

# HSE STANDARDS COMMISSIONING

Effective Date: 06/16/11

Standard: 14.6

Document Number: KUCSH0053

Rev: 01

## 14.6.1 **INTRODUCTION**

14.6.1.1 The purpose of this standard is to achieve a safe and effective transition of assets from the construction, installation, or major repair phase to owner custody while ensuring that benefits of the design objectives and expectations are achieved for the company. This standard is not intended to be a detailed commissioning plan for a given application but rather a high level view of how a commissioning plan is developed and the key elements which need to be included in the plan from the Safety and Health perspective.

## 14.6.2 **DEFINITIONS**

14.6.2.1 Area Manager - Any one of the operating unit management team members who have responsibility for accepting the asset – Operations Manager, Maintenance Manager, General Manager.

14.6.2.2 Change - Any addition / deletion, process modification, substitute item or organizational or procedural change.

14.6.2.3 Change Management - Administrative process or system established to properly manage change.

14.6.2.4 Commissioning - A period of testing following construction involving the project, operations, and EPCM teams aimed at ensuring that the constructed assets operate as planned For the purposes of this standard commissioning includes these elements as per KUC and Rio Tinto protocols:

- Custody Tagging – Care, Custody & Control identification process.
- Pre-commissioning – Dry Commissioning and Cold Commissioning.
- Commissioning – Hot Commissioning, Wet Commissioning, and Process Commissioning.

NOTE: Commissioning can fall under the jurisdiction of either the Operating Unit or the Project Manager depending on the application. It is understood that Operational Readiness activities have been executed prior to the commencement of the commissioning process (i.e. training, operating procedures, spare parts, materials and supplies, emergency response planning, etc.).

14.6.2.5 Commissioning Manager / Lead: Person who is accountable for commissioning the assets.

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- 14.6.2.6 Commissioning Team Member: Individuals who have been assigned to the Commissioning Team with specific responsibilities related to commissioning the assets.
- 14.6.2.7 Custody Tagging: A process to transfer of Care, Custody and Control for each phase of test work executed during the commissioning process stating who is in control of the equipment during the three phases of ownership. (See Exhibit 14.6.2)
- 14.6.2.8 Heavy Mobile Equipment (HME): Large mobile mining equipment – i.e. haul trucks, shovels, drills, support equipment.
- 14.6.2.9 Field Walk-Thru: Collaborative field verification of Pre-Startup Safety Review (PSSR) in the extent possible using checklists to ensure adequate operational preparations have been made before proceeding with Commissioning.
- 14.6.2.10 Fixed Plant: Mining processing facilities – i.e. concentrator, smelter, refinery, power plant, pump stations, Moly Autoclave Process and fixed equipment at the mine.
- 14.6.2.11 Operational Readiness: Preparatory work for the successful implementation and stabilization of the sustainable business.
- 14.6.2.12 Operating Unit: Owner, Business Unit site, plant, operation.
- 14.6.2.13 Pre-Startup Safety Review (PSSR): Collaborative review process using checklists to ensure adequate operational preparations have been made before proceeding with Commissioning.
- 14.6.2.14 Project Manager: Person who is accountable for project execution and project delivery to the Operating Unit.
- 14.6.2.15 RACI: Document outlining who is Responsible, Accountable, Consulted and Informed in relationship to commissioning.
- 14.6.3 **SCOPE**
- 14.6.3.1 Commissioning shall refer to the process whereby equipment and systems are verified to meet functional specifications as control and responsibility are transferred from project or non-operational status to operational status. This standard applies to the following commissioning situations for fixed plant and HME applications.

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- Capital projects
- Major equipment assembly (new)
- Significant changes to operating facilities
- Restarting a mothballed process
- Post-turnaround start-up
- Start-up after major maintenance activity/rebuilds

NOTE: Commissioning can fall under the jurisdiction of either the Project Manager or the Operating Unit depending on the application and needs to be determined by the Project/Area Manager. Typically commissioning planning and execution will also include vendor support.

## 14.6.4 **REQUIREMENTS**

14.6.4.1 Commissioning consists of several key functions including: (See Exhibit 14.1 for Commissioning Process flow diagram)

- Selection of a Commissioning Manager / Lead.
- Assembly and approval of a Commissioning Team.
  - The Commissioning Team should consist of a cross-functional team representing Operations, Maintenance, Reliability, HSE, the Project, and Vendors as applicable. All stakeholder groups shall identify a representative responsible for participating in the commissioning process at the request of the Commissioning Manager / Lead.
- Generation of a Commissioning Plan. The Commissioning Plan should also be generated well in advance of actual commissioning activities to allow for adequate preparation. The Commissioning Plan will vary in scope depending on the project and at a minimum the plan must include:
  - Resource Plan (Commissioning Team members and a RACI)
  - Communications Plan.
  - Detailed Scope of Work and Schedule.
  - Risk Review.
  - Custody Tagging (See Exhibit 14.2), Dry and Cold Testing, Hot and Wet Testing.
  - Pre-Startup Safety Review checklist (See sample - Exhibit 14.3) and / or HME checklists.
  - Field Walk-Thru checklist (See sample - Exhibit 14.4) and / or HME checklists.

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- A formal review conducted to identify the risks associated with the commissioning process, and a response plan prepared to address them. Field evaluations must be included in the risk identification process
- Proposed changes to the Commissioning Plan and the execution thereof must be evaluated for changes in risk by the Commissioning Team and be approved by the appropriate personnel prior to execution.

## 14.6.5 **ROLES & RESPONSIBILITIES**

- 14.6.5.1 Project or Area Manager: Appoint a Commissioning Manager or Lead and approve the Commissioning Plan, including proposed changes to the plan prior to and during the execution of the commissioning process. Ensure that time and other resources assigned are commensurate with the level of activity anticipated. Ensure that all **after start-up** action items are resolved in a timely manner after equipment turn-over
- 14.6.5.2 Commissioning Manager or Commissioning Lead: Assembles the Commissioning Team, generates the Commissioning Plan and approves the plan, including proposed changes to the plan prior to and during the execution of the commissioning process. Execute and manage the Commissioning Plan once it has been approved and ensure that Custody Tagging and Change Management is followed during the commissioning process. Ensure that all applicable KUC HSE standards are applied. Ensure that all **before start-up** action items as identified from the PSSR and FWT checklists are resolved before start-up and the transfer of custody of assets to the Operating Unit.
- 14.6.5.3 Commissioning Team Member: Participate in the development and execution of the Commissioning Plan and resolution of before start-up action items, participate in and witness commissioning activities.
- 14.6.5.4 The Commissioning Manager, Commissioning Team Members, and the Project/Area Managers need to sign off on the Commissioning Plan for approval before commissioning is executed and after commissioning has been completed prior to equipment turnover to the operating unit. Turn-over includes resolution and sign-off of all **before start-up** action items and having a timely resolution plan in place for all **after start-up** action items. Additional Roles and Responsibilities will be determined as needed per commissioning application

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## **REFERENCES**

Document No. GNMS0301: Guidance Note, HSEQ Management System Element 3 Hazard Identification and Risk Management

Document No. GNMS0302: Guidance Note, HSEQ Management System Element 3 Hazard Identification and Risk Management Process Safety Management

Document No. GNP00-25: Guidance Note, Major Project Development

Document No. KUCSH00017: KUC Safety & Health Standard – Management of Change

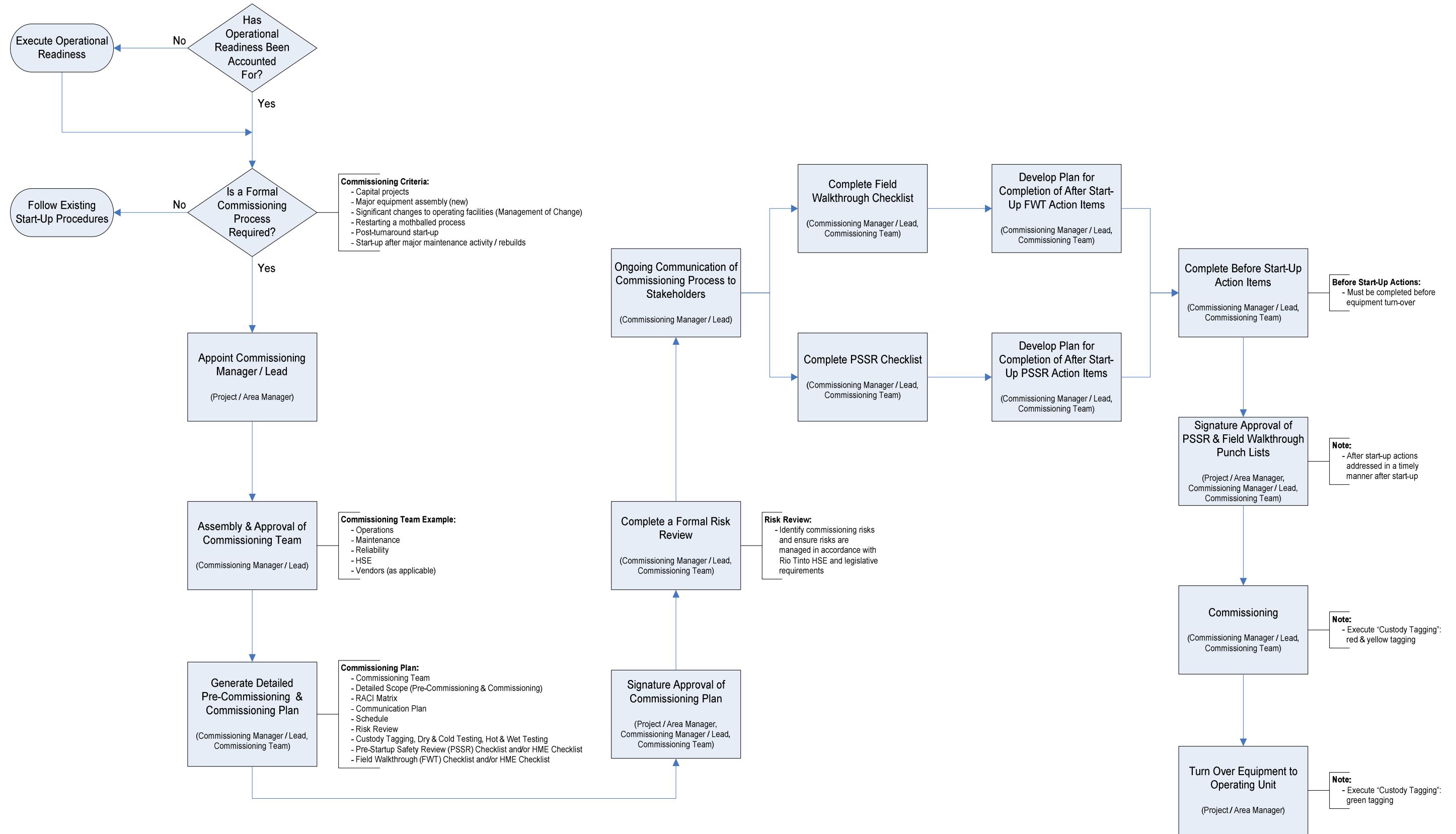
KUC Health and Safety Standards Manual:

[http://kuc/kuc/ehs/Safety\\_Health\\_Manual\\_File\\_Listing.aspx](http://kuc/kuc/ehs/Safety_Health_Manual_File_Listing.aspx)

## **REVISION HISTORY**

MOC#	Description of Change	Prepared By	Date
15925	New Standard	KUC Safety and Health Standards Committee	06 / 11

Exhibit 14.6.1: Commissioning Process Flow Diagram



**Exhibit 14.6.2: Transfer of Care, Custody, and Control (Custody Tagging)**

Throughout the execution of site construction testing, pre-commissioning and commissioning activities all personnel will adhere to and operate within the limitations of the following custody tagging methodology. Each phase of testing will have a clear and unambiguous custody tag stating the current group in control of all equipment.

The custody tags will be transitioned on each piece of equipment and the energy source feeding said piece of equipment at turnover by the removal of previous stages tags and attachment of the next stages tags. No testing is to occur prior to all tags being replaced for the transferred system and without the appropriate tag attached.

It should be noted that any equipment under either the Pre-Commissioning or Commissioning Tag may start at any time without warning and appropriate measures should be taken to ensure all project and site personnel are aware of the project tagging procedures.

The Custody tags shall be clearly identified with the appropriate phase of custody color and proper custody information, including a space for the "responsible party" to sign and date.

The following tags will be used to identify ownership:

- Construction Tag – This tag will be red in color and marked with black lettering "DO NOT OPERATE - UNDER CONSTRUCTION". This tag shall be placed on the equipment and the energy source/s feeding that piece of equipment during construction prior to Pre-Commissioning taking custody.
- Pre-Commissioning/Commissioning Tag - This tag will be yellow in color and marked with black lettering "CAUTION – COMMISSIONING IN PROGRESS". This tag shall be placed on equipment and the energy source/s feeding that piece of equipment at the time of Mechanical Completion acceptance by the Commissioning group and shall remain in place until all stages of pre-commissioning and commissioning are completed and the area / system has been turned over to KUC Operations.
- KUC Operations Tag - This tag will be green in color and marked with black lettering "CAUTION – OPERATIONAL". This tag shall be placed on equipment and the energy source/s feeding that piece of equipment at the time of final acceptance by KUC Operations group and shall remain in place until the completion of the project.

Examples of the custody tags:





### Exhibit 14.6.3: Sample Pre-Startup Safety Review Checklist

Pre-Startup Safety Review Checklist	
Review Date:	
Department / Area:	
Process / Equipment:	
MOC Number:	

<i>Sign below to indicate acceptance that the equipment or project is safe and satisfactory to startup with the exception of the noted constraining action items.</i>	
Area Manager	Date
Technical Services	Date
Asset Management	Date
Safety & Health	Date
Environmental	Date
Project Manager	Date



PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
<b>1.1</b>	<b>MACHINERY / EQUIPMENT SAFETY</b>	
1.1.1	Has the machinery/equipment been installed so that it will be stable and secure during operation?	
1.1.2	Have all vendor and company installation/assembly checklists been completed and accepted, including Heavy Mobile Equipment (HME) and other equipment?	
1.1.3	Are points of isolation clearly marked / labeled and readily accessible?	
<b>1.2</b>	<b>OCCUPATIONAL HEALTH</b>	
1.2.1	Have all health risks arising from the gases, liquids, dusts, mists, biological hazards or vapors used by, contained in or emitted by this equipment been assessed; and are these risks adequately mitigated through use of the proper controls?	
1.2.2	Has appropriate PPE (including respiratory protective equipment) been specified in the Standard Operating Procedures, has the PPE been provided, have PPE users been trained in its use and is the training documented?	
1.2.3	Has the need for an occupational health monitoring program been assessed, and if required, has a monitoring program been scheduled?	
1.2.4	Has a noise survey been considered and a noise compliance plan prepared, if required?	
1.2.5	Has adequate local ventilation been installed, tested, balanced, and entered on an inspection schedule?	
1.2.6	Have adequate inspection/cleaning ports been provided on ductwork?	
1.2.7	Has all insulation been identified?	
1.2.8	Have all pipe work, tanks, and equipment containing hazardous materials been adequately labeled?	
<b>2.1</b>	<b>PROCESS TECHNOLOGY</b>	
2.1.1	Are up-to-date Material Safety Data Sheets available?	
2.1.2	Have the hazardous effects of inadvertent mixing of different materials been considered (that is, has a chemical interaction matrix been prepared/updated)?	
2.1.3	Has the design basis for the overall process and individual equipment items been documented or updated?	
2.1.4	Has the control philosophy and sequence of operations been documented or updated?	
2.1.5	Are all relief devices shown on the P&IDs with standard markings, including the relieving / rupture pressures?	
2.1.6	Have pressure relief device calculations been provided and does the sizing of the pressure relief devices agree with the calculations?	
2.1.7	Do relief devices vent to safe locations and is containment provided for liquids and solids released from pressure relief devices?	
2.1.8	Are there isolation valves that, if closed, will inhibit the operation of pressure relief devices? If yes, does an operations control plan exist to insure that relief valve operation is not inhibited?	
<b>2.2</b>	<b>MANAGEMENT OF CHANGE</b>	
2.2.1	Has an MOC change request been completed and approved?	
2.2.2	Are all constraining action items identified in the change request complete?	
2.2.3	Have all changes made during construction been recorded and authorized and have risk assessments been completed for all the changes made during construction?	

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
<b>2.3</b>	<b>PROCESS HAZARDS ANALYSIS</b>	
2.3.1	Has a project risk assessment / PHA been completed and documented?	
2.3.2	Have all recommended actions deemed necessary by the risk assessment / PHA team for start-up been completed?	
<b>2.4</b>	<b>QUALITY ASSURANCE</b>	
2.4.1	Have checks and inspections been made to ensure that critical equipment is installed properly and is consistent with design specifications and vendor's recommendations?	
2.4.2	Have quality assurance inspection reports been completed covering fabrication, assembly and installation?	
2.4.3	Have factory acceptance tests been conducted as required in procurement contracts to demonstrate that system design and manufacturing comply with specifications?	
2.4.5	Have arrangements been made for vendor support during the commissioning process?	
2.4.6	Have the following documents been provided?	
2.4.6.a	Instrument loop diagrams?	
2.4.6.b	Tabulated alarm limits, permissive and interlock settings?	
2.4.6.c	Alarm, permissive and interlock descriptions?	
2.4.6.d	As-built engineering drawings covering electrical, piping and mechanical?	
2.4.6.e	Data sheets for pressure equipment built to ASME or equivalent codes?	
2.4.6.f	Welder certification?	
2.4.6.g	Non-destructive test (NDT) certifications?	
2.4.6.h	Electrical certification for classified areas?	
<b>2.5</b>	<b>MECHANICAL INTEGRITY</b>	
2.5.1	Have maintenance procedures been approved?	
2.5.2	Have maintenance personnel been trained?	
2.5.3	Has a spare parts list been developed and entered into the parts ordering software program?	
2.5.4	Are there adequate inventories of spare parts, operating supplies and maintenance materials?	
2.5.5	Have quality control procedures been approved for maintenance materials and spare parts?	
2.5.6	Have inspections, licensing/certification and tests for the following equipment been included in a maintenance schedule?	
2.5.6.a	Pressure vessels and storage tanks?	
2.5.6.b	Pressure relief systems, vent systems, and devices?	
2.5.6.c	Critical controls, interlocks, alarms and instruments?	
2.5.6.d	Emergency devices (including shutdown systems and isolation systems)?	
2.5.6.e	Fire protection equipment?	
2.5.6.f	Piping systems in critical service?	
2.5.6.g	Key process-to-service tie-ins?	
2.5.6.h	Electrical grounding, bonding and grounding records?	
2.5.6.i	MCC starters?	

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
2.5.6.j	Emergency alarm and communication system?	
2.5.6.k	Monitoring devices and sensors?	
2.5.6.l	Pumps?	
2.5.6.m	Lifting equipment?	
2.5.7	Has a reliability engineering analysis been considered / completed for process safety critical equipment?	
2.5.8	Are certificates on file for any equipment tested by an outside organization (e.g., pressure vessels, pressure relief devices, lifting equipment, etc.)?	
2.5.9	Have all commissioning tests or inspections been identified and completed (e.g., pressure tests, leak tests, passivating procedures, etc.)?	
2.5.10	Has <b>Custody Tagging</b> been completed?	
2.5.11	Have dry and cold testing been completed?	
2.5.12	Have hot and wet testing been completed? (prior to the introduction of chemicals)	
<b>2.6</b>	<b>OPERATING PROCEDURES AND SAFE WORK PRACTICES</b>	
2.6.1	Have standard operating procedures been prepared / updated and approved?	
2.6.2	Do the standard operating procedures cover initial start-up, normal start-up, normal operations, normal shutdowns, emergency operations including emergency shutdowns, start-up after emergency shutdowns and start-up following turnarounds or prolonged shutdowns?	
2.6.3	Do the standard operating procedures cover operating limits including the consequences of deviation and the steps required to correct or avoid deviation?	
2.6.4	Do the standard operating procedures include safety and health considerations?	
2.6.5	Do the standard operating procedures include non-routine procedures such as equipment clean-outs, preparation of equipment for maintenance and operation of auxiliary equipment?	
<b>2.7</b>	<b>TRAINING AND PERFORMANCE</b>	
2.7.1	Have ALL appropriate personnel (Operations, Maintenance, Technical Services) received adequate and appropriate training on the equipment, job task and operating procedures?	
2.7.2	Have all personnel who may interact with the location or facility been oriented/familiarized?	
2.7.3	Have training records been updated?	
2.7.4	Have all regulatory licensing, permits and operating requirements been received?	
2.7.5	Have all trainers been properly trained, KUC and vendors, to operate the equipment in question and/or deliver training to personnel taking into account HSE risks and mitigation?	
2.7.6	Have the trainers delivering the training, KUC and vendors, been trained to the applicable SOP and is the SOP current?	
<b>2.8</b>	<b>CONTRACTOR SAFETY</b>	
2.8.1.	Have all contract personnel been adequately trained in appropriate chemical awareness and evacuation procedures?	
2.8.2	Has an evaluation of potential contractor interaction/impact been performed and implemented?	

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
<b>2.9</b>	<b>INTERLOCKS AND ALARMS</b>	
2.9.1	Did the loop testing confirm that the alarm / interlock action proved, under all conceivable failure conditions, to be fail-safe?	
2.9.2	Are alarm volumes sufficient for the expected operating noise environment?	
2.9.3	Prior to this PSSR, has an interlock/critical alarm Standard Operating Procedure for testing, through to the final element, been prepared and reviewed / authorized by a competent person for each new or upgraded control system?	
2.9.4	For alarms / interlocks with more than one software or hardware circuit, have all possible interlock routes been tested?	
2.9.5	Does the control system documentation adequately specify all major components including model number and serial number, communication cable layout and configuration and set-up including any configurable or custom settings?	
2.9.6	Has consideration been given to suitable fire detection and prevention systems for the equipment?	
2.9.7	Does an appropriate procedure exist to ensure that software is protected (e.g., routinely archived, key/password protected, etc.)?	
2.9.8	Has the software been properly documented and filed (e.g., logic drawings, schematics, sequence/batch descriptions)?	
2.9.9	Has all software been properly validated and tested?	
2.9.10	Is there verification that the equipment does not re-start, either on the re-setting of a protective device such as an interlock, or the re-establishment of power after an outage?	
<b>3.0</b>	<b>ENVIRONMENTAL</b>	
3.1	Are all secondary containment facilities adequate including the unloading areas for bulk liquid chemicals (110% of truck volume)?	
3.2	Are all material storage facilities adequate and appropriately labeled?	
3.3	Have adequate arrangements been made, prior to start-up, for the identification, classification and safe disposal of all waste materials?	
3.4	Have all materials used in the system been entered on an area chemicals inventory list (or equivalent)?	
3.5	Are updated area spill procedures available?	
3.6	Are material unloading facilities adequate and constructed in accordance with corporate safety, health, and environmental standards?	
3.7	Have the corporate environmental guidelines been followed during the design stage of this project?	
3.8	Have all waste streams been identified, quantified, analyzed and minimized?	
3.9	Are all of the applicable construction, environmental and operating permits up-to-date and approved?	
<b>4.0</b>	<b>EMERGENCY RESPONSE</b>	
4.1	Have all necessary precautions been taken to ensure that the equipment is not a source of ignition to any flammable materials, irrespective of their source?	
4.3	Is sufficient respiratory protective equipment such as escape sets or self-contained breathing apparatus (SCBA) available?	
4.4	Has the safety equipment been added to inspection schedules?	
4.5	Have emergency procedures been prepared and relevant personnel trained?	
4.6	Have rendezvous points been identified and marked?	

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
4.7	Have Emergency Response, medical, fire, HazMat, and other agencies been included in emergency and incident response planning?	
<b>5.0</b>	<b>ELECTRICAL EQUIPMENT</b>	
5.1	Has an electrical safety checklist including arc flash and coordination studies (acceptance of electrical installations) been completed by a competent personnel?	
5.2	Has the equipment been properly installed and constructed to corporate guidelines and local legislation, and does it meet any special installation requirements noted on the manufacturer's certificate?	
5.3	Is all arc flash, voltage identification an hazard rating circuit in place as per NFPA70E?	
5.4	Has equipment been designed and purchased for the conditions under which it will operate (e.g., hazardous areas)?	
5.5	Have grounding tests been performed on systems and equipment, recorded and meet standards?	
5.6	Have fuses, circuit breakers and starters been sized appropriately with settings established and recorded?	
5.7	Are single-line drawings reflecting as-built conditions available?	
5.8	Are single line drawings and PPE requirements available in motor control centers (MCCs), electrical control rooms (ECRs) and sub-stations, as appropriate?	
5.9	Have PPE requirements for electrical personnel been identified and made available?	
5.10	Has the operation of all emergency shutoff devices been verified?	
5.10	Have all relevant documentation and drawings (e.g., P&IDs, SLDs, schematics, equipment arrangement drawings, I/O, interlock lists, logic drawings, electrical classification drawings, panel schedule drawings, settings, etc.) been updated to reflect the current installation?	
5.11	Have all new sub-station breakers, MCC isolators, starters or other appropriate equipment been included on the site inspection schedule?	
5.12	Have any electrical circuits, made redundant by this installation, been properly de-energized and removed?	
<b>6.0</b>	<b>GENERAL SAFETY</b>	
6.1	Have noise-monitoring evaluations been completed? Have signs been posted where noise levels excess 80dB? Are ear-plugs available near areas exceeding 80 dB?	
6.2	Are all applicable work permit procedures in place (e.g., confined space entry, isolation, hot work, working at heights, etc.) and have Operations and Maintenance personnel been properly trained?	
6.3	Are fire protection facilities adequate (e.g., fire extinguishers, fire walls, sprinkler systems, etc.)?	
6.4	Have the fire protection systems been inspected and has acceptance testing been completed and documented?	

**Exhibit 14.6.4: Sample Field Walkthrough Checklist**

Field Walkthrough Checklist	
Review Date:	
Department / Area:	
Process / Equipment:	
MOC Number:	

<i>Sign below to indicate acceptance that the equipment or project is safe and satisfactory to startup with the exception of the noted constraining action items.</i>	
Operations	Date
Technical Services	Date
Asset Management	Date
Safety & Health	Date
Environmental	Date
Project Manager	Date



Constraining Action Items – Items to be completed BEFORE authorization and startup			
Checklist Item No.	Details	Responsibility	Completion Date
<i>Sign below only when all constraining action items are completed.</i>			
Area Manager			Date

Non-Constraining Action Items – Items to be completed AFTER startup			
Checklist Item No.	Details	Responsibility	Completion Date

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
<b>1.1</b>	<b>MACHINERY / EQUIPMENT SAFETY</b>	
1.1.1	Has the machinery/equipment been installed so that it will be stable and secure during operation?	
1.1.2	Has all access to dangerous moving parts or danger zones created by the equipment been prevented by the provision of the correct guards, interlocks and/or barriers?	
1.1.3	Have the correct safety measures been taken to prevent any risk from ejection of material, failure of parts and their ejection, overheating or fire?	
1.1.4	Has safe access been provided to the equipment for normal operations, adjustments, service, calibration, maintenance, or repair?	
1.1.5	Is the equipment provided with the properly identified <i>START/STOP</i> and <i>EMERGENCY</i> controls that are positioned for safe operation without hesitation, loss of time and without ambiguity?	
1.1.6	Is the equipment provided with a clearly identified means to securely isolate it from <i>ALL</i> energy sources?	
1.1.7	Are points of isolation clearly marked / labeled and readily accessible?	
<b>1.2</b>	<b>ERGONOMICS</b>	
1.2.1	Have the workstations or equipment been constructed so that need for stooping, bending, stretching, over-reaching and working over-head during operation has been eliminated or minimized?	
1.2.2	Has the need to lift, carry, push or pull heavy loads, or parts, been eliminated to the extent possible?	
1.2.3	Are all displays, screens, dials and <i>START/STOP/ EMERGENCY</i> buttons positioned so that they are readily visible and accessible by the operating personnel?	
1.2.4	Have displays and screens been positioned so that interference from glare is reduced to the minimum?	
1.2.5	Have workstations been designed and equipped so that the operator can adopt a comfortable position?	
1.2.6	Does the operation of this equipment increase the risk of upper limb disorders?	
<b>1.3</b>	<b>OCCUPATIONAL HEALTH</b>	
1.3.1	Has adequate local ventilation been installed, tested, balanced, and entered on an inspection schedule?	
1.3.2	Have adequate inspection/cleaning ports been provided on ductwork?	
1.3.3	Has all insulation been identified?	
1.3.3	Have all pipe work, tanks, and equipment containing hazardous materials been adequately labeled?	
<b>2.1</b>	<b>PROCESS TECHNOLOGY</b>	
2.1.1	Do relief devices vent to safe locations and is containment provided for liquids and solids released from pressure relief devices?	
2.1.2	Are there isolation valves that, if closed, will inhibit the operation of pressure relief devices? If yes, does an operations control plan exist to insure that relief valve operation is not inhibited?	

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
<b>2.2</b>	<b>QUALITY ASSURANCE</b>	
2.2.1	Based on a field check as part of this PSSR, does the construction meet the design specifications and match the engineering drawings?	
<b>2.3</b>	<b>CONTRACTOR SAFETY</b>	
2.3.1	Have all contract personnel been adequately trained in appropriate chemical awareness and evacuation procedures?	
<b>2.4</b>	<b>INTERLOCKS AND ALARMS</b>	
2.4.1	Did the loop testing confirm that the alarm / interlock action proved, under all conceivable failure conditions, to be fail-safe?	
2.4.2	Are alarm volumes sufficient for the expected operating noise environment?	
<b>3.0</b>	<b>ENVIRONMENTAL</b>	
3.1	Are all secondary containment facilities adequate including the unloading areas for bulk liquid chemicals (110% of truck volume)?	
3.2	Are all material storage facilities adequate and appropriately labeled?	
3.2	Are material unloading facilities adequate and constructed in accordance with corporate safety, health, and environmental standards?	
<b>4.0</b>	<b>EMERGENCY RESPONSE</b>	
4.1	Are emergency escape routes, including ladders, adequate and clearly marked?	
4.2	Is sufficient respiratory protective equipment such as escape sets or self-contained breathing apparatus (SCBA) available?	
4.3	Are rendezvous points clearly marked and appropriately selected?	
4.3	Are emergency vehicle access routes clearly marked?	
<b>5.0</b>	<b>ELECTRICAL EQUIPMENT</b>	
5.1	Has the equipment been properly installed and constructed to corporate guidelines and local legislation, and does it meet any special installation requirements noted on the manufacturer's certificate?	
5.2	Is all arc flash, voltage identification and hazard rating in place?	
5.3	Are single line drawings and PPE requirements readily available in motor control centers (MCCs), electrical control rooms (ECRs) and sub-stations, as appropriate?	
5.4	Are MCC's labeled, secure and ready for use?	
5.10	Have any electrical circuits, made redundant by this installation, been properly de-energized and removed?	
5.11	Have MCC rooms been cleared of construction debris?	
5.12	Is access to electrical equipment for operation and maintenance clear and adequate?	
5.13	Have MCC rooms and electrical enclosures been made inaccessible to unauthorized personnel?	

PSSR ITEM NO.	CATEGORY / ITEM TO ASSESS	YES / NO / NA
<b>6.0</b>	<b>GENERAL SAFETY</b>	
6.1	Has sufficient lighting been provided so that operation and maintenance activities can be carried out safely?	
6.2	Is lighting in approach and parking areas adequate?	
6.3	Is emergency lighting sufficient?	
6.4	Have all hot / cold surfaces been adequately guarded to prevent burns? Are all cold surfaces adequately insulated to prevent condensation drips (slip hazards)?	
6.5	Are all instruments, equipment and piping adequately labeled?	
6.6	Is there any rusted and/or damaged equipment?	
6.7	Are swing gates or chains installed at the top of ladders and / or access platforms?	
6.8	Are there any gaps between platforms and equipment that could create a foot hazard?	
6.9	Is equipment and platform access adequate?	
6.10	Do safety shower / eye wash stations create a hazard to personnel (slips), potential for contamination of product (entry to equipment) or ingress to electrical equipment?	
6.11	Are safety shower and eye wash facilities provided, adequately marked and readily accessible?	
6.12	Are all pipelines labeled?	
6.13	Are all electrical switches, disconnects, MCCs, control panels, cables, etc labeled?	
6.14	Is all the equipment clearly labeled? Where required, are the materials and hazards included on the labeling?	
6.15	Are wall penetrations adequately sealed?	
6.16	Are electrical conduits sealed in accordance with code requirements?	
6.17	Are fire extinguishers installed properly?	
6.18	Has the required signage been posted?	
6.19	Are emergency stops provided where there is a potential for entrapment or exposure?	
6.20	Has all scaffolding and construction equipment been removed? Is housekeeping acceptable?	
6.21	Is all required equipment guarding installed and does it meet regulatory standards?	
6.22	Does all the applicable equipment have the required CE marking displayed? Does all the applicable equipment have the required UL or equivalent listing / labeling?	
6.23	Have noise-monitoring evaluations been completed? Have signs been posted where noise levels excess 80dB? Are ear-plugs available near areas exceeding 80 dB?	
6.24	Have bump hazards, trip hazards and sharp edges been properly identified, adequately marked or removed?	
6.25	Have proper guarding, handrails and barriers been provided to prevent falls?	
6.26	Have all overhead fixtures (e.g., pipe-hangers, pipe sleeves, pipe sleeve covers, valve handles, floor opening covers, etc.) which could fall or be dislodged been properly secured?	
6.27	Are fire protection facilities adequate (e.g., fire extinguishers, fire walls, sprinkler systems, etc.)?	