Eskom	Work Instruction	Kusile Power Station Project Commissioning

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Content

1. Introduction

1.1 Commissioning Process

1.1.1 This work instruction governs the commissioning process followed at the Kusile Power Station Project to ensure that the commissioning process and all its requirements are to the satisfaction of Eskom.

1.2 Management Responsibilities

1.2.1 It also covers the management responsibilities and activities of personnel from contractors' and the employers' organisations through completion, commissioning, taking-over of the works and the handover of the plant from the Kusile Power Station Project to the Client Kusile Power Station Generation.

2. Supporting Clauses

2.1 Scope

2.1.1 The purpose of this work instruction is to identify the organisational responsibilities and activities necessary for Contractor's and the Kusile Execution Team (KET) for the completion of construction, plant checks, commissioning, and take-over from contractors and hand-over to Kusile Generation Management. It further provides a framework for communication links and interfaces within Eskom and between Contractors and Eskom. The objectives are as follows:

2.1.1.1 To Document the high-level process and the requirements for construction completion, plant checks, commissioning, take-over of plant from the contractors and hand-over to the Kusile Power Station Representative.

2.1.1.2 To ensure the effective implementation of the requirements of the OHS Act, construction regulations and Eskom Kusile Safety Standards.

2.1.1.3 To establish meaningful communication links and interfaces between Kusile Power Station Project, Contractors and Kusile Power Station staff.

2.1.1.4 To ensure that contractual requirements are met in a timely and cost effective manner and that Eskom is not disadvantaged by having to bear liabilities which are the responsibility of the Contractor.

2.1.1.5 To ensure that appropriate quality requirements are met through applicable management systems and practices such as inspection, testing, commissioning, quality control and quality assurance, etc.

2.1.1.6 To ensure that the Power Station receives an asset by the planned date that is capable of commercial operation and fit for purpose as outlined in the User Requirement Specification (URS) of the Kusile Power Station Project.

2.1.1.7 To stipulate roles & accountabilities of contractors, and the Kusile Execution Team.

2.1.1.8 This document is a multi-disciplinary / group document to co-ordinate smooth "putting plant into service to the best of all parties".

2.1.2 Applicability

This work instruction is mandatory to all parties involved in the Kusile Power Station Project construction completion, plant checks, commissioning and hand over of generating plant.

2.1.3 Effective date

Authorisation Date

2.2 Normative/Informative References

2.2.1 Normative

[1] FIDIC and NEC Contracts and Guide notes

[2] Construction Safety, Health and Environmental Management (32-136)

[3] Plant Check Manual (36-1150)

[4] Erection Check Manual (36-1149)

[5] Commissioning Manual (36-1152)

[6] Eskom Project Management Policy (ESKPBABR4)

[7] Project Lifecycle Model (ESKAGABF9)

[8] Generation Division Project Management Policy (36-667)

[9] Project Execution Model and Reference Book (GGM 0588)

[10] Operating Regulations for High Voltage Systems (ESKPVAEY6)

[11] Eskom Generation: Plant Safety regulations (GGR 0992)

[12] Occupational Health and Safety Act, Act No. 85 of 1993

[13] Quality requirements for Engineering and Construction Works in Generation (GGS 0462 Rev1)

[14] Permit to Work System for New Construction Projects (39-100)

[15] The South African grid Code – Governance Code, Information Exchange Code, Network Code, Preamble and system Operation Code

[16] SANS 10142 Part 1

[17] Certification and performance monitoring of Generation reserves (240-110150430)

[18] Kusile Power Station Document handover specification (203-60262)

2.2.2 Informative

NA

2.3 Definitions

2.3.1 Commissioning Representative: The person appointed by the Commissioning Manager to be responsible for the commissioning of specific plant system or sub system.

2.3.2 Client: The Generation Division is the Client, represented by the Client's Designated Representative.

2.3.3 Certificate of Compliance: A certificate issued by an accredited person certifying that the installation complies with the relevant specification and standards. (E.g. electrical installation or part of an electrical installation).

2.3.4 Commercial Operation Date: The date on which the system operator and the client deem and declare the plant ready for commercial operation.

2.3.5 Cold Commissioning: The process of testing and verification of equipment and systems and introduction of designed plant process after safety clearance has been obtained. For C&I Loop checking it is not required to have a Safety Clearance.

2.3.6 Hot Commissioning: The process of putting into service an item of plant system or sub system, while it is still in the process of operational checkout and verification, after the cold Commissioning phase has being completed.

2.3.7 Commissioning Manager: The person appointed who is accountable for the overall commissioning of the plant.

2.3.8 Commissioning Start-Up Meeting: A representative body of persons who meet frequently to plan, schedule, co-ordinate and integrate construction completion, plant checks and commissioning activities that is chaired by the Commissioning Manager or his/her representative. The representative body will represent Kusile Power station Projects, Package Managers, Construction Managers, Project Engineering, CTC, Contractors and the Client.

2.3.9 Commissioning Working Party (CWP): A body of persons who meet as appointed, to co-ordinate and implement appropriate commissioning activities required to establish the performance of machinery and equipment under its control. Also responsible for determining the adequacy of testing of plant for initial energizing and controls the issuing of the safety clearance certificate. The CWP can be assembled at any time when requested to by the Commissioning Manager to attend to problems that may arise requiring the dedicated attention of specialist persons.

2.3.10 Commissioning Working Party Chairman (CWPC): The person appointed by the Commissioning Manager to be responsible for the coordination of the commissioning of a defined item of plant.

2.3.11 Completion: A stage when all requirements and obligations for completion as detailed in each specific contract have been met.

2.3.12 Completion Certificate: A certificate confirming completion.

2.3.13 Completion Date: As defined in each specific contract.

2.3.14 Contract Date: The date when each specific contract came into existence.

2.3.15 Defect Certificate: The certificate that signifies the end of most of the obligations of the parties. Uncorrected defects listed in the defects certificate are dealt as per the procedure set out in clause 45 of the NEC explanatory notes.

2.3.16 Defect Correction Period: The time-period as defined in the contract data of a specific contract, within which the Contractor makes good of notified defects.

2.3.17 Defects Date: The date after the Defect Correction Period as defined in the contract data of a specific contract.

2.3.18 Employer: Eskom Holdings Limited Reg. No. 2002/015527/06.

2.3.19 Gx Commissioning Manager: Person appointed by the Power Station Manager to verify the execution of all commissioning activities to ensure it is done in accordance with the Kusile URS. He also ensures that the Generation employees and contractors participate in all commissioning activities as required by this procedure (240-125815990). He monitors the commissioning activity progress and escalate any progress deviations to the KET Commissioning Manager and/or the Gx Engineering Manager. He furthermore provides and manages the Gx Commissioning staff.

2.3.20 Gx Engineering manager: The person who is appointed by the Kusile Power Station Manager with the prime responsibility to ensure technical integrity of the Kusile project / part of the project activities. He is also responsible for accepting the outcome of the plant commissioning activities and the plant handover.

2.3.21 Installation Electrician: A qualified Electrician accredited in terms of SANS 10142 Part 1 certifying that an electrical installation complies with the relevant specifications and standards.

2.3.22 Master Installation Electrician: A qualified Electrician accredited in terms of SANS 10142 Part 1 certifying that an electrical installation inside a hazardous area complies with the relevant specifications and standards.

2.3.23 Project / Package Manager (Contracts): The person appointed by the Employer to perform the duties of the Project Manager in terms of the NEC or FIDIC.

2.3.24 Supervisor / Contract Supervisor: The person appointed by the Employer to perform the duties of the Supervisor in terms of the NEC or FIDIC.

2.3.25 The Works: Those activities defined in each contract for which the Contractor is to provide equipment and/or services.

2.3.26 Declassified Plant: Means decommissioned plant that has been declassified in terms of these regulations (GGR0992) by the issue of a declassification certificate.

2.3.27 Documentation package; A complete set of documents intended for hand over to the Client.

2.3.28 The Engineer: The person appointed by the Employer to act as engineer for the purpose of the contract.

2.3.29 The Engineers Representative: The person appointed from time to time by the engineer to act on the engineers behalf.

2.3.30 Test on Completion: Those tests specified in the contract or otherwise agreed by the engineer and the Contractor to be performed before the Works are taken over by the Employer.

2.3.31 Defects Liability Period: The period stated in the contract following taking-over, during which the contractor is responsible for making good defects and damage.

2.3.32 Taking Over Certificate: A certificate issued in pursuant of the Contract.

2.3.33 Works: The Permanent Works and Temporary Works, or either of them as appropriate.

2.3.34 Time for Completion: The time for completing the Works or a section.

2.3.35 Energising: The application of voltage to machinery by electrical connection from other energized power systems or putting into operation by mechanical means or charging of pipe work or ducts, or loading of foundations.

2.3.36 Engineering Manager / Engineer: The person who is appointed with the prime responsibility for the technical integrity of the project / part of the project.

2.3.37 Exception: Plant not conforming to the user requirement specification.

2.3.38 Hand-over: The process of taking-over the responsibility for all, or part of the project, or its deliverables from the Contractor by GCD and transferring it to the Client. It is also the hand-over of the statutory accountability of the plant and equipment and includes all relevant documentation required to operate and maintain the plant as specified in the Kusile Power Station Documentation Handover Specification (203-60262). Typically, this takes place at the end of a project, or a major part thereof. 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) and includes documentation package information as per Kusile URS.

2.3.39 Inspection: The process of measuring, examining, testing, gauging or otherwise comparing one or more attributes of a product to ensure compliance with the applicable requirements.

2.3.40 Permit to Work: The permit issued in terms of Eskom Generation Plant Safety Regulations (GGR 0992), which allows work to be carried out on machinery for which a safety clearance certificate has been issued and become effective at safety clearance.

2.3.41 Plant Checks: Checking of the plant for construction completion e.g. erection check sheets, plant check sheets, commissioning check sheets, etc.

2.3.42 Plant Matrix: A document outlining how the plant is broken down into systems / subsystems and plant items for the purpose of plant checks, commissioning, partial / final hand-over, etc. and the requirements to affect it.

2.3.43 Pre-Commissioning: All testing prior to applying energy, excluding all plant power supplies required for pre-commissioning.

2.3.44 Project Execution Team: The team of persons who is appointed with the prime responsibility for completing the project within the approved constraints of time, cost scope and quality.

2.3.45 Project Manager: The person appointed with the prime responsibility for completing the project within the approved constraints of time, cost, scope and quality.

2.3.46 Possession / Access: The permission for the area, building or machinery to be used for the purpose of carrying out the work subject to the regulations pertaining to Plant Permits and Work Permits.

2.3.47 Pre-commissioning review: An Engineering activity which will provide assurance that the system is ready for commissioning by verifying that actual plant/asset configuration conforms to detail design, verify that the design documentation set is complete.

2.3.48 Prelim Safety Clearance Certificate: A temporary certificate also on form 240-124861660, but clearly endorsed as Prelim next to Safety Clearance on the form. This certificate is issued by the Employer to the Contractor for major/minor flushing or work-around' s that is mutually agreed with the Clients and Contractor's Representatives that from the time and date stated until completion the specified machinery, equipment or section of plant is under the Employer's control and can be energised anytime. Access to work during this period on machinery, equipment or section of plant is only permissible through the Employer's plant / work permit system. On completion of the above-mentioned activity, the plant is normalised and the certificate is revoked.

2.3.49 Quality: The combination of features and characteristics of a product, process or service that have an impact on its ability to satisfy stated or implied needs.

2.3.50 Quality Assurance: All those planned and systematic actions necessary to provide adequate confidence that a product, process or service satisfies given quality requirements.

2.3.51 Quality Control: The operational techniques and activities that are used to satisfy quality requirements.

2.3.52 Quality Management System: The organizational structure, responsibilities, procedures, activities, capabilities and resources that together aim to ensure that products, processes or services satisfy stated or implied needs as stipulated in the requirements of ISO9004:2000.

2.3.53 Quality Representative: A person appointed with delegated responsibility and authority for control of the Quality Management System and quality within the Project Group.

2.3.54 Quality Surveillance: The continuous evaluation of the status of procedures, methods, conditions, products, processes and services and analysis of records in relation to stated references to ensure that applicable requirements are met.

2.3.55 Registered Person: A person registered with the Engineering Council of South Africa (ECSA) that is competent in the design and commissioning of equipment and plant (e.g. medium voltage equipment).

2.3.56 Safety Clearance Certificate: A certificate as per form 240-124861660 issued by the Employer to the Contractor that is mutually agreed with the Clients and Contractor's Representatives that from the time and date stated the specified machinery, equipment or section of plant is under the Employer's control and can be energised. Further access to machinery, equipment or section of plant is only permissible through the Employer's plant / work permit system.

2.3.57 Statutory Accountability: The person that has statutory accountability for the safe operation and maintenance of the plant and equipment. This is usually the person appointed under OHS Act General Machinery Regulation 2.1.

2.3.58 Testing: Application of prescribed tests, loads or checks to ensure compliance with the applicable requirements.

2.3.59 Work Permit: Means a written declaration on the permit to work form, signed by the Appointed Person or Appointed Operator and issued to the Responsible Person in charge of the work, informing the latter that the plant to be worked on has been isolated as detailed/requested.

2.4 Abbreviations

Abbreviation	Explanation
AIA	Approved Inspection Authority
CAR	Corrective Action Request
CM	Configuration Management
CO	Commercial operation
COC	Certificate of Compliance
COD	Commercial Operation Date
CTC	Construction Turn-over Coordinator
CWP	Commissioning Working party
CWPC	Commissioning Working Party Chairman
FAT	Factory Acceptance Test
FIDIC	Federation Internationale des Ingenieurs – Conseils (International Federation of Consulting Engineers)
GB	Generation Business
GBE	Generation Business Engineering
GCD	Group Capital Division
GD	Generation Division
IE	Installation Electrician
KET	Kusile Execution Team
KKS	Kraftwerk Kennzeichen System
MIE	Master Installation Electrician
NEC	New Engineering Contract
NCR	Non Conformance Report
NDT	Non Destructive Testing
OEM	Original Equipment Manufacturer
OHS Act	Occupational Health and Safety Act number 85 of 1993, as amended
ORHVS	Eskom Operation Regulations for High Voltage Systems PCR: Pre commissioning Review
P&ID	Process and Instrumentation Diagram
PEM	Project Engineering Manager
PLCM	Project Life Cycle Model
PMP	Project Management Plan
PSR	Eskom Plant Safety Regulations
PTW	Permit to Work
QCP	Quality Control Plan
URS	User Requirement Specification
KPSP	Kusile Power Station Project
QMP	Quality Management Plan
SANS (SABS)	South African National Standard

Abbreviation	Explanation
SAT	Site Acceptance Test
SCC	Safety Clearance Certificate
ToR	Terms of Reference

2.5 Roles and Responsibilities

2.5.1 Package Manager

2.5.1.1 Ensures that the requirements for construction completion, plant checks, commissioning, take-over and hand-over are included in the PMP and project schedule.

2.5.1.2 Establish communication / interface links and meet on a regular basis with the Contractors, Construction Discipline Managers, Discipline Field Engineer, Commissioning Manager to discuss progress and issues regarding:

- Take-over
- Hand-over
- Conditions of the contract

2.5.1.3 Ensure that all terms and conditions of the contract are complied with.

2.5.2 Project Discipline Engineering Manager

2.5.2.1 Ensure the review and approval of quality assurance and quality control plans (QCP's) and identify hold and witness points.

2.5.2.2 Ensure that erection check and plant check sheets required for checking the plant as per the approved plant matrix are developed (use the erection and plant check manuals as input / guidance).

2.5.2.3 Ensure that the Project Engineers are active members of the grid code committee

2.5.2.4 Ensure that quality control is done and that the QCP's are signed off after construction completion

2.5.2.5 Ensure that the terminal points are interfaced smoothly between contractors / other suppliers.

2.5.2.6 Participate in construction completion checks and sign off erection checks, plant checks and safety clearances, etc.

2.5.2.7 Facilitate the technical meetings and ensure that all plant problems and issues relating to the technical integrity of the project are resolved e.g. scope changes, technical specifications, design, quality, exceptions, defects, configuration management, etc.

2.5.2.8 Attend the commissioning/start-up meeting and participate in the CWP.

2.5.2.9 Review control and operating philosophies for content, clarity and adequacy.

2.5.2.10 Review and approve the appropriate routine maintenance requirements as issued in accordance the Contractor's specifications.

2.5.2.11 Assist with plant commissioning and optimisation and verify that the plant performs as per the requirements set out in the technical specifications, plant designs and project URS.

2.5.2.12 Participate in the take-over, partial hand-over / hand-over of plant as per plant matrix.

2.5.3 Construction Manager/ Construction Supervisor

2.5.3.1 Ensures that the requirements for construction completion, plant checks, commissioning, take-over and hand-over are included in the PMP and project schedule.

2.5.3.2 Establish communication / interface links and meet on a regular basis with the Contractors, Construction Discipline Managers, Construction Supervisors, Quality representatives, Discipline Field Engineer, Commissioning Manager and Clients representatives for the purpose of discussing progress and issues regarding:

- Construction Completion
- Plant Checks Safety Assurance
- Quality Assurance
- Any other relevant issues within his Construction Management discipline.

2.5.3.3 Ensure that the plant is constructed as per the Authorised PMP and project schedule.

2.5.3.4 Develop in conjunction with the Contractors, Package Managers, Construction Supervisors, Discipline Engineering Managers, Project Discipline Engineers, Commissioning Manager and Client's Representative a plant matrix that outlines how the plant will be checked for completion, commissioned, taken-over and handed-over as well as the requirements to affect it.

2.5.3.5 Ensure that the erection checks and plant checks are done by the Construction Supervisors and Project Discipline Engineers after the QCP's have been signed-off and the contractors have submitted the following forms:

- Application for Eskom's inspection of the work / part of the works
- Partial / final inspection certificate

2.5.3.6 Ensure that the defects found during Construction completion inspection, final inspection, the commissioning phase are corrected before hand-over to the Client. If not the Client needs to agree to the outstanding punch list items.

2.5.3.7 Ensures that defects identified during the Defects period is corrected and cleared to ensure optimal plant and component performance

2.5.4 Construction Turn-over Coordinator

2.5.4.1 Prior to the Contractors Declaration of Construction Completion the Construction Turn Over Coordinator works closely with the Construction Manager to monitor and confirm the last 5% of the contractors activities and to aid both parties with the necessary preparations before the commissioning of plant is initiated.

2.5.4.2 The Construction Turn-over Coordinator assess plant readiness by confirming and reviewing the signed-off Contractor's Application for Eskom's Inspection of the works / part of the works form and associated documentation such as:

- P&ID's
- Single line drawings
- Latest approved design
- Operating and control philosophy
- QCP's
- ITP's and construction completion check sheets
- Applicable alignment checks
- Cable numbers
- Cable insulation tests
- Motor dryness tests
- Torque checks
- Calibration certificates
- FAT & SAT
- Data book completion and
- AIA release certificates
- KKS Configuration & Labelling Inspections

2.5.4.3 Ensure that all related documentation and certificates are completed and filed in the Hand Over File;

- Contractors Application for inspection of the works
- Final Inspection Certificate
- KKS Configuration inspection
    - Final KKS and Labelling Certificate 240-124861030 for plant with permanent KKS labels
    - Final KKS and Labelling Certificate 240-124861030 for plant with justified (ie plant still to be lagged and cladded) temporary KKS labels and compiled Project Defect Notification / Clearance form (form 240-124861234) registered at the Commissioning Documentation Centre
    - Preliminary KKS and Labelling Certificate 240-124861030 for temporary plant with temporary KKS labels
- Construction Completion check list
- Construction Completion Certificates

2.5.4.4 Confirm Pre Commissioning Design Review readiness (PCR).

2.5.4.5 Confirm that all the construction completion requirements have been satisfied.

2.5.5 Commissioning Manager

2.5.5.1 Review control and operating philosophies for content, clarity and adequacy.

2.5.5.2 Plan the commissioning activities.

2.5.5.3 Develop a plant matrix referencing the various start-up packages required to commission the plant via a scoping method utilising P&ID's to ensure that no plant is overlooked for commissioning, the approach will be systems based with KKS referencing.

2.5.5.4 Develop a start-up / commissioning and hand-over schedule, update it on a regular basis and distribute it to the parties involved with commissioning activities and ensure it is integrated into the construction schedule. This will provide direction in which systems is required next and by when, it determines the project pace and requirements.

2.5.5.5 Provide the client with a schedule for safety clearances to ensure that the required resources are available for plant operations after safety clearance.

2.5.5.6 Ensure that a commissioning work instruction exists for each plant system / sub-system as deemed necessary, and distributed to all relevant parties for acceptance and approval.

2.5.5.7 Chair the commissioning/start-up meeting.

2.5.5.8 Coordinate start-up / commissioning activities between the Contractors, Construction managers, Construction supervisors, Project discipline engineering manager / engineers, and the Client representative and ensure that interfaces between all parties are defined.

2.5.5.9 Appoint a CWPC who plans and co-ordinates all Safety Clearance inspections and commissioning activities for a defined item of plant.

2.5.5.10 Ensure that Commissioning staff ie Engineers, Technicians, Snr Advisors etc. participate in CWP activities.

2.5.5.11 Ensure that Commissioning staff ie Engineers, Technicians, Snr Advisors etc. are active members of the grid code committee

2.5.5.12 Ensure that safety clearance certificates are completed, signed and distributed accordingly.

2.5.5.13 Ensure that appropriate operating instructions are issued in accordance with the contractor's specifications.

2.5.5.14 Ensure that routine maintenance is done in accordance with the OEM specifications after the plant has been has been commissioned prior to hand over.

2.5.5.15 Effect partial hand-over inclusive of the hand-over documentation packages to the client's representative as per the plant matrix.

2.5.5.16 Ensure that plant performance tests are carried out in accordance with the documented plan with clearly set time periods and requirements.

2.5.5.17 Ensure that the required permits are issued to all personnel that requires to perform work (as per PSR and ORHVS) on the plant after the safety clearance certificate has been issued.

2.5.5.18 Ensure that the site tagging system (Caution Sanction for Test, Danger Do Not Operate and Caution System under Operation) is implemented, to ensure that safe work practices are evident and maintained.

2.5.5.19 Ensure co-ordination of and integration of all isolations on the plant in preparation for a permit to work or work permit.

2.5.5.20 Ensure that the plant is optimised after completion of electrical tests and unit synchronisation.

2.5.5.21 Ensure that plant performance complies with the design specifications.

2.5.5.22 Demonstrate to the client's representative that all optimisation criteria and capabilities have been met.

2.5.5.23 Co-ordinate and submit documentation of control demonstrations and unit capabilities for plant take-over and hand-over.

2.5.5.24 Identify those working areas, buildings, plant and machinery, etc. where construction completion inspection, safety clearance, sectional completion hand-over, and take-over certificate, defects certificate and final certificate, as appropriate are to be issued.

2.5.5.25 Ensure that defects found during the commissioning and defects periods are recorded and corrected by the relevant Package and Construction managers.

2.5.5.26 Ensure that the plant is taken-over from the contractors and handed-over to the Client and Project Support Services with all the related documentation as outlined by the Hand-over package and the package is filed in the project documentation office.

2.5.5.27 Ensure that the plant commissioned is operated and maintained as per statutory requirements before hand-over.

2.5.5.28 Ensure that plant performance tests to be done after hand-over are arranged in consultation with the client's representative.

2.5.5.29 Ensure the project obtains a fire clearance certificate to allow fuel oil onto site in preparation for commissioning.

2.5.5.30 Appoint Commissioning Working Party Chairman's (CWPC) and Commissioning Working Party's (CWP) as and when required.

2.5.5.31 Compile or obtain the commissioning procedures for the defined plant system / sub-system and plant item and ensure compliance to the URS, plant design, and operating / control philosophy when compiling the commissioning procedure.

2.5.5.32 Ensure that anticipated activities, within a six week rolling period, are recorded in the start-up meeting minutes, as well as what systems to be available for the next 4 to 6 weeks.

2.5.5.33 Maintain commissioning documentation including the commissioning hand-over documentation files.

2.5.5.34 Take the Lead in following Activities for the given scope of their responsibility:

- Partial / final inspections
- Commissioning documentation requirements
- Plant Safety Clearance inspections
- Commissioning of plant
- Notification of defects
- Partial hand-over of plant after commissioning.

2.5.6 Client's Representative

2.5.6.1 The Gx Commissioning Manager appointed by the Power Station Manager, over sees the execution of all commissioning activities, to ensure compliance with the Kusile URS.

2.5.6.2 The Gx Commissioning Manager also ensures that the Generation Commissioning Senior/Technicians participate in all commissioning activities, including the monitoring of commissioning activity progress and escalation of any deviations to the KET Commissioning Manager and/or the Gx Engineering Manager.

2.5.6.3 The Generation Commissioning Senior/Technicians oversees commissioning activities performed by the KET Commissioning staff ie Commissioning Engineers, Snr Advisors, Snr Technicians, technicians etc.

2.5.6.4 Ensure that safety requirements identified, under the responsibility in terms of safety requirements, are met.

2.5.6.5 Participate in meetings, activities and decision making processes as agreed with the Construction manager/ Supervisor, Discipline Engineering managers, Commissioning manager for construction completion inspections, safety clearances, commissioning, take-over and final hand-over of the plant.

2.5.6.6 Ensure involvement of power station personnel during erection checks and final inspection of plant systems / sub-systems and plant items before safety clearance certificates are issued. Any plant operations by the Client, on plant that is not yet handed over to the client, will be under the supervision and instruction of the Contractor.

2.5.6.7 Obtain a fire clearance certificate to allow fuel onto site in preparation for commissioning.

2.5.6.8 To participate and advice in, but not be accountable for the activities and decision making process necessary for issuing take-over, Defects notifications, Performance and handover certificates.

2.5.6.9 Comply with commissioning instructions when carrying out any operating activities on plant and machinery during the commissioning period.

2.5.6.10 Ensure that routine maintenance is carried out in accordance with the contractor's recommendations after the handover certificate has been issued for the works.

2.5.6.11 Notifies the Commissioning manager / Supervisor of any defects found on plant and machinery from the commencement of the commissioning period to the defects date.

2.5.6.12 Ensure that all defects are uploaded on SAP after handover.

2.5.6.13 Allow reasonable access to plant and machinery for contractor(s) to rectify defects after hand-over (use SAP and Gx processes).

2.5.6.14 Accept the works (with reasonable defects) as agreed per the plant matrix from the commissioning manager after verification that it is acceptable for use. Reasonable defects are those defects list that are categorized as not having an impact on the safety or the safe operation of the plant.

2.5.6.15 Co-ordinate the preparation of documentation for the application by the Power Station Manager for grid code compliance.

2.5.6.16 Ensure adherence to the National Control Procedure Generation Asset Integration Grid Code Compliance Process.

2.5.6.17 Obtain the Grid Code Compliance Certificate.

2.5.6.18 Ensure that all operating licences for the unit are in place.

2.5.6.19 Ensure that the operating and maintenance manuals are reviewed for content, clarity and adequacy.

2.5.6.20 To provide status reports covering the performance of machinery throughout the defects period to the Commissioning Manger to take action where necessary.

2.5.6.21 Be part of the CWP.

2.5.6.22 Participate in Safety Clearance inspection and ensure that all defects are recorded before signing off.

2.5.6.23 Provide status reports covering the performance of the plant and machinery up to the defects date to the Commissioning / Package/ Construction manager to take action where necessary.

2.5.6.24 Ensure that all hand-over files received on the project are properly indexed and filed for future use by the power station.

2.5.6.25 Ensure that arrangements are made to allow access for the contractor to do the plant performance tests if done after hand-over. Should this test be required on one of the units, it should be done on a unit that has been handed over to the client, but before handover of the final unit.

2.5.7 The Contractor

2.5.7.1 Supplies statutory required documents such as pressure tests, megger tests etc., as and when requested during system completion or sectional completion.

2.5.7.2 Provision should be made in the individual contracts to provide these documents when required.

2.5.7.3 Submits the application for Eskom Inspection of Works as and when required to ensure that the plant/systems are constructed, build and available as per the accepted schedules and programs.

2.6 Process for Monitoring

NA

2.7 Related/Supporting Documents

Contractor's Application for Eskom's Inspection of the Works / Part of the works, 240-124667653

Plant Exception Certificate, 240-126039686

Partial / Final Inspection Certificate, 240-124860884

KKS and Labelling Certificate, 240-124861030

Project Defect Notification / Clearance Certificate, 240-124861234

Completion Certificate, 240-124861396

Safety Clearance Certificate, 240-124861660

Take-Over Certificate, 240-124861824

Commissioning Certificate, 240-125005052

Safety / House Keeping Certificate, 240-124862622

Partial Hand-Over Certificate, 240-124862854

Hand-Over Certificate, 240-124863218

Defects Certificate, 240-124863468

Commissioning Process Flow Chart

3. Construction Completion, Plant Checks, Commissioning and Hand-Over

3.1 Planning and Scheduling

3.1.1 In order to cover every aspect of commissioning the Commissioning Manager will develop a plant matrix referencing the various start-up packages required to commission the plant.

3.1.2 The Commissioning Manager will integrate the respective contract commissioning schedules to develop the start-up / commissioning schedule and will ensure that it is integrated into the construction schedule. The ultimate goal is to define:

3.1.2.1 The general order and timing in which the start-up / commissioning activities will take place

3.1.2.2 The safety pre-requisites for implementing the commissioning procedures

3.1.2.3 The corresponding manpower, equipment, materials, supplies, and third party support required to support the start-up / commissioning effort

3.1.2.4 The manner in which the start-up / commissioning will be managed and executed

3.1.2.5 The hand-over milestone dates required for each start-up package and milestone dates for each start-up major event.

3.2 Construction Completion

3.2.1 Contractor Applies for Construction inspection of the works/part of the works (form 240-124667653).

3.2.2 CTC identify System for Turnover and supply forms for construction completion, notifies KKS team and Data Pack team. These forms are generated by the Documentation Centre and supplied to CTC.

3.3 Construction Inspection of the Work/Part of Works

3.3.1 Plant walk down by Contractor, KET and Engineering to verify:-

3.3.1.1 KKS Labelling

3.3.1.2 Plant configuration as per design

3.4 Construction Defects

3.4.1 Priority 1 and Priority 2 Defects

3.4.1.1 Defects are referred to the contractor by the Package Manager for correction.

3.4.1.2 On correction of the defects the contractor re-applies for Inspection of the works/Part of works

3.4.2 Priority 3, 4 and 5 Defects

3.4.2.1 Package Manager and Commissioning Manager review these defects for acceptance

- Defects not accepted are referred back to the contractor by the Package Manager for correction and on correction of the defects the contractor re-applies for Inspection of the Works/Part of Works
- Each defect accepted is noted by the Package Manager/Contractor on a Project Defect Notification / Clearance form (form 240-124861234) supplied by CTC. The Project Defect Notification / Clearance form is then submitted with the AFI to the Commissioning Documentation Centre for registration and recording on the Master Defect List. The registration number is a unique number preceded by the Safety Clearance Certificate number.
- Registered Project Defect Notification / Clearance forms are added to the Hand Over File and distributed to the relevant contractors for rectification by the Package Manager.

3.5 Pre Commissioning Review

3.5.1 The Pre-Commissioning Review is carried out by Eskom Engineering during construction, fabrication, installation of a system. The review is primarily to ensure compliance with the design baseline and to ensure the final installed system complies with the detailed design. Power up testing of a system or motor direction testing is not required at this time and is not needed for completion of the Pre-Commissioning Review.

3.5.2 It verifies the following:

3.5.2.1 Actual plant/asset configuration conforms to detail design

3.5.2.2 The design documentation set is complete. It provides assurance that the system is ready for commissioning by:

- Reviewing all interfacing services' availability for commissioning,
- Reviewing system commissioning procedures,
- Confirming all required safety clearances are in place,
- Verifying plant codification labelling is as per design drawings and Works Information (inspection and walk-down)
- Verifying manuals (e.g. Operating and Maintenance manuals) are accepted, and available

3.5.2.3 The Contractor's Request for Inspection of Plant will trigger the requirement for a PCR to be conducted for that plant. At least 2 weeks' notice is required prior to the date of inspection, to allow the PCR to be done timeously. The following approved documentation must be made available by the Contractor:

- As-built drawings
- Commissioning procedures
- Manuals
- Data books

3.5.2.4 The successful verification that the final installed system complies with the detailed design, and all documents are in place, will permit entry into the next phase, Contractor Request for Inspection of Plant.

3.6 Contractor Request for Inspection of Plant

3.6.1 The Construction Manager / Construction Supervisor monitors the actual plant construction progress ITO the approved construction / commissioning schedule, the sign-off of the QCPs by the Contractor and the Project Discipline Engineer, the sign-off of the data books by the AIA, etc., and ensures that the Contractor timeously submits the application for inspection of the works / part of the works (see form 240-124667653 Application for inspection of Works).

3.6.2 Once the plant is ready for construction completion certification, energising and commissioning, the Contractor submits a Contractor's application for Eskom's inspection of the works / part of the works as well as the applicable documents such as signed-off QCPs, AIA release certificates, P&IDs, etc.

3.6.3 The Construction Manager / Construction Supervisor ensures checking of the request for completion against contract requirements and the quality records to verify that there are no outstanding defects, CAR's on the contract works

3.6.4 The Construction Manager / Construction Supervisor and the Contractor ensures that the required drawings and description of the works to be inspected are available

3.6.5 Pre-inspection of the works is carried out by the Contractor, Construction Manager / Construction Supervisor and Project Discipline Engineer using the relevant plant check and erection check sheets and approved P&ID's and construction drawings. The plant is checked for completeness, safety and house-keeping aspects, plant coding and labelling, etc.

3.6.6 If the works conform to contractual requirements, the Construction Manager / Construction Supervisor and the Project Discipline Engineer sign off the Contractor's application for Eskom's inspection of the works / part of the works and complete the required plant check and erection check sheets.

3.6.7 If the works do not conform to contractual requirements, the Contractor's application for Eskom's inspection of the works / part of the works is returned to the Contractor with the required endorsements on the form. After rectification of the works, the contractor shall re-apply for an inspection.

3.6.8 The signed-off Contractor's application for Eskom's inspection of the works / part of the works form and associated documentation such as P&IDs / single line drawings and latest approved design; operating and control philosophy; QCPs and check sheets; applicable alignment checks, cable numbers, cable insulation tests, motor dryness tests, torque checks, calibration certificates, FAT & SAT, data book completion and AIA release certificates, etc. are then given to the Construction Manager who shall ensure that the partial / final inspection, energizing and commissioning of the plant system / sub-system and plant items are scheduled at the start-up meeting.

3.7 Commissioning Start-up Meeting

3.7.1 All partial / final inspections, safety clearances, permit requirements, pre-commissioning and commissioning activities, meetings, plant walk-downs / integrity checks and partial hand-over, take-over and final hand-over are planned at the start-up meeting.

3.7.2 The minutes for the commissioning start-up meeting reflects all the activities as per the plant matrix

3.7.3 The minutes of the commissioning start-up meeting reflect four periods in time, i.e.:

3.7.3.1 Activities to be scheduled in the next six-week window.

3.7.3.2 Activities scheduled for the following period to the next start-up meeting

3.7.3.3 Activities in progress

3.7.3.4 Activities reported complete at the previous meeting

3.7.3.5 The Commissioning Manager or his delegate chairs all commissioning start-up meetings for which minutes will be taken and attendance recorded. Copies of the minutes are distributed as per the attendance and distribution list and a copy is stored in the project documentation management system for record purposes.

3.7.3.6 All the role players involved in commissioning activities shall attend or be represented at the start-up meeting.

3.8 Partial / Final Inspection of Plant

3.8.1 This inspection is planned at the start-up meeting and is coordinated by the appointed CWPC that arranges for a physical inspection of the plant with the Contractor, Construction Manager / Construction Supervisor, Project Discipline Engineer, Client's Representative, relevant commissioning personnel, etc. The CWPC will also receive the signed-off Contractor's application for Eskom's inspection of the works / part of the works form and associated documentation as supplied by the Construction Manager.

3.8.2 Priority 1 and Priority 2 Defects

3.8.2.1 Defects are referred back to the contractor by the Package Manager for immediate correction.

3.8.2.2 On correction of these defects the contractor re-applies for Partial/Final Inspection of Plant

3.8.3 Priority 3, 4 and 5 Defects

3.8.3.1 Each defect is noted on a Project Defect Notification / Clearance form (form 240-124861234) by the CWPC and submitted to the Commissioning Documentation Centre for registration and recording on the Master List. The registration number is a unique number preceded by the relevant Safety Clearance Certificate number.

3.8.3.2 Registered Project Defect Notification / Clearance forms are added to the Hand Over File and copies are forwarded to the Package Manager who distributes them to the relevant parties and the contractor for rectification.

3.8.4 For plant that has been accepted, a partial / final inspection certificate is completed by the parties who conducted the inspection (see 240-124860884 Inspection Certificate). This document signifies the plant is ready for planning of subsequent start-up and commissioning activities.

3.8.5 The inspection certificate, with its relevant information, forms the package required for safety clearance and commissioning.

3.8.6 The Construction Manager / Construction Supervisor distribute copies of the inspection certificate and ensure defects are cleared timeously.

3.9 Submission and Clearance of Defects

3.9.1 Each and every defects shall be captured on its own Project Defect Notification / Clearance form (form 240-124861234) and registered at the Commissioning Documentation Centre with its own unique number that is preceded by the relevant Safety Clearance number

3.9.2 Each Project Defect Notification / Clearance form is recorded on the Outstanding Defects Master List by the Commissioning Documentation Centre

3.9.3 The Outstanding Defects Master List is discussed at the Start Up meeting to ensure rectification is taking place

3.9.4 Registered Project Defect Notification / Clearance form are added to the Hand Over File and copies are forwarded to the Package Manager who distributes them to the relevant parties and the contractor for rectification.

3.9.5 The Package Manager will arrange with the relevant Contractor to clear the defects timeously

3.9.6 The relevant Contractor will notify the Package Manager once these defects have been cleared to arrange for an inspection (see form 240-124861234 Project Defect Notification / Clearance form)

3.9.7 The Package Manager will arrange with the CWPC and the initiators of the defects to inspect the plant and to verify that the defects were cleared for sign-off. The completed Project Defect Notification / Clearance form is returned to the CWPC

3.9.8 The CWPC forwards the completed Project Defect Notification / Clearance form to the Commissioning Documentation Centre which then updates the Outstanding Defects Master List

3.9.9 It may be necessary to allow some defects to be carried forward to the contractual certification stage provided they do not affect the safety and integrity of the plant and the personnel operating it

3.9.10 This process is conducted independently of the safety clearance process unless the defect precludes the safety clearance from being issued.

3.9.11 This process is conducted independently of the safety clearance process unless the defect precludes the safety clearance from being issued.

3.9.12 Systems where temporary KKS Labels are installed

3.9.12.1 Configuration Management will issue a Permanent KKS certificate on systems where the contractor installed, by agreement, temporary KKS labels together with a Project Defect Notification / Clearance form (form 240-124861234).

3.9.12.2 The "Submitted BY": section is completed by the CM representative.

3.9.12.3 The Project Defect Notification / Clearance form (form 240-124861234) together with the KKS certificate is placed in the file before submitting it to CTC.

3.9.12.4 After safety clearance a defect number is generated by the Commissioning Planner and enters it on to the Project Defect Notification / Clearance form as well as on the Permeant KKS certificate.

3.9.12.5 The original Permanent KKS certificate will be handed to the Construction Representative to form part of the data pack for that system.

3.9.12.6 A copy of the certificate is placed in the safety clearance file.

3.9.12.7 The defect will further follow the normal process via the Commissioning Document control system.

3.9.12.8 To clear the temporary KKS label Defect the Contractor will complete the Project Defect Notification / Clearance form.

3.9.12.9 The Project Defect Notification / Clearance form is returned to the Commissioning Planner.

3.9.12.10 The Commissioning Planner informs CM of the defect that needs to be verified.

3.9.12.11 CM arranges the verification and completes the "Verified By" section of the Project Defect Notification / Clearance form confirming that the work was done and that it complies too the relevant labelling standard.

3.9.12.12 The Project Defect Notification / Clearance form is returned to the Commissioning Planner and removes it from Outstanding Defects Master List.

3.10 Safety Clearance of Plant

3.10.1 The CWPC prepares the safety clearance certificate (see form 240-124861660 Safety Clearance Certificate). Information for the safety clearance certificate is obtained from the partial / final inspection certificate

3.10.2 The CWPC, in consultation with the CWP (Contractor, Construction Manager / Construction Supervisor, Project Discipline Engineer, Client's Representative, relevant commissioning personnel, etc.) plans and schedules the safety clearance activities at the start-up meeting.

3.10.3 The CWP members carry out the safety clearance inspection as scheduled.

3.10.4 Rejected safety clearances follow a remedial path, as agreed with all parties, and the re-planning of the activity follows. A new date is scheduled at the start-up meeting.

3.10.5 On acceptance of the safety clearance the CWPC, Contractor, Construction Manager / Construction Supervisor, Project Discipline Engineer, and the Client's Representative sign the safety clearance certificate to declare the plant is safe and ready for commissioning.

3.10.6 The CWPC is responsible for the immediate (within 1 working day) distribution of the safety clearance certificate to the parties as listed on the certificate.

3.10.7 The safety clearance certificate now becomes part of the hand-over documentation package for the plant system / sub-system or plant item.

3.10.8 Once the safety clearance certificate has been issued, the plant falls under the Eskom Plant Safety Regulations and Operating Regulations for High Voltage Systems, which governs any further work to be conducted on plant that has been safety cleared. The Commissioning Manager is still in control of the work on the plant until hand-over to the Client.

3.10.9 Commissioning of the plant may now commence, using the required check sheets, commissioning procedures, operating procedures and test result sheets. For electrical equipment these procedures etc. shall, as a minimum, comply with the requirements of SANS 10142 Part 1.

3.10.10 The Construction Manager / Construction Supervisor ensure that the "as-built" drawings are available in the project documentation management system and Centre. Should there be any modifications during commissioning, properly marked-up drawings, which reflect the current plant status, are made available in the project documentation management system and Centre.

3.11 Pre-commissioning

3.11.1 Following the issuing of the safety clearance certificate the plant now enters the pre-commissioning phase where it is ascertained that the plant item is ready to be placed in service.

3.11.2 PCR process

3.11.2.1 Having carried out the pre-commissioning check of any plant item, a pre-commissioning check certificate is issued by those parties involved in the check.

3.11.2.2 Comments or reservations will be written on the pre-commissioning certificate and be retained as part of the hand-over documentation package for the plant system / sub-system or plant item and kept in the relevant project documentation management system and Centre.

3.11.3 All plant and equipment that will be effected during commissioning activities will have to be identified and locked out with commissioning locks and tagged with NON – COMMISSIONED labels before energizing.

3.11.4 The requirements of the OHS Act and applicable Regulations as well as Eskom's PSR and ORHVS have to be implemented before energising

3.12 Commissioning

3.12.1 All Commissioning activities are planned in the Start-up meeting and will be performed as outlined in the Commissioning Procedure for the relevant plant.

3.12.2 Compiling of the Commissioning procedure is the responsibility of the CWPC, acceptance by the relevant Engineering Discipline, the Client and other CWP members and authorised by the Commissioning Manager. The commissioning procedure is distributed to the CWP and Client Representative. The CWP members will liaise with their relevant managers as required ensuring minimum disruption to the compiling / approval process.

3.12.3 Commissioning of the plant may now commence using the required Commissioning Procedures, check sheets, operating procedures and test result sheets. For electrical equipment these procedures etc. shall, as a minimum, comply with the requirements of SANS 10142 Part 1.

3.12.4 The Construction Manager / Construction Supervisor ensures that the 'as-built' drawings are available in the Project Documentation Centre. Should there be any modifications during commissioning an ECP shall be raised, to ensure that properly marked-up drawings, which reflect the current plant status, are made available in the Technical Document Centre (TDC) and Handover Document Centre whilst the changes are being implemented. On completion both TDC and Handover Document Centre, systems are updated with the finalised documentation.

3.12.5 A Commissioning Certificate (see form 240-125005052) will be completed and issued by the CWPC on completion of the commissioning activity.

3.12.6 A safety / housekeeping certificate (see form 240-124862622 Safety / Housekeeping Certificate) shall be issued by the KET SHEQ department on the completion of the commissioning period and is required per plant (unit or common plant system)

3.12.7 The CWP will proceed with the activities required for Hand-over of the plant as per the agreed matrix system once the plant is fully commissioned and a Commissioning Certificate is issued.

3.13 Minor Flushing of Systems during Construction prior to System Safety Clearance

Flushing may be conducted prior to final inspection, in this event a Safety Clearance Certificate (Form 240-124861660) is used and clearly marked as a prelim clearance and for what activity it has been used. The Contractor's risk analysis, method statement, safe task analysis and restoration of system to design must be included in the Flushing procedure or attached to the Prelim Safety Clearance Certificate. For this Prelim Safety Clearance Certificate, permanent Labelling of mechanical and C&I equipment is waivered, if the Contractor is responsible for flushing.

3.14 Major Flushing of Systems during Construction prior to System Safety Clearance

When flushing using the DCS, switchgear and installed plant, Minor Flushing of Systems during Construction prior to System Safety Clearance is not applicable and the minimum requirements must be defined and accepted by KET Engineering and Commissioning. The required Flushing procedure is to be in the form of a Commissioning Procedure and is compiled defining the minimum requirements and the process.

3.15 Electrical Energisation To and From Temporary Plant

3.15.1 When permanent electrical equipment is used to energise a temporary cable and temporary equipment, Safety Clearance Certification shall be conducted for the permanent equipment prior to energising such equipment. Prelim Safety Clearance Certification shall be conducted for the temporary equipment and the temporary cable prior to energising thereof.

3.15.2 When temporary electrical equipment and a temporary cable is used to energise permanent equipment, Prelim Safety Clearance Certification shall be conducted for the temporary equipment and the temporary cable prior to energising thereof. Safety Clearance Certification shall be conducted for the permanent equipment prior to energising thereof.

3.15.3 The circuit used on the permanent equipment to accommodate the temporary cable shall be considered temporary for the duration of the work-around.

3.15.4 A KET MIE/IE shall provide an inclusive COC for the entire temporary plant to be energised, prior to the Prelim Safety Clearance Certification thereof.

3.15.5 Red Line drawings provided and approved by Engineering shall accompany the request of these above-mentioned Prelim Safety Clearances to indicate the temporary supplies and/or plant.

3.15.6 Permanent supplies and plant shall always be fitted with permanent KKS Labelling prior to Safety Clearance regardless of being fed from a temporary supply or not. For Prelim Safety Clearance Certification, temporary KKS Labelling is allowed and Certification shall be valid for the duration of the temporary work-around.

3.15.7 Temporary Supplies not required anymore shall be removed by the relevant Contractor and inform Commissioning and Engineering of this change and completion of the work-around in which case the Prelim Safety Clearance is revoked.

3.16 Plant Exception Requests

Where plant does not conform to the URS and technical specifications but is deemed operable and maintainable, a plant exception is requested from the Client via a plant exception form (see form 240-126039686 Plant Exception Certificate) and an ECP process will be started by Engineering. On acceptance of such an exception, safety clearance / commissioning / partial / final hand-over may occur.

3.17 Optimisations of Plant

3.17.1 Once the various systems / sub-systems have been started up individually, the integrated plant is started up and tuned to optimise performance.

3.17.2 Optimisation on the different systems / sub-systems, making up the unit until proven to meet the requirements of the URS and plant design specifications. In this period, the Commissioning Manager will plan, schedule, execute and report on all activities as per the optimization plan. Assistance from the Contractors and the Client's Representative, etc. will be requested as and when required.

3.17.3 Capability and Load swing tests will be performed with the Client's Representative and documented to demonstrate that the unit meets the requirements specified in the URS, design specifications and grid code requirements.

3.18 Hand-over of Plant

3.18.1 When mutual agreement between GCD and Gx is obtained on specific plant systems, that plant will be handed over to Gx on a systems approach.

3.18.2 When a unit or a system and all of its associated plant is optimised, capabilities demonstrated, the reliability run completed and grid code compliant, the Package or Construction Manager shall arrange for the hand- over of the plant to the Client (see form 240-124863218 Handover Certificate). Such approvals affect the transfer of the asset and the control of the plant from the KET to the Client (e.g. Power Station Manager). This also means transfer of statutory accountability.

3.18.3 Sections of plant (buildings, Mini-subs, roads, etc.) will be handed-over to KET Commissioning/Site Services to maintain and ensure that it is kept functional till final hand-over to Generation on project completion. It is KET's responsibility to maintain and keep maintenance records/history and the relevant Hand-over documentation package up to date

3.18.4 All hand-over documentation packages to be handed-over will be kept in the project documentation management system and Centre until the plant is handed over to the Client. The relevant hand-over documentation packages will be transferred to the Client's documentation Centre within three (3) months after CO of the unit or final hand-over of the relevant plant except for the documents specified in the Kusile Power Station Documentation Handover Specification (203-60262) which are required by the Client immediately.

3.18.5 Hand-over of sectional completed plant completed should be done for specific plant areas not dependent on other systems, examples compressor plant, fuel oil plant, water treatment plant, raw water system, simulator, effluent plant etc.

3.19 Plant Performance Verification Tests

3.19.1 Where a contract calls for extended tests after hand-over to prove performance of the plant during operation the Commissioning Manager shall ensure that these are carried out in accordance with the documented plan with clearly set time periods and requirements.

3.19.2 The detail of how and when these tests are to be carried out must be agreed with the Client's Representative and all affected parties (e.g. Contractor, Operations, Maintenance, etc.).

3.19.3 The Contractor shall prepare (where required) a risk assessment detailing all production and safety risks associated with the test to the client, this will assist the client to schedule with national control for the activity

3.19.4 The Package / Construction Manager shall ensure that the tests are properly scheduled and that all parties are fully aware of the schedule and their roles and responsibilities.

3.19.5 The Client's representative shall ensure that arrangements are made to allow access for the Contractor (i.e. plant permits, access permits, etc.)

3.20 Commercial Operation

The Client or the Client's Representative shall ensure adherence to the National Control Generation Asset Integration Grid Code Compliance Process Procedure (see requirements applicable to GD who is the license holder as stated in paragraph "5.5 Application for commercial operation").

3.21 Defects Period

3.21.1 The Client's Representative will ensure that all defects found during the defects period are forwarded to the Commissioning manager who will distribute it to the relevant Package / Construction Manager who will ensure that it is captured in the Project Defect Notification / Clearance form (see form 240-124861234). It is important to differentiate between running maintenance (fair wear and tear) and equipment breakage.

3.21.2 The relevant Package / Construction Manager will forward the Project Defect Notification / Clearance form to the Contractor and a copy to Client's Representative for information.

3.21.3 The relevant Package / Construction Manager will arrange with the relevant Contractor to clear the defects identified.

3.21.4 The relevant Contractor will notify the relevant Package / Construction Manager once these defects have been cleared to arrange for an inspection and sign-off of defects (see form 240-124861234 Project Defect Notification / Clearance form).

3.21.5 The relevant Package / Construction Manager will arrange a defects period expiry meeting to discuss the close-out of defects and other noted issues in view of issuing the defects certificate.

3.21.6 At the end of the defects period the relevant Package / Construction Manager will issue the defects certificate (see form 240-124863468 Defect Certificate).

3.22 Project Finalisations

The relevant Package / Construction Manager will schedule and facilitate the post project technical and operational reviews and document the lessons learnt ITO construction completion, plant checks, commissioning, take-over and hand-over.

4. Acceptance

This document has been seen and accepted by:

Name	Designation	Signature
Mildred Nyoka	Senior Manager Contracts Management	
Justice Bore	Senior Manager Construction	
Thulani Mtshali	Senior Manager Delivery Units 2 & 4	
Tumiso Railo	Middle Manager Project Engineering (Acting)	
Aubrey Mzobe	Senior Manager Delivery Units 5 & 6	
Miranda Moahlodi	Risk and Assurance Manager	
Ernest Pawson	GMR (2) 1	
Deborah Maune	Senior Manager Technical Plant - Gx	
Markus Ueckermann	Middle Manager Operating - Gx	
Ntebo Mhlungu	Middle Manager Engineering - Gx	
Stanley Mathye	Middle Manager Maintenance (Acting) - Gx	

5. Revisions

Current Change Note No.:			N/A
Rev.	**Date YYYY/MM/DD**	**Author (Name & Designation)**	**Comment / Change Description**
2	2013/03/27	Ray Whitley: Kusile Commissioning Manager	Change of roles & Responsibilities between the Project Engineering Manager & Field Engineering
2	2013/03/27	Ray Whitley: Kusile Commissioning	Change in the Construction Completion form
2	2013/03/27	Ray Whitley: Kusile Commissioning	Change in all attached forms. (They were given document numbers)
2	2013/03/27	Ray Whitley: Kusile Commissioning Manager	Change in the Defect Notification & Clearance form (These two forms are now combined on one document)
2	2013/03/27	Ray Whitley: Kusile Commissioning	Change in the Commissioning Work Flow Diagram
2	2013/03/27	Ray Whitley: Kusile Commissioning Manager	Contractual description added to explain requirements for each document.
3	2015/01/31	Christo Basson: Kusile	Major changes to roles & responsibilities
4	2017/04/03	Johan Botma : Kusile Commissioning	Minor and Major Flushing, Temporary supplies and Defect Management added.
1	2017/04/20	Johan Botma : Kusile Commissioning	Document Unique Identifier changed to 240-125815990 and document revision changed to Rev: 1

6. Development Team

The following people were involved in the development of this document:

- Willie Geyer, Johan Botma and Sebongile Foku

7. Acknowledgements

None

8. Annexures

8.1 Contractor's Application for Eskom's Inspection

Eskom	CONTRACTS APPLICATION FOR ESKOM'S INSPECTION OF THE WORKS / PART OF THE WORKS	Template Identifier	240-124667653	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.1	CERTIFICATE NO:	AFI-			
HOF NAME:	«HOF_NAME»					
ORIGINAL TO:	Contract File	File No. «HANDOVER_FILE_No»		DATE COMPLETED :		
COPIES TO:	Construction Supervisor	Power Station Client Manager	Discipline Construction Manager	DAY	Month	Year
	Commissioning Manager	Contractor	Construction Manager			

CONTRACTOR			
PROJECT: ESKOM P146838	NAME OF CONTRACTOR:		
ENQUIRIES TO:		PHONE NO:	
CONTRACT / ORDER No.		CONTRACT ITEM No.	
APPLICABLE MODIFICATION No.(S):			
UNIT NO.		PLANT / SYSTEM KKS CODE:	
PLANT / SYSTEM ITEM KKS CODE:			

☐ PARTIAL COMPLETION / ☐ WHOLE OF WORKS COMPLETION

QA REVIEW: HAVE ALL APPLICABLE NCR'S, OCR'S AND CONCESSIONS BEEN CLOSED OUT? ☐ YES ☐ NO

IF NO, INDICATE APPROPRIATE NUMBERS AND ATTACH COPIES:

THE WORKS HAS BEEN INSPECTED AND FOUND: ☐ ACCEPTABLE ☐ NOT ACCEPTABLE

	PRINT NAME	SIGNATURE	DATE
QA REPRESENTATIVE:			

ARE THERE ANY CONTRACTUAL SPARES, MANUALS AND/OR TOOLS INVOLVED? ☐ Yes ☐ NO ☐ N / A

THE WORKS HAS BEEN INSPECTED AND FOUND: ☐ ACCEPTABLE ☐ NOT ACCEPTABLE

	PRINT NAME	SIGNATURE	DATE
CONTRACTOR SUPERVISOR / MANAGER			

KUSILE POWER STATION KET WORKING PARTY

THE WORKS HAS BEEN INSPECTED AND FOUND: ☐ ACCEPTABLE ☐ NOT ACCEPTABLE

	PRINT NAME	SIGNATURE	DATE
KET CONSTRUCTION SUPERVISOR / MANAGER			

IS CONTRACT WORKS ACCEPTABLE TO ENABLE? ☐ YES ☐ NO

COMPLETION INSPECTION TO BE PLANNED? ☐ YES ☐ NO

IF "NO" STATE REASONS:

PRINT NAME	SIGNATURE	DESIGNATION	DATE
		KET WORKING PARTY REPRESENTATIVE	

8.2 [illegible]

Eskom	KUSILE PROJECT PLANT EXCEPTION	Template Identifier	240-126039686	Rev	1
		Document Identifier		Rev	
		Effective Date	April 2017		
		Review Date	April 2020		

Project/Station/Site:	Kusile Power Project			Review Date:		Close Out Date:	
Plant Area	U1	U2	U3	U4	U5	U6	C/PLANT
Plant	BOILER	TURBINE	ELECTRICAL	C & I	OTHER		
Plant System (as per matrix)							
Plant Specific							

Applicable Standards / Specifications		Applicable Drawings / Documents	
Standard / Specification	Rev.	Drawing / Document	Rev.

Exception Description:			
Reason for Exception:			
Exception Required For:	☐ SC/Commissioning	☐ Prov. Handover	☐ Final Handover
Outage Required ☐ Yes ☐ No	Outage Duration:		
TOI Required ☐ Yes ☐ No	TOI #:		
Temp Mod ☐ Yes ☐ No	Mod #:		
Documents to be Revoked at Close Out:			

"MANAGER"	PRINT NAME	SIGNATURE	DATE
Generation Representative			
Engineering Representative			
Commissioning Representative			

8.3 Partial / Final Inspection Certificate: 240-124860884

Eskom	PARTIAL / FINAL INSPECTION CERTIFICATE	Template Identifier	240-124860884	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.2	CERTIFICATE NO:	P / FIC-			
HOF NAME:	«HOF_NAME»					
ORIGINAL TO:	Contracts File	File No. «HANDOVER_FILE_No»		DATE COMPLETED :		
COPIES TO:	Construction Supervisor	Power Station Client Manager	Discipline Construction Manager	DAY	Month	Year
	Contractor	Commissioning Manager	Construction Manager			
	ESKOM P146838	NAME OF CONTRACTOR:				
CONTRACT / ORDER NO:		CONTRACT ITEM NO:				
UNIT NO:		PLANT / SYSTEM KKS CODE:				
PLANT / SYSTEM ITEM KKS CODE:						
PLANT / SYSTEM DESCRIPTION:						

PRIORITIZE PUNCHLIST ITEMS:	Priority 1 System or equipment cannot be operated safely. Priority 2 Must be completed before operational acceptance. Priority 3 Must be complete prior to Client Acceptance. Priority 4 Cosmetic issues Priority 5 Plant Enhancements / Items in Dispute.

INSPECTION RESULTS

RECOMMENDATION

IS PLANT RECOMMENDED FOR COMPLETION CERTIFICATION AND SAFETY CLEARANCE? ☐ YES ☐ NO

COMMENTS (IF APPLICABLE)

DECISION

REPRESENTATIVE OF:	PRINT NAME	SIGNATURE	DATE
COMMISSIONING REP.			
PROJECT CONSTRUCTION			
PROJECT ENGINEERING			
CTC REPRESENTATIVE			
PROJECT SAFETY			
POWER STATION CLIENT			
CONTRACTOR			

8.4 KKS and Labelling Certificate: 240-124861030

Eskom	KKS and LABELING CERTIFICATE	Template Identifier	240-124861030	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.3	CERTIFICATE NO:	KKS-			
HOF NAME:	«HOF_NAME»					
ORIGINAL TO:	Commissioning File	File No. «HANDOVER_FILE_No»				
COPIES TO:						
PLANT AREA	U1 ☐	U2 ☐	U3 ☐	U4 ☐	U5 ☐	U6 ☐ BOP ☐
PLANT	CIVIL ☐	MECHANICAL ☐	ELECTRICAL ☐	C & I ☐	Package No:	
PLANT SYSTEM (as per matrix)				All PBS No's		
PLANT SPECIFIC						
PLANT SYSTEM DRAWINGS						
PERMANENT LABELING	☐ Yes ☐ No					
TEMPORARY LABELING	☐ Yes ☐ No					
KKS CERTIFICATE STATUS	Accepted ☐	Temporary Accepted ☐	Rejected ☐			
If Temporary labeling, specify expiring date	DATE:					

The above-mentioned plant system was checked against the above-mentioned drawings:

Inspection Results:

The above items to be added to safety clearance and commissioning defect list

	Print Name	Signature	Date
Contractor Applicant			
Engineer			
Config. Man. Discipline Team Leader			
Commissioning Representative			
Power Station Representative			

8.5 Project Defect Notification / Clearance Certificate: 240-124861234

Eskom	DEFECT NOTIFICATION / CLEARANCE	Template Identifier	240-124861234	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

ORIGINAL TO:	Contract File	File No:	
COPIES TO:	Contracts Manager	Const. Supervisor	Contractor
CONTRACT / ORDER NO.		AUDIT/SURVEIL/INSPECT NO : FIC-	
DESCRIPTION OF THE WORKS			
DESCRIPTION OF DEFECT	Priority 1 ☐ 2 ☐ 3 ☐ 4 ☐		

ORIGINATOR: NAME	SIGNATURE	DATE
NOTIFIED BY:		

FOR DEFECT NOTIFIED BEFORE * COMPLETION ☐		RQUESTED REPLY DATE:	DATE
FOR DEFECT NOTIFIED AFTER * COMPLETION ☐			
DEFECT CORRECTION PERIOD IS:	14 DAYS	DEFECT CORRECTION PERIOD ENDS ON:	
"CONTRACTOR" RESPONSE REQUIRED FOR:	Cause ☐ Corrective Action ☐ Prevent Recurrence ☐ Implementation Date ☐		

RESPONDERS: NAME	SIGNATURE:	DATE:
RESPONSE BY:		

"CONST. SUPERVISOR" EVALUATION OF PROPOSED RESPONSE			COMMENTS:
ACCEPTED ☐		REJECTED ☐	
NAME:	SIGNATURE:	DATE:	
"CONTRACTOR" RESPONSE VERIFIED AS IMPLEMENTED			COMMENTS
NAME:	SIGNATURE:	DATE:	
TITLE:			

DEFECT NOTIFICATION CLOSE-OUT			
ACCEPTED ☐		REJECTED ☐	
"MANAGER"	PRINT NAME	SIGNATURE:	DATE:
Contracts Manager			
Generation Representative			
Commissioning Rep.			
Contractor Rep.			

8.6 Completion Certificate: 240-124861396

Eskom	COMPLETION CERTIFICATE	Template Identifier	240-124861396	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.6	CERTIFICATE NO:	CCC-
HOF NAME:	«HOF_NAME»		
ORIGINAL TO:	Contract File	File No. «HANDOVER_FILE_No»	
COPIES TO:	Construction Manager	Commissioning Manager	

I hereby certify that the erection, installation, construction, examination, testing, inspection, stamping, certification and documentation for all onsite construction work included in the **«HOF_NAME»** Handover File has been completed in accordance with the purchase and construction specifications pertinent to this system. Upon acceptance of this certificate the system will be placed under the control of the Commissioning Manager and the construction personnel will abide by the requirements of the Eskom Permit to Work system as it is administered by the Commissioning personnel.

List of documents required to for construction completion:
Construction list of Outstanding Work and Deficiencies
Signed Construction Certification Checklists in Sections **4.0, 5.0 6.0 & 7.0 of HOF**

Discipline Engineering Manager **Printed name**

Signature

Date

Construction Manager **Printed name**

Signature

Date

Package Manager **Printed name**

Signature

Date

I hereby accept this system to be under the control of Commissioning, and am in general agreement that the work performed is substantially complete and proper as stated.

Commissioning Manager **Printed name**

Signature

Date

8.7 Safety Clearance Certificate: 240-124861660

Eskom	SAFETY CLEARANCE CERTIFICATE	Template Identifier	240-124861660	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.7	CERTIFICATE NO:	SCC-	
HOF NAME:	«HOF_NAME»			
ORIGINAL TO:	Commissioning File	File No. «HANDOVER_FILE_No		
COPIES TO:	Discipline Construction Manager	Commissioning Manager	Contractor	Power Station Client Manager

NOTIFICATION

ESKOM HEREBY NOTIFIES:	NAME OF CONTRACTOR:		
PROJECT:	ESKOM P146838	Power Station:	Kusile Power Station
CONTRACT / ORDER NO.		INSPECTION CERTIFICATE No.	FIC -

AND ALL OTHER SIGNATORIES THAT THE PLANT DESCRIBED BELOW MUST BE REGARDED AS BEING ALIVE AND/OR IN SERVICE AND CAN BE PUT INTO OPERATION WITHOUT WARNING AS FROM_____ HOURS ON DATE FROM THIS TIME AND DATE. THE SAID PLANT IS UNDER THE CONTROL OF ESKOM AS PER ESKOM'S OPERATING AND PLANT SAFETY REGULATION. NO FURTHER WORK SHALL BE CARRIED OUT UNLESS THE RESPONSIBLE PERSON IN CHARGE OF THIS WORK IS IN POSSESSION OF A PLANT OR WORK PERMIT ISSUED BY ESKOM'S OPERATING REPRESENTATIVES. FURTHER, THE RESPONSIBILITY AS USER OF THE PLANT, IN TERMS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, ACT NO. 85 OF 1993, IS ACCEPTED BY ESKOM. THIS CERTIFICATE DOES NOT IN ANY OTHER WAY EFFECT THE CONTRACTOR'S CONTRACTUAL RESPONSIBILITIES AND OBLIGATIONS TOWARDS ESKOM.THE CONTRACTOR AND ALL OTHER SIGNATORIES HEREBY ACKNOWLEDGES THEIR RESPONSIBILITIES TO ADVISE ALL THEIR PERSONNEL AND SUB-CONTRACTORS OF ESKOM'S PLANT, OR WORK PERMIT SYSTEM TO ENSURE COMPLIANCE.

PLANT DESCRIPTION

PLANT CODE NO.	DESCRIPTION OF PLANT	ORIGIN

SIGNATORIES

REPRESENTATIVES OF:	PRINT NAME	SIGNATURE	DATE
COMMISSIONING			
PROJECT CONSTRUCTION			
PROJECT SAFETY			
PROJECT ENGINEERING			
POWER STATION CLIENT			
CONTRACTOR			

8.8 Commissioning Certificate: 240-125005052

Eskom	COMMISSIONING CERTIFICATE	Template Identifier	240-125005052	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF NAME:	«HOF_NAME»					COMMISSIONING CERTIFICATE No:	
File No.	«HANDOVER_FILE_No»					CMC -	
ORIGINAL TO:	Commissioning File	Contracts File	Construction Supervisor				
COPIES TO:	Power Station Client Manager		Commissioning Manager				
PLANT AREA	U1 ☐	U2 ☐	U3 ☐	U4 ☐	U5 ☐	U6 ☐	BOP ☐
PLANT	BOILER ☐	TURBINE ☐	ELECTRICAL ☐	C & I ☐	OTHER ☐		
PLANT/SYSTEM KKS CODE							
PLANT SPECIFIC							

Equipment Check List	Name	Signature	Date
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

The above-mentioned plant is certified to be Commissioned and Available for Operation

	Print Name	Signature	Date
Commissioning			
Project Construction			
Project Engineering			
Project Safety			
Project Quality			
Power Station Client			
Contractor			

8.9 Safety / Housekeeping Certificate: 240-124862622

Eskom	SAFETY/HOUSE KEEPING CERTIFICATE	Template Identifier	240-124862622	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.9	CERTIFICATE NO:	S / HKC-
HOF NAME:	«HOF_NAME»		
ORIGINAL TO:	Commissioning File	File No. «HANDOVER_FILE_No»	
COPIES TO:	Project Manager	GX Production Manager	GX Technical Services Manager
UNIT AREA	U1 ☐ U2 ☐ U3 ☐ U4 ☐ U5 ☐ U6 ☐ BOP ☐		
PLANT	BOILER ☐ TURBINE ☐ ELECTRICAL ☐ C & I ☐ OTHER ☐		
PLANT / SYSTEM KKS CODE			
PLANT SPECIFIC	ESKOM P146838 Kusile Power Station		

	Equipment Check List	Name	Signature	Date
1.	Plant Area Cleared and Clean			
2.	Scaffolding Removed			
3.	Hanger Brackets on Pipes Where Required			
4.	Motor Cables and Cable Trays Fastened			
5.	Gratings/Covers Repaired and in place			
6.	Trenches Clear of Debris			
7.	Hand Railings in Place Where Required			
8.	Old Equipment Removed from Plant			
9.	Insulation And Cladding Completed			
10.				
11.				
12.				
13.				

The above-mentioned plant is certified to be safe and in a clean condition

Commissioning Rep.	Print Name	Signature	Date
KET Supervisor			
Safety Officer			
Commissioning Engineer			

8.10 Partial Handover Certificate: 240-124862854

Eskom	PARTIAL HAND OVER CERTIFICATE	Template Identifier	240-124862854	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.10	CERTIFICATE NO.	PHOC-
HOF NAME:	«HOF_NAME»		
TAKEOVER CERTIFICATE. No.	TOC-		
ORIGINAL TO:	Contract File	File No. «HANDOVER_FILE_No»	
COPIES TO:	Commissioning Manager	Project Manager	Power Station Manager
	Production Manager	Technical Manager	Commercial Manager
PROJECT:	ESKOM P146838	CONTRACT/ORDER NO.	
DESCRIPTION OF PLANT / SYSTEM:			
DEFECTS No.			

Partial Hand Over Date	DAY	MONTH	YEAR
Kusile Power Station Project Partially Hands over the above mentioned plant to the Power Station. The Power Station will from the hand over date take control of the mentioned plant and be responsible for its operating and maintenance.			

Handed over by:	PRINT NAME	SIGNATURE	DATE
Project Field Manager			
Commissioning Manager			
Accepted by Power Station Manager			

8.11 Hand Over Certificate: 240-124863218

Eskom	HAND OVER CERTIFICATE	Template Identifier	240-124863218	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

HOF Section:	2.0.11	CERTIFICATE NO.	HOC-
HOF NAME:	«HOF_NAME»		
PROVISIONAL HANDOVER CERTIFICATE No.	PHOC-		
ORIGINAL TO:	Contract File	File No. «HANDOVER_FILE_No»	
COPIES TO:	Commissioning Manager	Technical Manager	Project Manager
	Production Manager	Power Station Manager	Commercial Manager
PROJECT:	ESKOM P146838	Contracts/Order No.	
DESCRIPTION OF PLANT:			
DEFECTS			

Hand Over Date	DAY	MONTH	YEAR
Kusile Power Station Project Hands over the above mentioned plant to the Power Station. The Power Station will from the hand over date take possession of the asset and control of the mentioned plant and be responsible for its operating and maintenance.			

Handed over by:	PRINT NAME	SIGNATURE	DATE
Project Director			
Commissioning Manager			
Accepted by Power Station Manager			

8.12 Defect Certificate: 240-124863468

Eskom	DEFECTS CERTIFICATE	Template Identifier	240-124863468	Rev	1
		Document Identifier		Rev	
		Effective Date	March 2017		
		Review Date	March 2020		

ORIGINAL TO:	Contract File	File No.		
COPIES TO:	Contractor	Supervisor	Commercial Manager	
	PM (C)	Operating Manager	Maintenance	
PROJECT: ESKOM P146838		CONTRACT/ORDER NO:		
NAME OF CONTRACTOR:				
TEL:				
ATTENTION:				
DESCRIPTION OF WORKS				

CONTRACT / ITEM NO.	LOCATION / KKS CODE(S)	UNIT/SYSTEM NUMBER: APPLICABLE SERIAL AND DESCRIPTION OF THE PERMANENT WORKS:

Completion achieved on:	Day	Month	Year
The end of the last defects correction period is:			
The defects date is:			
* This Defects Certificate date is:			

(*at the later of the defects date or the end of the last defects correction period)

List of Defects notified before the defects date which the Contractor has not corrected
[or, if there are no such Defects, a statement that there are none]

ARE THERE ANY FURTHER DEFECTS? ☐ Yes ☐ NO

	PRINT NAME	SIGNATURE	DATE
Certified by Project Manager:			
Commissioning Manager::			
Contractor Manager:			

8.13 Commissioning Process Flow Chart