number

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3.4 Disposition Review Process

Table 4: RACI Matrix -Disposition Review Process

Process Step	Initiator	LDE/Process Owner	Contract Manager	Quality	Contractor
Review of the disposition					
- Conduct Root Cause Analysis					R
- Send the RCA to KET for review via CIM	I	I	I	I	R
- Indicate whether an outage is required to address the defect and the duration of the outage	I	I	I	I	R
-Review the submitted RCA by accepting or rejecting		R	I	I	I
- Capture the RCA report and review comments on the defect register				A	

Note: Conducting RCAs will be done only on defects indicated as such on the defect notification form. The Contractor's formal response to the defect shall contain, as a minimum, the proposed disposition, root cause analysis where necessary, defect repair timeline and an indication whether an outage is required or not. The contractor shall submit a formal response and attach it to the Defect Notification/Clearance Form (240-124861234).

3.5 Implementation and Closure of the Defect Process

Table 5: RACI Matrix – Implementation and Closure of the defect Process:

Process Step	Initiator	LDE/Process Owner	Contract Manager	Quality	Commissioning	Construction	Quality Control	Doc Controller	Contractor
Implementation and Closure									
-Implement the approved corrective actions						A			R

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- Arrange for inspection or verification of the implemented corrective	C	C			C	C	C		R
- Send closure documentation to KET	I	I	I	I					A
- Sign off the closure documentation		R	R	I	R	R			
- Send the signed closure documentation to the Contractor	I		A	I	I	I		R	
- Close officially on the defect register				A					
- Capture the closed defect on SPO								R	

Note: Verification of implemented defects will be done either through an RFI process or Plant Walkdown with Engineering/Commissioning/Construction/Quality Control/Generation. Not all defects will require a physical verification some might be documentation review, reports or performance testing reviews etc.

3.6 Defect Communication/Distribution

Defects will be communicated internally to KET by Quality Department according to the communication protocol below:

Priority	Communication protocol	Recommended Time frame to resolve
1	General Manager, Project Engineering Manager, Commissioning Manager, Unit/BOP Delivery Manager, Contract Manager, Doc Controller, Initiator	Within 1 month
2	Project Engineering Manager, Commissioning Manager, Unit/BOP Delivery Manager, Contract Manager, Doc Controller, Initiator	Within 3 months
3	Commissioning Manager, Unit/BOP Delivery Manager, Contract Manager, Doc Controller, Initiator	Within 6 months to a year
4	Commissioning Manager, Unit/BOP Delivery Manager, Contract Manager, Doc Controller, Initiator	Within a year

3.7 Document and Records Management

The primary storage of defect records shall be kept on SPO through the Doc Controller of the package, and the secondary storage for easy access will be the G-Drive; Quality Folder. The Quality Department shall retain records in accordance with the Kusile Project Records Control Work Instruction (240-124499000)

3.8 Defect Monitoring, Resolution and Reporting

- The Unit/BMH/BOP Delivery Manager shall ensure and manage the consistent defect monitoring and resolution progress.

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- The Unit/BMH/BOP Delivery Manager is responsible to drive the resolution of defects. This can be driven through construction integration meetings or separate meetings arranged directly with the Contractor. Contract Management will support the driving of defects by ensuring that defects are resolved timeously as per the contractual obligations of the Contractor.
- Quality will capture progress updates on the defect management register
- The Unit/BMH/BOP Delivery Managers shall obtain reports from the Quality Department for accurate reporting of their relevant areas of responsibility.

3.9 NCR's and Punch list (Construction Defects) items remaining during Taking-Over

- Any remaining Non-Conformance Reports (NCRs) and Construction defects identified during the construction overlapping into the Taking-Over phase shall be converted to defects and shall follow the process as stipulated in this Work Instruction
- The Unit/BMH/BOP Delivery Manager and the Contracts Manager shall ensure that Taking-Over Certificates are not issued for any plant area where category 1 and 2 punch items are still open.
- NCRs shall be converted to defects by closing the NCR through the Non-Conformance Process (240-132156363). The defect number shall be referenced on the closed NCR.

3.10 Transfer of Punch List (Construction Defects) Items or Defects between Packages

Construction defects or defects that are identified as belonging to a different package than that to which it was originally raised, will be first verified by the Unit/BMH/BOP Delivery Manager before it can be transferred.

Punch list items or defects that are transferred from one package to another will be closed for the original package (initial to which it was raised) by referencing the new allocated defect number. A new number shall be allocated to the punch list item or defect now raised to the transferred package.

3.11 Defects Identified After Completion/Performance Certificate

Defect identified after the issuance of the Completion/Performance Certificate shall be rectified by Generation unless if proven to be a Latent Defect or Inherent Defect.

Latent or Inherent Defects shall be issued within the time periods as stipulated within the specific Contract and shall be accompanied by a Root Cause Analysis (RCA) or any form of investigation. The process as stipulated in this Work Instruction shall be followed during the issuance of the Latent or Inherent Defect.

4. Acceptance

This document has been seen and accepted by:

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Portia Matshitela	Project Quality Manager
Makwena Makgwane	Senior Manager Complex Projects
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Name	Designation
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5. Revisions

Date	Rev.	Compiler	Remarks
July 2023	4	NS Sikhosana	Changes on defect prioritization, adding RACI Matrix, defect closure mechanisms after a review by Medupi
August 2022	3	NS Sikhosana	Addition of RCA requirements
September 2022	2	TS Silenge	Changes made to align Work Instruction with corrective actions emanating from an audit NCR raised by Sustainability. Audit ref QMS-IA-GX-KCP-005/2020
December 2012	1	TS Silenge	First issue

6. Development Team

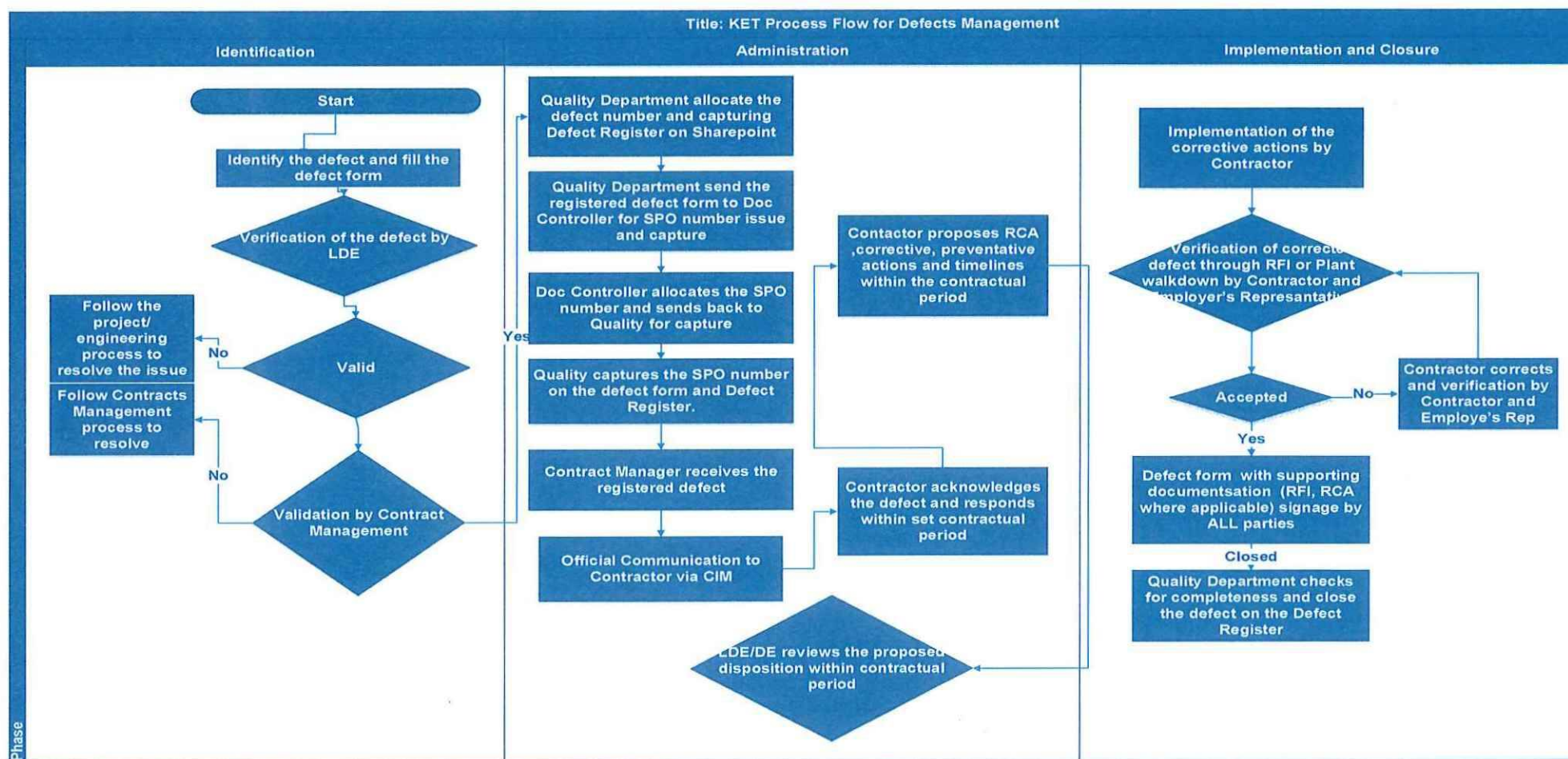
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- Sebongile Foku
- Austin Musekiwa

7. Acknowledgements

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Appendix A - Defect Management Process Flow

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Appendix B – Critical Component Evaluation Criteria:

Criticality Criteria	Category	Classification
A failure of a component directly resulting in:		
Injury or fatality to one or more persons.	Safety	C
Personnel health effect (e.g. radiological/asbestos).	Health	C
An environmental release that would exceed the site permit requirement or result in an environmental legislative contravention.	Environment	C
A component governed by statutory or Eskom mandatory regulation.	Statutory	C
Single/Multiple generating unit trip or forced shutdown.	Production Loss	C
A sustained production loss of greater than 10% of the generating unit capability for more than 8 hours.	Production Loss	C
Significant Plant/Equipment damage greater than R10m. (Repair cost including Planning, Labour, Parts and Production loss).	Cost	C
Failure of a component resulting in failure or degradation of a critical component (e.g. HP pipe hangers).	Secondary Damage	C
Loss of safe shut-down of systems required for plant safety or power production. (e.g. DC Aux Oil Pump for the Main Turbine, Station Battery's)	Hidden - Protective Device	C
Loss of safety protective function or failure to start up a safety system (e.g. fire sprays, safety relief valve; fire pumps)	Hidden - Protective Device	C

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