TABLE OF CONTENTS

1. OBJECTIVE:

G.I. 2.710 is intended to define the respective duties and obligations required of the Saudi Aramco Project Management Team (SAPMT)/Construction Agency, Inspection Department, Loss Prevention Department, and the Proponent that are necessary to ensure a smooth and timely transition from the construction phase through the start-up and operation of a facility. The Mechanical Completion and Performance Acceptance Certificates document these duties and obligations.

* Reference to this Instruction and its attachments in a lump sum contract as a requirement for the contractor to follow and as a sole means of defining the contractor's pre- and post-MC responsibilities is not permitted. This Instruction and its attachments define responsibilities within Saudi Aramco organizations only and are not a suitable means of assigning responsibilities to the contractor. As applicable, a customized division of responsibility based on needs should be included or referenced in lump sum contract, either in the body of Schedule "B" or as an attachment to Schedule "B" titled Completing & Accepting the WORK.

2. SUMMARY:

This Instruction and its attachments are applicable to all Saudi Aramco capital and non-capital projects. Steps are detailed herein for: (1) accepting new facilities as mechanically complete, (2) commissioning and start-up, and (3) final performance acceptance and financial closeout.

The Construction Agency is responsible for delivering a completed facility as defined in the project scope of work.

After the facility is accepted as Mechanically Complete, the Commissioning, Start-Up and Performance Acceptance become the responsibility of the Proponent Organization with the Construction Agency providing necessary design and construction personnel, technicians and vendor representatives to assist in these activities.

For all facilities and especially where an existing facility is undergoing an upgrade or retrofit, both the Construction Agency and the Proponent are to assign personnel during the design phase to establish a Pre-Commissioning, Commissioning and Start-Up Plan.

3. DEFINITION OF TERMS:

3.1 ACCEPTANCE COMMITTEE:

A Committee chaired by a Proponent representative and comprised of Construction Agency, Inspection Department, Loss Prevention and other representatives as appropriate, depending upon the nature of the facility.

3.2 COMMISSIONING:

Placement of a facility in service, after the scope of work defined in the Project Proposal/Construction documentation, drawings, specifications, and pre-commissioning is complete and Mechanical Completion has been achieved. For a process facility, commissioning includes the testing of a plant's system with test medium in the line. After commissioning, the plant is ready for start-up, during which feedstock and other normal operating liquids and gases are introduced in the lines.

3.3 EXCEPTION ITEMS:

Mechanical Completion (MC) Exception Items are outstanding scope of work items considering construction quality, completeness, and adherence to the Saudi Aramco Engineering Standards (SAES's) which have been transferred from the system punchlist or originate from the Acceptance Committee's Mechanical Completion inspection. Exception items must be specific and not general statements such as 'verify' etc.

"Yes" items are items that are evident danger to Company property or personnel safety, and those that may impact the safe commissioning, start up, and operation of the facility. 'Yes' items are **required** to be completed before the Mechanical Completion Certificate is approved by the Proponent.

"No" items generally relate to scope of work items that, if not completed prior to Mechanical Completion, will not impact the safe commissioning, start up, and operation of the facility.

Mechanical Performance & Closeout System (MPCS) will be used to generate Exception Items list.

3.4 FACILITY:

The product of a Saudi Aramco project (capital or non-capital) consisting of: structures, equipment, materials, fabrication and erection. For example, in the case of a marine project, the vessel is the facility. In the case of a petrochemical plant project, the entire plant or a portion identified in the approved project scope is the Facility.

3.5 INSPECT (WORK):

To determine conformity to specified or other prescribed requirements by examination, measurement, testing, analysis or other methods of assessment.

3.6 MECHANICAL COMPLETION

Achieved when the facility defined in the approved scope, construction documentation, drawings, specifications and material requisitions has been installed and tested (Pre-commissioned) and is available for commissioning and start-up. (See also Supplement No. 2.710-6)

3.6.1 Partial Mechanical Completion:

Achieved when a separable portion of a plant/facility is available for commissioning as defined by its portion of the approved scope.

3.6.2 Final Mechanical Completion:

The Final Mechanical Completion is achieved when the total facility is available for commissioning and may be the last of a series of Partial Mechanical Completions.

3.6.3 Mechanical Completion Date:

The Mechanical Completion Date is the date that the Final Mechanical Completion Certificate is approved by the Proponent Representative.

3.7 ONSTREAM:

A facility is “ONSTREAM” when it has achieved MCC, the system has been energized or product has been introduced into the facility, and it has been successfully operated during the initial start-up period, although design capacity or specification targets have not yet been attained.

3.8 PERFORMANCE ACCEPTANCE:

The process of demonstrating via performance tests that the facility can operate successfully at the design conditions established by the approved Project Scope.

3.9 PERFORMANCE ACCEPTANCE DEFICIENCES:

Performance Acceptance Deficiencies consider equipment or plant operational performance deficiencies (failure to meet performance required by the design basis) **only** and shall not duplicate Mechanical Completion Exception Items.

3.10 PRE-COMMISSIONING:

Testing of system components for continuity, operability and in the case of process plants, their ability to withstand operating pressures prior to the introduction of feedstock or other final products into the facility.

3.11 PROJECT SCOPE OF WORK:

Defined as all and any work associated with accomplishing the requirements of the Approved Project Proposal, applicable SAES's, Expenditure Request, Master Appropriations Release(s) (MAR's) and/or approved Project Change Requests (PCR's).

3.12 SERVICE DATE OF A PROJECT:

The service date shown on the Mechanical Completion Certificate (Form SA-7213) shall be the date when the facility is ready for start-up, even though it may not be immediately placed in service. For example, the service date of a new pipeline or storage tank is the date it is ready for start-up, even if it is not immediately placed in service. The service date is used to determine the date on which plant depreciation commences. The service date of a purchase order will be the date the total equipment package is received. (Reference Accounting Instruction Manual No. 201)

3.13 START-UP:

Following commissioning, the introduction of feedstock, liquids, or gases into the facility to achieve normal operating conditions.

3.14 SYSTEM:

A group of components (piping, instrumentation, equipment, motors, vessels, etc) related to a single process or utility service such as sweet gas, sour gas, firewater, etc. Where components of the same service are located in different geographical locations, they can be treated either as separate systems or as subsystems.

A "system" can also be other components of a facility logically grouped together e.g.: buildings, roads, structures, foundations, electrical power distribution, etc.

3.15 MECHANICAL PERFORMANCE & CLOSEOUT SYSTEM (MPCS):

MPCS is a web based application that documents exception items and generates Mechanical Completion and Performance Acceptance Certificates for each budget item. All projects initiating walkthrough and generating punch lists must use the MPCS system
A punchlist is master list of outstanding work for all systems that has been identified by any party (e.g., contractor, construction agency, Inspection Department, Loss Prevention Department, Proponent, etc.) that is required by the approved scope to achieve Mechanical Completion. The system punchlist will record the originating party's **recommendation** as to whether the item should be classified as a "Yes" or "No" exception item by the Acceptance Committee Chairman.

3.16 WARRANTY DEFECT (Material & Equipment)

Manufacturing defect or premature failure of material (e.g. paint), equipment (e.g. pumps), or component (e.g. bearings), discovered or occurring during the warranty period stipulated in a contract or purchase order where the contractor and/or vendor is responsible for the cost of repair or replacement.

3.17 WITNESS (EVENT):

To be present at the event.

* 3.18 TEMPORARY CHANGE

A change implemented with the intent that the change is applied for a fixed duration e.g. until the next planned facility shutdown or until a date pre-determined by the manager in conjunction with the Change Coordinator. Temporary changes that remain in place for longer than six months should be subject to the full permanent change procedures.

4. COMPLETING AND TURNING OVER THE WORK

The completion and turnover activities of a project represent the culmination of project activities which have been directed toward providing the Proponent a facility that conforms to the project scope of work. The following shall establish the structure, activities to be accomplished, and assignment of responsibilities during the process of Mechanical Completion, commissioning, and start-up of the facility. Significant violations of this GI which affect the time of completion, prudent expenditure of funds, or safety shall be reported to the Administration Area heads.

* Note: Temporary installations implemented by the Construction Agency in support of achieving the project's scope and objectives shall be subject to the Proponent Organization's Management of Change process as required by Saudi Aramco's Safety Management System, Element 5, Asset Integrity.

4.1 ACCEPTANCE OF A FACILITY

4.1.1 Requirement for Mechanical Completion

A facility, or portion thereof, shall be certified as Mechanically Complete and safe to operate prior to commissioning, start-up, or placement in service. This applies for all Budget Items regardless of value. Further, in the case of hydrocarbon storage, handling, transportation, or processing plant type facilities, the hydrocarbon may not be brought into the Plant/Unit concerned until the Mechanical Completion Certificate has been approved by the relevant parties. For a facility to be certified mechanically complete, the following work is required where applicable using MPCS:

4.1.1.1 All spare parts packages have been submitted to the Material Supply Organization to allow cataloging of spare parts prior to MC in accordance with the requirements of SAEP-3101.

4.1.1.2 All construction and pre-commissioning activities for the project shall have been completed.

4.1.1.3 All agreed "Yes" items on the MCC Exception Item List shall have been completed and approved by the Acceptance Committee members or their representatives.

4.1.1.4 All non-conformance reports (issued by Saudi Aramco or Contractors) and worksheets shall have been resolved to the satisfaction of Inspection Department or entered on the MCC Exception Item List and classified as a "Yes" item that can be changed to a No item after the Acceptance Committee Chairman in accordance with Paragraph 4.2.8. (Reference SAIP-10, Non-Conformance Reports)

4.1.1.5 All Redlined as-built vendor manuals, Redlined vendor drawings for switchgear, and Redlined as-built key drawings shall have been transmitted to the Proponent.

4.1.1.6 All equipment fabrication documents, inspection record books and Equipment Inspection Schedules (EIS) shall be made available for review at the construction site. (Reference SAEP-20, Equipment Inspection Schedule)

4.1.1.7 All Operation and Maintenance (O&M) manuals will have been submitted to the Proponent for review four (4) weeks prior to MC.

Note: Process O&M manuals for facilities must be approved by the Proponent before MC.

4.1.2 Parties to Mechanical Completion Process

4.1.2.1 **Construction Agency** – Normally SAPMT.

4.1.2.2 **Proponent** – The Saudi Aramco organization which will "own" the facility assets.

4.1.2.3 **Acceptance Committee** – A committee appointed by the Proponent to inspect the facility and certify Mechanical Completion. The Acceptance Committee shall be comprised of the following personnel or their designated representatives who will have full authority to act on their behalf:

- Acceptance Committee Chairman (Proponent Division Head or higher)
- Construction Agency Project Manager
- Proponent Maintenance Superintendent
- Proponent Commissioning Representative
- Senior Supervisor, Projects Inspection
- Area Loss Prevention Engineer
- Fire Prevention Engineer
- Area Fire Protection Department Representative
- Area Power Distribution Department Representative*
- Area Communication Operations Representative*
- Area Security Technical Services Representative*
- Marine Department Representative*
- Any additional members designated by the Proponent to facilitate proper evaluation and acceptance of the facility(s)*

* As Applicable

4.2 STEPS TO ACHIEVE MECHANICAL COMPLETION – (Organization with primary responsibility in **bold**)

4.2.1 The designated **Construction Agency** shall use MPCS to establish and maintain a punchlist submitted by all parties (e.g.: contractor, construction agency, project inspection, Proponent, loss prevention, etc.) throughout the construction phase. If the construction agency disputes the validity of any punchlist item, it shall notify the originator who shall then provide the construction agency with justification for the item by reference to the project proposal or applicable project document (e.g.: Saudi Aramco Engineering Standard, Industry Code, etc.). If the originator is unable to justify the item, he shall remove the item from the list sent to the Acceptance Committee Chairman.

4.2.2 For plant type facilities, the **Construction Agency** will normally define the facility by process system/subsystem (additionally by geographical area where appropriate) and assign non-

process components such as buildings, structures, power, etc., a system identification to ensure that all parts of the facility are covered and allow punchlisting to be performed in an organized, systematic manner. This definition is required as early as possible and no later than the Acceptance Committee meeting to be held at the 60% stage of actual construction.

4.2.3 The **Proponent** shall establish the Acceptance Committee and appoint its Chairman as soon as practical after the start of the facility's construction but no later than the 60% stage of actual construction completion. At the first formal meeting of the Acceptance Committee (normally to be held at the 60% stage of actual construction completion and **required for all projects),** the Proponent and the Construction Agency may jointly concur that further formal Acceptance Committee meetings are not required. In such case, the Acceptance Committee members from the Construction Agency, Inspection Department, Loss Prevention, and the Proponent will designate their representatives.

4.2.4 The **Construction Agency** shall advise the Proponent that the construction stage has reached 60% and request a formal kick-off meeting of the Acceptance Committee to agree on the procedures to be implemented and inform the committee of the schedule and scope of any proposed Partial Mechanical Completions.

4.2.5 The **Construction Agency** will request the Acceptance Committee to commence system punchlisting when all major components of a system have been installed and precommissioned and the Construction Agency has verified that the system is ready for punchlisting. Normally, all Acceptance Committee representatives shall submit their system punchlist items to the Construction Agency within one week of this request. The commencement of this system punchlisting shall not be unduly delayed.

4.2.6 Four (4) weeks prior to the scheduled MC date, the **Construction Agency** shall notify the Acceptance Committee that the facility, or portions thereof, is complete with the exception of the Punchlist items in the MPCS and ready for MC inspection. Prior to, or at the next Acceptance Committee Meeting, each member of the Acceptance Committee will be provided with a list of all outstanding system punchlist items with the originator's Yes/No recommendation for each item.

4.2.7 Within three (3) working days of receiving the above notification, the **Acceptance Committee Chairman** will schedule and complete the Mechanical Completion Inspection (which is normally a thorough review of the outstanding system punchlist items and an inspection of site conditions).

During the Mechanical Completion inspection, the **Acceptance Committee** shall ensure that all construction and pre-commissioning has been completed in accordance with the approved Project Scope, or that any outstanding work is included on the Exception Items List. The **Construction Agency** will make all project documentation available for the Acceptance Committee.

4.2.8 No later than two (2) days after the Mechanical Completion Inspection, the **Acceptance Committee Chairman** shall convene a meeting of the Acceptance Committee at which time the members will submit any additional exception items relating to incomplete work or other proposed Exception Items arising from the Mechanical Completion inspection. During this meeting, the **Acceptance Committee Chairman** will review the members' recommendations of "Yes" and "No" items, designate the "Yes" items in accordance with the above definition under paragraph 3.3, and appoint the responsible party in the case of duplicated items. This meeting shall be minuted by the **Construction Agency,** who will be responsible for preparing the consolidated Exception Item List for action. Any disputes regarding critical safety items must be resolved prior to approval of the Mechanical Completion Certificate.

Once the MCC Exception Item List is established, deleting an item from the Exception Item List or changing a "Yes" item to "No" requires the approval of the Acceptance Committee Chairman.

4.2.9 The **Acceptance Committee** and/or their nominees shall, on an on-going basis, review the MCC Exception Item List to ensure that all "Yes" items that would limit the safe operation of the facility have been completed and approved.

4.2.10 The **Construction Agency** will notify the Acceptance Committee Chairman, when all of the assigned "Yes" items have been completed and approved by the originators. Within three (3) working days of receiving this notification, the **Acceptance Committee Chairman** shall arrange for an Acceptance Committee meeting. The MCC will be generated and electronically routed for approvals using MPCS. Hydrocarbon shall not be brought into the Plant/Unit concerned until the Mechanical Completion Certificate has been completely approved.

Note: Any items still outstanding shall be reviewed and the schedule and organization responsible for completion of each Exception Item shall be provided to the Proponent by the **Construction Agency.**

4.2.11 The **Acceptance Committee** chairman shall approve the MCC without delay after the necessary requirements specified in this procedure are met. (The **Acceptance Committee Chairman** shall resolve any disputes which may prevent expeditious approval of the MCC).

NOTE: The **Construction Agency** can route the MCC to an organization for approvals after all of the "Yes" items submitted by that organization are completed. The MCC shall not be routed to the Inspection Department unless all required approvals other than Proponent organizations have been obtained. The **Proponent** shall approve the MCC within one (1) day or notify the Construction Agency immediately of his reason for not doing so.

4.2.12 The MCC approval signifies acceptance of custody for the facility by the **Proponent**. After this turnover, routine facility maintenance is the **Proponent'**s responsibility. The remaining work to clear "No" Exception Items by the Construction Agency can only be accomplished upon issuance of Work Permits by the Proponent.

4.2.13 After approval of the Final MCC, the **Proponent** is responsible for approving completed Exception Items or making arrangement for the originator to be available for approval.

4.2.14 Specific consideration should be given to establishing a system of partial MCCs where equipment and facilities need to be pre-commissioned and commissioned to allow subsequent activities to be completed (e.g. fire and safety systems).

4.2.15 An Energization Authorization Certificate shall not be used in lieu of a Partial Mechanical Completion Certificate.

4.2.16 Once the MCC, partial or otherwise, is approved, no additional Mechanical Completion Exception Items should be added to the Exception Item List. In the exceptional circumstance where an item would create a hazardous condition to personnel or equipment is identified after the MCC is approved, the item can be added with the concurrence of the **Proponent** and **Construction Agency** Managers.

4.2.17 After Mechanical Completion, the **Construction Agency** is responsible for providing an agreed number of contractor and vendor commissioning and start-up assistance personnel. These personnel shall be released as soon as possible after the start-up of the facility. If the Proponent requires to retain the services of the personnel beyond the 60-day Performance Acceptance period to assist with Plant operations, maintenance, or provide training, the **Construction**

Agency will transfer the administrative and cost functions associated with these personnel to the Proponent to allow the project to be closed out.

The **Construction Agency** is responsible for arranging for any Vendor provided training requested by the Proponent but the cost of such training shall be charged in accordance with GI 202.309, Allocation of Costs – New Facilities Start-Up.

The cost of materials and consumables for commissioning and start-up will be charged in accordance with GI 202.309.

4.3 STEPS FOR PERFORMANCE ACCEPTANCE

4.3.1 Upon approval of the Mechanical Completion Certificate, commissioning and start-up shall begin. The **Proponent** Organization is responsible for these activities with the **Construction Agency** providing assistance as listed in Supplement No. 2.710-5. Where applicable, the **Construction Agency** (in conjunction with the **Proponent**) is responsible for developing commissioning plans and the **Proponent** is responsible for the development and execution of facility start-up and performance test plans and procedures. The acceptance of the Mechanical Completion Certificate constitutes the beginning of the commissioning, start-up and initial operating period during which the facility performance should, where possible, be demonstrated to be in accordance with the approved Project Scope.

4.3.2 During the performance acceptance period the **Proponent** shall:

4.3.2.1 Review facility performance, relative to operating conditions, in accordance with the approved Project Scope after conducting the necessary performance tests in the presence of qualified contractor personnel, vendor representatives (if required), and the Construction Agency.

4.3.2.2 Prepare a list of performance-related items requiring corrective actions if the facility is not up to performance specifications and assign responsibility for completion in MPCS. Exception Items relating to Mechanical Completion (non-performance related items) shall not be included in the Performance Acceptance deficiency item list. The agreed Performance Acceptance Certificate (PAC - Saudi Aramco Form 7214) deficiency items will form the basis of the PAC deficiency item list, which will be attached to the PAC at the time of approval. These items may fall under the jurisdiction of the Construction Agency or Proponent's Operation and Maintenance Departments. The cost of completion for those items deemed to be the responsibility of the **Construction Agency** (within the approved facility scope) shall be charged to the ER/Job Order.

4.3.3 If performance tests cannot be completed due to lack of capacity (either of input to the plant or of supply to the users) within a time period not to exceed sixty (60) days from the date of the MCC or other time period agreed to by the **Proponent** and **Construction Agency**, these tests will either be omitted or performed at a later date and the Performance Acceptance Certificate approved by the **Proponent** Representative without such tests.

4.4 PERFORMANCE ACCEPTANCE CERTIFICATE

4.4.1 A Performance Acceptance Certificate (PAC) shall be prepared by the **Construction Agency** for each facility after the final Mechanical Completion Certificate for the facility has been approved for subsequent approval by the Proponent upon completion of performance testing. The PAC will be generated and electronically routed for approval using MPCS no later than forty five (45) days after MCC

4.4.2 The date of the Proponent representative's approval on the PAC shall for process and process related facilities constitute the completion of the initial operating period. **Proponent** Representative will approve the Performance Acceptance Certificate no later than sixty (60) days after the final MCC was approved by the Proponent Representative. If the **Proponent** Representative does not accept that the requirements for approving the Performance Acceptance Certificate (with or without a list of performance deficiencies attached) have been satisfied within sixty (60) days after the final MCC was approved, this shall be reported by the **Proponent** to their Vice President and the Construction Agency Vice President by letter with a copy to PFAAD (Projects and Fixed Asset Accounting Division) explaining the reason(s) and the actions being taken to achieve Performance Acceptance. If the sixty (60) days have elapsed and no letter with a list of performance deficiencies has been issued by the proponent, the facility shall be automatically deemed accepted by means of a Performance Acceptance Certificate with the Construction Acceptance representative signature. The construction agency shall send a letter with PAC attached to PFAAD with a copy to the PM Vice President and the Proponent Vice President, indicating that the Construction Agency's Performance Acceptance obligations have been met.

For all intents and purposes, the Proponent Representative's approval of the Performance Acceptance Certificate for the overall facility, signifies completion of the Construction Agency's Performance Acceptance obligations unless the certificate lists performance deficiencies requiring rectification.

Should performance or equipment warranty issues arise after approval of the Performance Acceptance Certificate, the **Proponent** shall notify the Construction Agency's management of the details so that the **Construction Agency's** contract representative can officially notify the Contractor in accordance with the contract's terms and conditions.

4.4.3 The capability to meet "Performance Specifications" is established after the facility has been commissioned. The failure of the facility or its associated equipment to meet its operational design criteria is a Performance Warranty Issue. The issuing of a Performance Acceptance Certificate shall not be delayed for deficiency items that have little or no bearing on the operable condition of the facility or for delays in completing Mechanical Completion exception items.

4.4.4 Although all references in this GI refer to one final Performance Acceptance Certificate, the **Construction Agency** and **Proponent** may agree to use Performance Acceptance Certificates to document partial completion. In this situation the Performance Acceptance Certificate must clearly indicate in the space provided that the facility is partially accepted and under the description, note that the accepted work is part of an overall facility.

4.4.5 The **Proponent** will maintain a list of Performance Deficiency Items identified during the commissioning and initial operating period in MPCS. Any performance deficiencies not addressed and closed out during this period will be listed as a Performance Acceptance deficiency item and attached to the PAC at the time of approval.

4.4.6 Where the Proponent cannot obtain resolution of the equipment or facilities performance deficiencies through the Contract Warranty terms, the **Construction Agency** must assist in resolving the performance warranty issues.

4.4.7 The **Proponent** may formally notify the Construction Agency and the Finance Organization that a Performance Acceptance Certificate is not required by the time the Mechanical completion has been achieved.

4.4.8 The requirement for a Performance Acceptance Certificate on all Maintain Potential On-Shore Flowline Master Appropriation BI's has been waived by the respective Proponents and acknowledged by Accounting Policy Methods and System Department. (Ref: Accounting Letter

No. APMS-220/94 (MO32) dated February 8, 1994). Also, Performance Acceptance Certificates are not required for third party secondary fuel gas projects per SAEP 50, Third Party Royalty/Custody Metering Facilities Execution Guide.

4.4.9 Any MCC Exception Items not completed ninety (90) days after the Performance Acceptance Certificate has been approved, shall be reported by the **Construction Agency** to their Vice President and the Proponent Organization's Vice President by letter explaining the reason for non-completion of each item and the target completion date.

5. FINANCIAL CLOSE-OUT OF A PROJECT (See Supplement No. 2.710-5):

5.1 PFAAD shall begin preparations for close-out of all job orders and phase numbers associated with the facility upon acceptance of the Mechanical Completion Certificate in accordance with Accounting Instruction Manual (AIM) 201 "Financial Close-Out of Capital/Non-Capital Projects." The service date shown on the Mechanical Completion or Partial Mechanical Completion Certificates is used to determine the capitalization/depreciation start date of the facility as specified in the above AIM. Where a system of "Partial MC's" is utilized, to identify separable systems that are available for commissioning then the date on the last "System MCC" will be the "Service Date". The service date for the completed project will remain as the date shown on the Final MCC.

5.2 Where MCC Exception Items cannot be completed by the Contractor and/or are out of the Contractor's Scope of Work, and with the agreement of the **Proponent,** the project scope MC Exception Items defined as "No" items can be assigned to the **Proponent** Maintenance and Engineering organization to complete after MC.

5.3 After the MCC is approved, any changes or modifications outside the original project scope that are not required to allow the plant or facility to reach and sustain the operating levels defined in the project proposal shall be charged to the **Proponent's** Operating Account, a BI-1900 project, or another project Expenditure Request. The execution of such modifications shall, whenever feasible, be carried out by the **Proponent**'s Maintenance Department. Where this is impractical, because of size or technical complexity of the change(s), a new Construction Agency may be designated to execute the work after funding is approved or the Proponent has agreed to charge the costs to its operating account.

5.4 <u>POST MC COST ALLOCATIONS:</u>

5.4.1 Costs associated with the period following MCC approval are treated according to the procedures established in GI 202.309 as follows:

- o Contractor or Vendor Commissioning Assistance for the commissioning and start-up period, following MC and lasting until the plant is ready for initial operation or for a period of up to sixty (60) days after MC; costs are borne by the Project.
- o Initial operation period, from conclusion of commissioning and start-up until the plant meets performance specifications; all costs are borne by **Proponent** Operating Expense, except those identified above.
- o Training costs are borne by the **Proponent.**
- o Repairs, modifications or additions before project close-out that are required to attain performance specifications as defined in the Project Proposal or approved PCR's must be borne by the Project (GI 202.309)

5.4.2 Additional construction activities identified after project close-out require funding from either BI-19 (cost not to exceed $ 4.0 MM) or a major project Expenditure Request (greater than $ 4.0 MM) (AIM 201).

*

5.4.3 Before Mechanical Completion, the **Construction Agency** will provide PFAAD with a listing of capital assets, i.e. those costing over $20,000, in accordance with GI 202.305, Accounting Plant Numbering.

6. REFERENCE:

The following references should be reviewed carefully by all parties to this GI:

Accounting Instruction Manual No. 201, “Financial Close-Out of Capital/Non-Capital Projects”
GI 2.102, "Pressure Testing Safely"
GI 1781.001 "Inspection, Testing and Maintenance of Fire Protection Equipment"
GI 1782.001 " Testing, Inspection and Maintenance of Fixed Fire Protection Systems"
GI 202.305, “Accounting Plant Numbering & Preparation of New Asset Record Transaction Entry Form SA-9032-1”
GI 202.309, “Allocation of Costs – New Facilities Start-Up”
SAEP-20, “Equipment Inspection Schedules (EIS)”
SAEP-50, “Third Party Royalty/Custody Metering Facilities Execution Guide”
SAEP-327, “Disposal of Wastewater from Cleaning, Flushing, and Hydrostatic Tests”
SAEP-3101, “Spare Parts Data Requirements for Contractor Procured Equipment”
SAES-A-004, “General Requirements for Pressure Testing”
SAES-A-007, “Hydrostatic Testing Fluids and Lay-Up Procedures”
SAES-B-017, “Fire Water System Design“
SAES-B-054, “Access, Egress, And Materials Handling For Plant Facilities”
SAES-G-116, “Cleanliness Standard for Lube/Seal Oil and Fluid Power Systems”
SAES-J-801, “Control Buildings”
SAES-J-600, “Pressure Relief Devices”
SAES-K-002, “Air Conditioning Systems For Essential Operating Facilities”
SAES-L-050, “Construction Requirements For Metallic Plant Piping”
SAES-L-056, “Pressure Testing of Plant Piping and Pipelines”
SAIP-10, “Non-Conformance Reports”

Other related reference materials:

Saudi Aramco Construction Safety Manual
GI 20.520, “Project Change Request (Saudi Aramco Form 3000-C)”
GI 400.001, “Quality System Roles and Responsibilities”
SAEP-12, “Project Execution Planning”
SAEP-329, “Project Close-Out Report”
“Planning for Startup”, CII Implementation Resource 121-2
“Planning Construction Activity to Support the Startup Process”, CII Publication 6-9

APPROVED BY: (for minor change)

Motaz A. Al-Mashouk, Manager
Project Support & Controls Department

Concurred by

Sr. Vice President
Gas Operations

Sr. Vice President
Exploration and Producing

Sr. Vice President
Refining, Supply and Distribution

Sr. Vice President
Finance

Sr. Vice President
Industrial Relations

Approval

Vice President
Project Management

Sr. Vice President
Engineering and Operations Services

MECHANICAL COMPLETION CERTIFICATE Saudi Aramco 7213 (3/09)	DATE:
E.R. NO. J.O. NO. ☐ PARTIAL COMPLETION ☐ FINAL COMPLETION	
DESCRIPTION:	
I hereby certify that this facility, or portion thereof, has been completed in accordance with the approved Expenditure Request, project drawings, and specifications except as noted below:	
CONSTRUCTION AGENCY PROJECT MANAGER:	DATE:
PROPONENT MAINTENANCE SUPERINTENDENT:	DATE:
I hereby certify that this facility has been inspected and that it complies with all applicable safety and fire protection requirements except as noted below:	
LOSS PREVENTION REPRESENTATIVE:	DATE:
FIRE PREVENTION REPRESENTATIVE:	DATE:
FIRE PROTECTION REPRESENTATIVE:	DATE:
I hereby certify that this facility or portion thereof, has been inspected and that all materials meet applicable Saudi Aramco Standards, and that it is constructed in agreement with pertinent design and engineering specifications.	
SR. SUPERVISOR, PROJECTS INSPECTION	DATE:
I hereby certify that the facility or portion thereof has been checked, pre-commissioned and that all electrical work meets the pertinent standards. It can be energized without hazard to the power system.	
AREA POWER DISTRIBUTION DEPT. REPRESENTATIVE:	DATE:
I hereby certify that tests have been conducted and witnessed demonstrating that this project is mechanically complete and ready for commissioning and start-up, that I have received adequate operating instructions including safety requirements have been received, and that this project conforms to the approved Expenditure Request, project drawings, and specifications except as noted below:	
PROPONENT COMMISSIONING REPRESENTATIVE:	DATE:
PROPONENT REPRESENTATIVE:	SERVICE DATE:
EXCEPTIONS:	

Original to : Fixed Assets and Work-In Progress (FAWIP) Accounting Dept.
1st Copy : Proponent Representative
2nd Copy : Proponent Commissioning Representative
3rd Copy : Proponent Maintenance Superintendent
4th Copy : Construction Agency Project Manager
5th Copy : Senior Supervisor, Project Inspection
6th Copy : Area Loss Prevention Division Head
7th Copy : Area Power Distribution Department Representative
8th Copy : Area Fire Protection Department
9th Copy : Administrator, Material Standardization (MSO)

PERFORMANCE ACCEPTANCE CERTIFICATE Saudi Aramco 7214 (3/02)	DATE:

E.R. NO. J.O. NO. ☐ PARTIAL COMPLETION ☐ FINAL COMPLETION

DESCRIPTION

I hereby certify that the equipment installed on this project has been demonstrated to perform within Saudi Aramco Standards and project drawings and specifications.

CONSTRUCTION AGENCY PROJECT MANAGER	DATE:
PROPONENT MAINTENANCE SUPERINTENDENT	DATE:
PROPONENT OPERATIONS ENGINEERING SUPERVISOR	DATE:

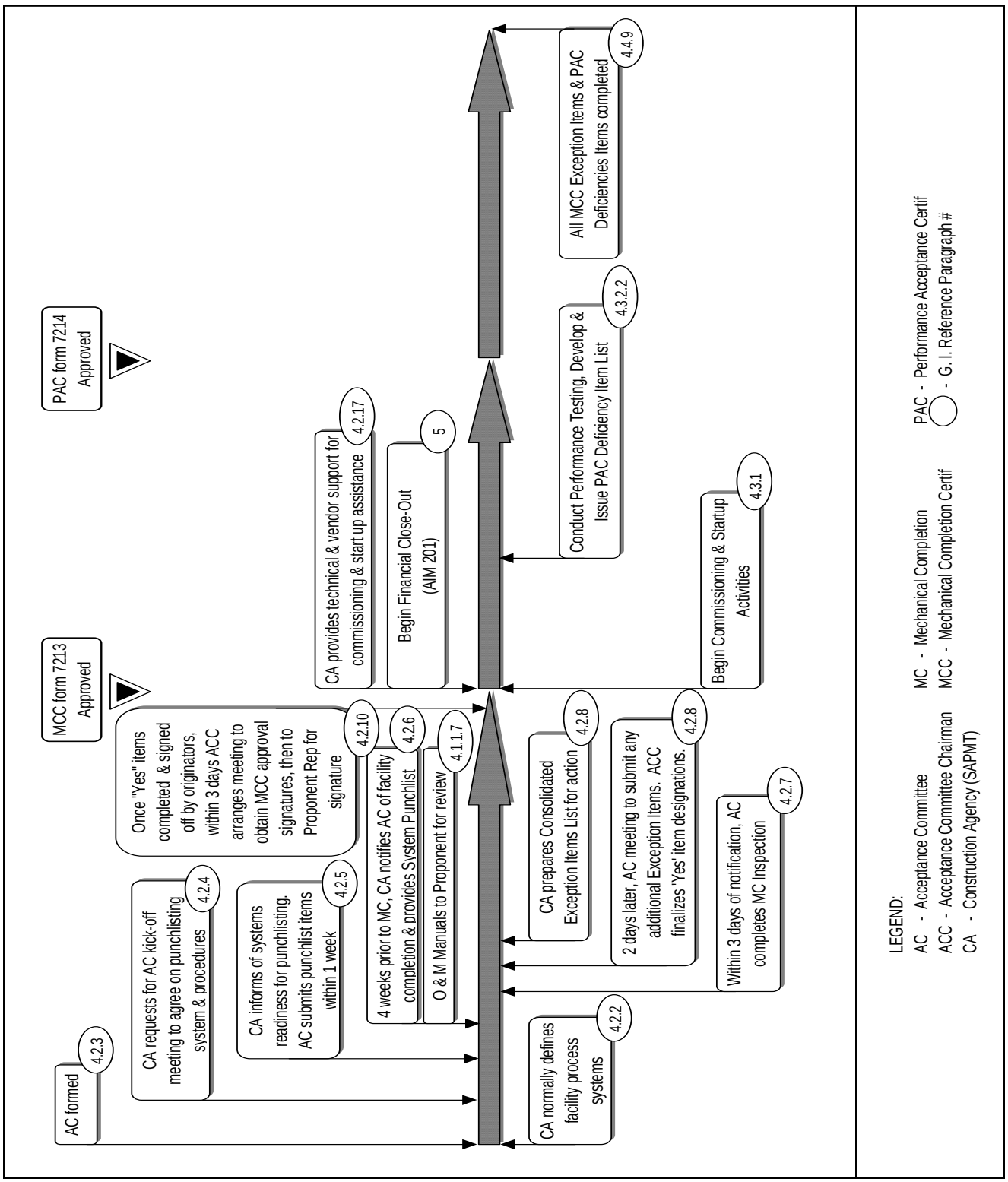
I hereby certify that I have witnessed or conducted operating tests demonstrating the operability of the facility, that I have received adequate operating instructions including safety requirements, and that this project conforms to the approved Expenditure Request and project drawings and specifications except as noted below.

PROPONENT COMMISSIONING REPRESENTATIVE	DATE:
PROPONENT REPRESENTATIVE	DATE:

EXCEPTIONS:

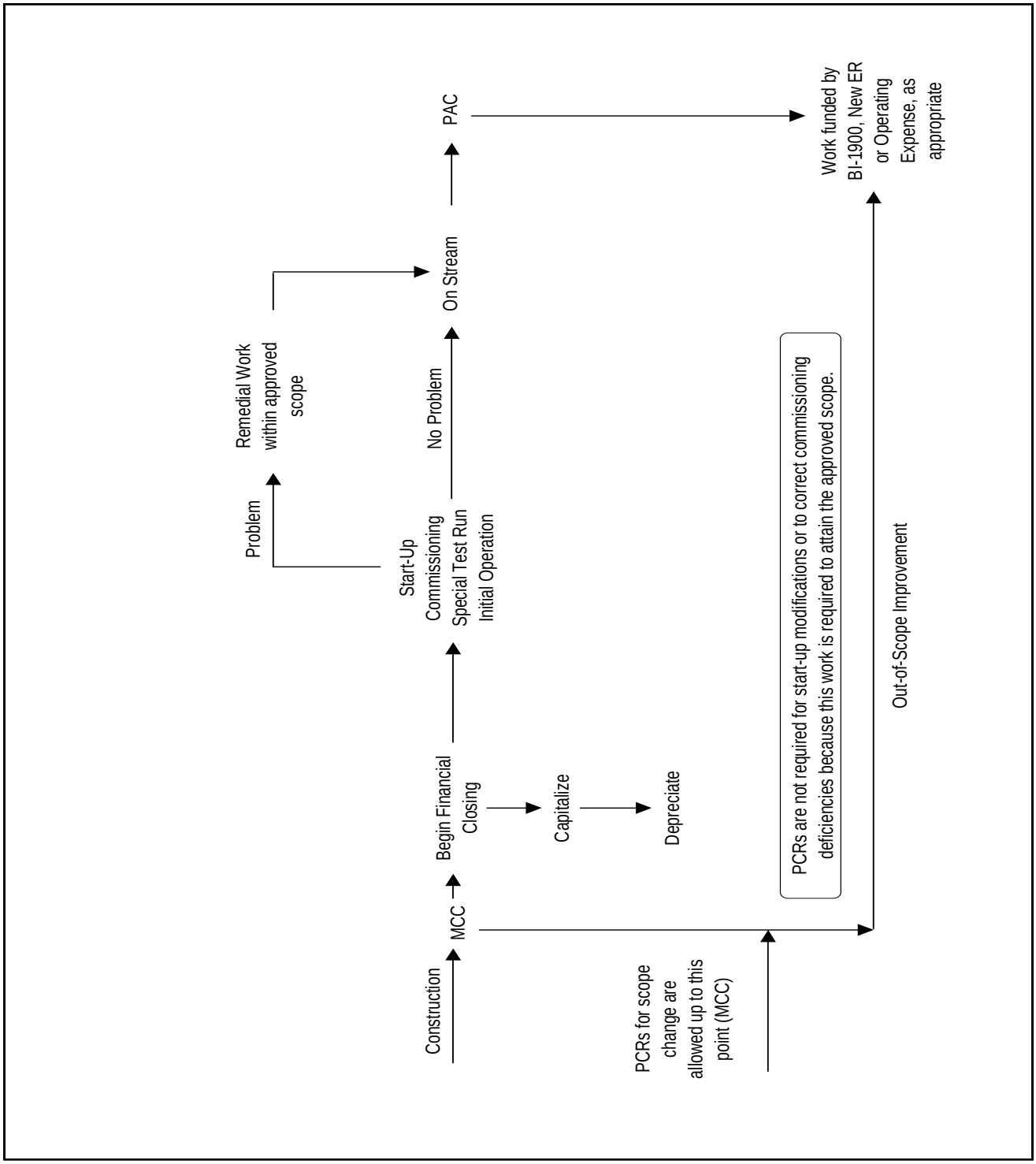
Original to : Fixed Assets and Work-In Progress (FAWIP) Accounting Dept.
1st Copy : Proponent Representative
2nd Copy : Proponent Commissioning Representative
3rd Copy : Proponent Maintenance Superintendent
4th Copy : Construction Agency Project Manager
5th Copy : Area Loss Prevention Division Head
6th Copy : Area Power Distribution Department Representative
7th Copy : Fixed Assets and Work-In Progress (FAWIP) Accounting Dept. – Immediately after signature by Construction Agency.

MECHANICAL COMPLETION AND PERFORMANCE ACCEPTANCE WORK FLOWCHART



* CHANGE ** ADDITION NEW INSTRUCTION ☐ COMPLETE REVISION■

FINANCIAL CLOSE OUT FLOWCHART



GENERAL INSTRUCTION MANUAL

DIVISION OF RESPONSIBILITIES FOR TURNOVER SUPPLEMENT NO. 2.710-5

The main purpose of this Supplement is to delineate those activities which are required to be complete prior to Mechanical Completion and those activities which are performed post-MCC, and to designate the responsible party for each activity.

INDEX:

LEGEND:

X	-	Perform Work
R	-	Review and Approve
W	-	Witness (Event)
I	-	Inspect (Work)
O	-	Operate Process Equipment - By Operator
E&I	-	Maintenance's Start-Up Electrical & Instrument Specialis
M	-	Maintenance's Start-Up Machinist
P	-	Maintenance's Start-Up Fitter
PDD	-	Power Distribution Department
FP	-	Fire Prevention
LP	-	Loss Prevention
P&CSD	-	Process & Control Systems Department
IT	-	Information Technology

NOTE 1: Construction Agency is responsible for performing all work prior to Mechanical Completion, unless assigned otherwise as indicated with an X.

NOTE 2: Per paragraph 4.2.17 of G.I. 2.710, Construction Agency will provide an agreed number of Contractor Commissioning Assistance Personnel to work under the direction of the Proponent Commissioning Supervisor or his Nominee. Alternatively, and as directed by Proponent, Operations/Commissioning will utilize E&I, P or PDD personnel for Commissioning Assistance.

NOTE 3: PDD will inspect and sign-off for all Power Distribution Systems above 480V; 480V and below will be inspected by Project Inspection and witnessed by Operations/Commissioning.

NOTE 4: Minimum of 10% of Megger Testing to be witnessed, balance to be monitored.

NOTE 5: Cleaning/flushing per SAES-A-004 to be witnessed by Inspection and reviewed by Commissioning. All other specialty cleaning (lube oil systems, etc.) to be witnessed by Commissioning. (see SAES-L-050).

NOTE 6: Construction Agency is responsible for providing completed As-Built Drawings in accordance with
* SAES-A-202 and SAEP-334 prior to the Performance Acceptance Certificate (PAC).

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC)		COMMISS. & STARTUP (Post-MCC)	
		Inspection	Project Proponent	Commiss. w/ Constr Agency (Note 2)	Proponent
1.	GENERAL				
	a. Provide proper identification of all equipment. Identification numbers shall be legible from 50 feet away for process equipment.	I	R		
	b. Remove all rust preventatives, oil, grease, etc. used to preserve equipment during construction, and install proper lubricants after review with Operations.		I-R		
	c. At time of turnover, all fire proofing and rough insulation shall be complete. All equipment, piping, instruments, instruments leads, etc. requiring insulation for heat conservation or proper operation shall be covered so that startup operations will not be delayed due to excessive heat loss. Insulation required for personnel protection shall also be completed.	I	R		
	d. At time of turnover, painting shall be complete enough so that an excessive amount of scaffolding is not left still standing in the areas where the operators must work to start up the plant.	I	R		
	e. At the time of turnover, operating areas including platforms shall be free of debris, tools and extraneous materials which would impede operation or cause an unsafe condition. All accessways shall be open for emergency vehicles.		I		
	f. Make check of lighting intensities.		X		
	g. Make check of noise levels (after startup).			X	
	h. Complete all necessary paving, fencing, and items of like nature.	I	R		
	i. All testing of lifting equipment shall be witnessed by the Inspection Department's Crane Inspection Representative which can then be provided with a current inspection sticker or the completion of the successful tests.	W	R		
	j. Perform Leak test of all piping and equipment handling process fluids in accordance with SAES-L-056 and repair all leaks. Check all nuts and bolts to see that threads are fully engaged. All torque procedures for bolting and bolt pre-loads should be verified on (ANSI 600# and above) piping and equipment where applicable.	W	R		
	k. Verify all spare parts data packages have been submitted and accepted by Material Supply Organization (MSO).		X		
	l. All temporary fencing or barricades must be removed to allow		I		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC)		COMMISS. & STARTUP (Post-MCC)	
		Inspection	Project Proponent	Commiss. w/ Constr Agency (Note 2)	Proponent
	free access to the operating units.				
	m. All start up spare parts required by contract are available on site.		X		
2.	CIVIL/STRUCTURAL				
	a. Inspect sewer lines and check all cleanouts manholes, and service connections for proper installation and functioning. Check manholes for leak tightness by filling and then observing the water level for ten hours.	I	W		
	b. Test buildings for leak tightness and maintenance of required internal positive pressure. (Refer to SAES-J-801 and SAES-K-002)	I	W		
	c. Access platforms, ladders, stairs, walkways and handrails.	I	W		
	d. Perform a "Flood Test" for verification of process area OWS catch basins and a "Flow Test" of the floor drain for battery rooms to the acid neutralization pits.	I	W		
	e. Check access around equipment at grade and at elevated areas to ensure it is proper for normal operation and maintenance as well as for emergency escape. Refer to SAES-B-054 for more details.	I	W		
	f. Verify that all valves and instruments are provided with proper access for normal operation and maintenance purposes as per SAES-B-054.	I	W		
3.	ELECTRICAL				
	a. Perform dielectric strength tests on power transformer and disconnect switch insulating oil and install when satisfactory.	I	PDD-W		
	b. Check condition of grease in grease lubricated motor and generator bearings.		I		
	c. Perform all necessary prestart-up non-operating tests and Hi Pot checks on all power cables, generators, Switchgear, MCCs, transformers and grounding resistors following manufacturers' instructions and guidelines given in the applicable Saudi Aramco Pre-Commissioning Forms Manual available from Consulting Services Department.	I	PDD/ (Note 3)		
	d. Measure and record the insulation resistance (Megger Testing) of all power (480V or less), instrument wiring (including thermocouple leads) and lighting circuits from	I (Note 4)	R		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	COMMISS. & STARTUP (Post-MCC) Proponent
	conductor to conductor and from each conductor to ground.				
	e. Perform applicable checks, adjustments and field tests using, if necessary in order to maintain schedule, temporary construction power.	I	R PDD/W (Note 2)		
	f. Calibrate and set substation relays on all circuit breakers. Set time delays. Set and test fault pressure relays and transformer taps.	I	PDD/W		
	g. Energize substations and load centers by connection to electrical distribution systems (Energized by authorized electrical systems operator after obtaining approved "Energization Authorization Certificate").		PDD/W		
	h Check operability of emergency and instrument power systems as well as emergency lighting system.	I	W		
	i. Issue work permits to Contractor for carrying out checks on electrical equipment, after facilities are energized per item (g) if partial MCC approved.		R		X
	j. Paint or tag all electrical apparatus (Push button boxes, connection boxes, etc) according to Saudi Aramco's color code or regulations.	I	R		
	k. Construction Agency will use existing established work permit procedure for remaining construction period, once electrical equipment is energized. (If the existing Tag and Lock-Out Procedure needs to be revised, it shall be approved by Loss Prevention and implemented as part of this effort).				X
	l. Perform a final functional checkout for all equipment and systems.		I PDD-W		
4.	PIPING				
	a. Flush, clean and hydro/pressure test, per SAEP-327, SAES-A-004 and SAES-G-116, all piping and piping systems as required by drawings, standards and specifications prior to MCC. All orifice plates, strainers, control valves, thermowells, and other items, which may be damaged during flushing and testing, are to be removed from the system. With systems in LPG service, and on completion of hydrotesting, system shall be fully drained and dried.	W	R (Note 5)		
	b. Provide and install all strainers, both temporary and permanent, spec. blinds, and temporary blinds, called for on drawings and specifications.			W	I
	c. Check that all temporary blanks, plugs, caps, spectacle blinds and temporary spools installed for the hydro/pressure	I	W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	COMMISS. & STARTUP (Post-MCC) Proponent
	test have been removed and that all spectacle plates, blinds, etc. that are to remain in the system are in their correct locations as per the P&ID.				
	d. Provide and install other temporary blinds required for startup, as specified by Proponent Operations.			X	I
	e Check packing and packing materials and lubrication of valves, repack and lubricate as necessary.	I	R		
	f. Supply supervised labor (Note 1) and necessary tools for post hydro/pressure test, air blowing and/or water flushing operations that may be required by Commissioning/Operations. This will include opening flanges, dropping out control valves, soft-seat valves, and spool pieces, installation of temporary blinds and piping connections, removing all debris, blowing cut lines, cleaning temporary strainers, replacing valves, reassembling piping, repairing insulation and painting, etc., as required for additional flushing of piping and equipment run-in subsequent to MCC. Steam lines serving turbines shall be cleaned by steam prior to placing into service.			X	O-I
	g. Schedule and direct additional Post MCC air blowing/steam blowing and/or water flushing operations. Perform Leak test at operational pressure of all piping and equipment handling process fluids and repair all leaks.			X	O-W
	h. Provide all replacement gaskets, spool pieces, temporary connections, hoses, rigging and hoisting equipment, and blinds required for additional post MCC Hydro/Pressure testing or flushing operation.				X
	i. Supply and install line identification tags and signs. Stencil lines for identification.	I	R		
	j. Provide list and location of all blinds installed for start-up and not detailed on P&ID's.		X		R
	k. Perform hot bolting of piping and equipment during initial plant start up.			X	I
	l. Commission spring hangers and supports after hydro test, check spring hangers and pipe anchors and guides in hot position, provide cold and hot setting data.	I	W		
	m. Check pipe anchors and guides.	I	R		
	n. Install corrosion probes.	I	W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	COMMISS. & STARTUP (Post-MCC) Proponent
	o. Remove temporary strainers (Normally after start-up).			X	W
	p. Confirm that bleeds and vents used during commissioning are properly plugged.			X	W
5.	MECHANICAL EQUIPMENT				
	5.1 AIR FIN COOLERS				
	a. Perform all hydro/pressure tests as required per SAES-A-004.	W	I		
	b. Check levels and dimensions of substructure, machinery mount, fan ring, Furnish record of measurements.	I	R		
	c. Perform decoupled motor running test, (Min. 4 hours), check vibration and perform necessary corrective work.	I	W		
	d. Set and align fan assembly, fan shaft, sheave and driver.	I	W		
	e. Demonstrate satisfactory operation of louvers; adjust as necessary			X	O-W
	f. Clean inside of the hood and remove all extraneous articles around the air fin cooler.	I	W		
	g. Set and adjust V-Belts.		W		
	h. Check and verify fan tip clearances.	I	W		
	5.2 BOILERS, DUCTWORK AND STACK				
	a. Perform hydrostatic tests per SAES-A-004. Empty water completely after test and dry. Alternatively, can be laid up with inhibitor added to test water.	W	I		
	b. Perform air leak test on completed casing.	W	I		
	c. Check to see if provision has been made for thermal expansion of all boiler parts and attached piping	I	R		
	d. Clean out stack and duct, open manholes and other opening for inspection. Check operation of dampers. Close stack and duct after inspection.	I	W		
	e. Check mechanical operation of soot blowers.		O-W		
	f. Prepare boiler dry-out procedure including manufacturer's recommendations and review with proponent 90 days in advance of turnover.		R		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	COMMISS. & STARTUP (Post-MCC) Proponent
	g. Make check of boiler safety cutout.			X	I-R
	h. Re-couple fans to drivers after successful run-in of driver.	W	R		
	i. Commission fans and drivers, and check vibration after proponent run-in. Correct operability problems of fans and drivers as required.			X	O-I
	j. Inspect internal surfaces of drums, remove all debris and provide supervised labor to open, clear and close boilers after boil out and/or acid cleaning.	I	W		
	k. Verify proper relief valve rating, certification, and installation.	I	R		
	l. Purge, light off & put boilers and heaters in operation.			X	O-I
	m. Dryout, boilout, and chemically clean according to manufacturers' and contractor's procedures. Operations will operate furnace and pumps.			X	O-I
	n. Check out and fine tune instrumentation and controls during start-up.			X	O-I
	o. Determine boiler response under manually imposed load changes and demonstrate operation of shutdown devices.			X	O-I
	p. Repair damage to liners if it occurs during cureout.	I	W		
	q. Conduct guarantee performance test.			W	O-X
	5.3 COMPRESSORS				
	a. Install compressor piping and make piping corrections as required by manufacturer's tolerances. Set and cold align compressor and driver. Furnish record of alignment to Operations.	W	I		
	b. Clean suction piping of gas compressors, mechanically and/or chemically.	I	W		
	c. Ensure that compressor suction piping, suction and interstage drums, lube and seal oil piping, are in clean condition, free of mill scale, weld spatter and all loose and foreign material. Disassemble piping for cleanliness inspection as required.	I	W		
	d. Commission lube and seal oil systems, circulate oil, and replace with clean oil, etc., as required to prepare system for operation.			X	O-W

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC)		COMMISS. & STARTUP (Post-MCC)	
		Inspection	Project Proponent	Commiss. w/ Constr Agency (Note 2)	Proponent
	e. Run-in the uncoupled compressor drive motor (minimum 4 hours).	I	W		
	f. Recouple compressor to driver after successful run-in of driver. Complete cold alignment of train.	I	W		
	g. Check, Commission and run-in compressor. Operations will operate equipment.			X	O-W
	h. Make comprehensive vibration check of rotating elements and auxiliary equipment.			X	O-W
	i. Check hot alignment of compressor and driver and do any required doweling.			X	I
	j. Correct any piping mis-alignment or deficiency which results from run-in of the compressor after MCC.			X	W
	5.4 COOLING TOWER				
	a. Clean inside and outside the tower. Remove all extraneous articles around the tower.	I	W		
	b. Clean the cold water basin, water distribution deck and ensure all spray nozzles are installed.	I	R		
	c. Couple fans to drivers. After the motor has been checked for rotation, run-in 4 hours uncoupled, and check bearings.	I	W		
	d. Commission cooling tower.			X	O-W
	e. After Commissioning, check vibration and perform necessary correction work.			X	O-I
	f. Performance test cooling tower.			X	O-I
	5.5 FURNACES AND FIXED HEATERS				
	a. Perform hydrostatic test per SAES-A-004.	W	I		
	b. Empty water from coil and air blow if necessary. Add corrosion inhibitor to water in non-drainable coils.	I	W		
	c. Provide furnace dryout procedure based on manufacturer's recommendations.		R		
	d. Check mechanical operation of soot blowers and dampers.	I	W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	COMMISS. & STARTUP (Post-MCC) Proponent
	e. Pre-Commission instruments on furnace and ensure all skin thermocouples are properly installed and functional.	I	W		
	f. Prepare furnace and fuel systems for dry-out.			X	O-W
	g. Accomplish boilout, chemical cleaning and flushing as specified.			X	W
	h. Dry out the furnace following the approved procedure.			X	O
	i. Couple fans to drivers after successful run-in of driver.			X	W
	j. Correct operability problems of fans and driver during/after oper. run-in. Check vibration.			X	O-I
	k. Verify proper relief valve rating certification and installation.	I	W		R
	l. Check fuel lines/valves for leaks and proper operation.			X	O-I
	m. Test all safety systems, including snuffing steam, for proper operation.			X	O-I
	n. Check operation of stack dampers and verify correct position of damper to correspond with instrumentation and external pointer(s).		X	R	
	5.6 <u>WEIGHING SCALES/PRODUCT METERS</u>				
	a. Calibrate all solids weighing & measuring devices in their field-installed operating positions. Furnish record of all calibration data. Show that equipment meets the specified tolerance for accuracy over full range of operating conditions Note: Operations will arrange for independent calibration of weigh scales and product meters for custody transfer where required by government regulations.	I	X		R
	5.7 <u>PUMPS</u>				
	a. Set and cold align pump inlet and outlet piping and driver. Furnish record of alignment to operations.	W	I		R
	b. (i) Check the motor for rotation, run-in four hours uncoupled, and check bearings.	W	R		
	(ii) Recouple pump to driver. Furnish record to Operations.	W	R		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	Proponent
	c. Install temporary packing if permanent packing or mechanical seal is not suitable for flushing. (If pump used for flushing.)		R		
	d. Reinstall mechanical seals or permanent packing prior to startup.		W		
	e. Make final check of cold alignment after pipe flushing. Correct if necessary.		W		
	f. Check and run-in pump. All temporary strainers should be in place.			X	O-I
	g. Make final hot alignment check and do any required doweling of the pump and driver.			W	X
	h. If fire water or other permanent plant pumps are to be used for supply of water during construction period they are to be operated by Operations.		O-X		
	i. Maintenance of pumps covered by "h" above will be by Contractor. At end of construction, pumps are to be put in first class condition by Contractor.	I	W		
	5.8 TANKAGE				
	a. Hydrotest tank and internal piping, and clean inside tank.	W	I		
	b. Close manways.		W		R
	c. Strap tank and issue record. (As an exception, Oper. will arrange for independent calibration of product tanks for custody transfer where required by government regulations.)		W		
	d. Install and test appurtenances	I	W		
	e. Paint floating roof and inside of tank if required.	I	R		
	f. Water flood floating roof rainwater sumps and test for leaks on swivel joints subsequent to floating roof.	I	W		
	g. Verify proper operation of floating roof and ensure all pressure release systems and vacuum breakers are clear and functional.	I	W		
	h. Test the manifolded foam fire protection system for storage tanks if provided in accordance with SAES-B-017.	I	W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	COMMISS. & STARTUP (Post-MCC) Proponent
	5.9 TURBINE DRIVERS				
	a. Set and cold align turbine and associated piping. Check parallel flange alignment. Furnish record of alignment to operations.	W	I		R
	b. Chemically clean lube, seal, and hydraulic control lines.	I	W		
	c. Install all permanent packing and accessories after flushing and immediately prior to startup.		W		
	d. Check and run-in turbine, make vibration tests, check governor and trips.			X	O-W
	e. Recouple turbine driver to equipment.			X	W
	f. Make final hot alignment check and dowel as necessary.			W	X
	5.10 VESSELS - TOWERS, REACTORS AND DRUMS				
	a. Hydrotest all vessels per SAES-A-004.	W	I		
	b. Provide supervised labor to open, clean and close vessels during and after flushing, if required.		R		
	c. Cure and dry out castable linings. Contractor will provide procedure, including time/temperature to be used, during drying period source of heat must first be accepted by MCC.	I	W		R
	d. Install all tower, reactor and drum internals and perform tray leakage tests and leveling adjustments as required.	I	W		
	e. Clean out all vessels and open manholes and other openings for inspection.	W	I		
	f. Perform a detailed inspection of the vessel internals to include holiday detection of internal coating as well as installation of mechanical internals.	W	I		
	g. Release Construction Agency to issue to Contractor written authority to close up each vessel.		O-X		R
	h. Properly close up all vessel internal manways and openings per the proper torquing procedures, after final inspection or after charging of chemicals, catalysts, etc., is completed.	I	W		R
	(1) For vessels where Contractor has responsibility for loading chemicals.		W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	Proponent
	(2) For vessels where Operations has responsibility for loading chemicals.			X	O-I
	5.11 HEAT EXCHANGERS				
	a. Check that slide plates have been properly installed.	I	W		
	b. (i) Open exchangers to allow detailed inspection of the internals.	I	R		
	(ii) For shell and tube exchangers, provide a source of high pressure air, appropriate lances, and other arrangements required for safe air blowing and/or flushing of the tubes during initial operation if required for PAC.			X	W
	c. Check for damage to tubes and tube sheets.	I	R		
	d. Perform all hydrotesting per SAES-A-004.	I	R		
	e. At the conclusion of flushing and cleaning, inspection, hydro-testing, and correction of all deficiencies, issue authorization (closure certificate) to close the exchangers.		X		
	f. Install new gaskets on all broken connections, and then close all ports to the exchanger following the proper torquing procedures.	I	R		
	g. Low Pressure (SAES-A-004) leak test exchangers.	I	W		
	5.12 MIXERS				
	a. Rotate mixers by hand to ascertain that they turn freely.		I		
	b. Disassemble bearings and other components to allow inspection, then reassemble.		I		
	c. Check alignment & set blades at proper height per vendor requirements.	I	W		
	d. Confirm rotation is correct for blade installation.		W		
	e. Conduct four (4) hour uncoupled running test of motor.	I	R		
	5.13 AIR CONDITIONING AND AIR HANDLING EQUIPMENT				
	a. Air conditioning and air handling units, individual components appurtenances, piping and wiring connected to the units, and instrumentation controlling the units shall be precommissioned per vendor instructions.	I	W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC)		COMMISS. & STARTUP (Post-MCC)	
		Inspection	Project Proponent	Commiss. w/ Constr Agency (Note 2)	Proponent
	b. Provide all freon or other cooling medium and charge or recharge the units as required.	I	R		
	c. All ductwork shall be inspected prior to closing, to verify that all fittings and air volume control devices, and duct heaters have been properly fabricated, installed and operate properly.	I	W		
	d. All dampers shall be thoroughly cleaned to insure proper operation. Ducts plenums and casings shall be cleaned of all debris and blown free of particles fiberglass, dust and rubbish before installation of registers and grills. Equipment shall be properly lubricated.	I	W		
	e. Filters and strainers used during construction shall be cleaned or replaced.		I		
	f. Conduct capacity tests of air conditioning and air handling units.	I	W		R
	g. Conduct building fire damper "closure" test.	I	W		
	5.14 PRESSURE RELIEF AND DISPOSAL SYSTEM (FLARES & BURN PIT)				
	a. Check pressure relief valves (PZV), pressure relief and blowdown piping, relief knockout drums, flares and burn pits for completeness and proper line up prior to placing the facility in service.	I	W		
	b. Check all PZVs tags to ensure that the PZVs are not overdue for T&I and the set pressure is correct as per the P&ID.	I	W		
	c. Verify that all block valves upstream and downstream pressure relief valves (PZV) are car-sealed in their proper position. The inlet block valve to the PZV that is in service shall be open. The inlet block valve to the standby PZV shall be closed and all PZV outlet block valves shall be car-sealed open.	I	W		
	d. All inlet and outlet block valves for PZVs shall be painted orange.	I	W		
	e. Check bellow-type PZVs to ensure their bonnets are painted green.	I	W		
	f. Verify that the outlets and vents of all PZVs are pointed to a safe location away from equipment, piping, walkways and working platforms.	I	W		
	g. Check the flare/burn pit ignition system for completeness and proper labeling.	I	W		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC)		COMMISS. & STARTUP (Post-MCC)	
		Inspection	Project Proponent	Commiss. w/ Constr Agency (Note 2)	Proponent
	h. Ensure that flare and burn pit areas have proper warning signs for toxic gas and heat radiation.	I	W		
	5.15 MISCELLANEOUS MECHANICAL EQUIPMENT				
	a. All equipment and components not otherwise addressed by this list shall where applicable, be installed, adjusted, lubricated, tested, confirmed for proper functioning.	I	O-W		
6.	FIRE AND SAFETY SYSTEMS				
	a. Conduct Capacity and Flush Tests of the Fire Water System.			X	FP/O -W
	b. Schedule relief valve testing with Aramco's agreement, sufficiently in advance of startup to permit orderly installation. All relief valves are to be tested within 90 days prior to turnover date.	I	W		R
	c. Remove as necessary and transport all relief valves to and from the approved Aramco facility.				
	d. Test, set, and tag relief valves prior to final installation.		W		
	e. Install all relief valves after Aramco or approved Agency, sets and test them.	I	W		
	f. Install all road signs, safety shields, warning signs, barriers, etc.	I	R		
	g. Paint and/or tag all relief valves, car sealed valves and safety equipment per Aramco Standards.	I	R		
	h. Verify valve position per P&ID and then install car seals on block valves where required in accordance with SAES J 600			X	I
	i. Install and pre-commission Fire and Safety systems: Portable fire extinguishers Stretchers Emergency air packs and containers Deluge systems, sprinkler systems Safety showers and eyebaths Tag all fire extinguishers and all fixed fire protection equipment Fire protection equipment layout map for facility Gas detection systems Fire detection and alarm systems New or revised plant evacuation, stop-work, etc. alarm systems	I	W		
	j. Prepare/update emergency response plans for facility and post assembly area signs.				X

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC) Inspection	Project Proponent	COMMISS. & STARTUP (Post-MCC) Commiss. w/ Constr Agency (Note 2)	Proponent
	k. Commission all new fire protection equipment, systems and facilities.			X	I
7.	COMMUNICATIONS				
	a. OSP: cables, manholes, conduits, protection and termination.	I			
	b. Tower: Structure and foundation, wave guide bridge, grounding, etc.	I			
	c. Buildings and Support utilities; grounding, etc.	I			
	d. Power: DC Plant, Standby, etc.	I			
	e. Ensure Communications equipment, transmission switches, muxes data equipment alarms and miscellaneous equipment etc. is correctly installed.	I			
	f. Ensure equipment correctly installed and pre-commissioned.		I-IT		W
	g. Commission and ensure systems operable.			X	W
8.	INSTRUMENTATION AND CONTROL SYSTEMS				
	a. Perform required tightness tests on instrument take-off piping and air piping and tubing.	I	R		
	b. Check continuity and identification of transmission and control systems loops for each instrument to insure proper hook-up. This applies to both pneumatic and electrical systems (analog and digital). Identification refers to the proper tagging of cable and / or each control loop conductor where it is terminated at multiple connection points (instrument, junction box, termination panel, marshalling cabinet, etc.).	I	W		
	c. Remove rotameters, orifice places, flow nozzles, venturi and other in-line primary flow elements, strainers, and other equipment as necessary before hydrostatic testing, flushing or chemical cleaning prior to MC.	I	R		
	d. Reinstall above equipment. Check for direction of flow and proper operation, e.g. travel, action with air failure, etc.	I	R		
	e. Check and tag orifice plates and flow nozzles, calibrate all instruments and transmitters and receiver readings for each instrument loop.	I	W		R
	f. Install pressure and temperature gauges after line flushing, and check air supply for required pressure.	I	R		

		CONSTRUCTION & PRE-COMMISS. (Pre-MCC)		COMMISS. & STARTUP (Post-MCC)	
		Inspection	Project Proponent	Commiss. w/ Constr Agency (Note 2)	Proponent
	g. Provide and install sealing fluids where required.	I	R		
	h. Perform final loop check which is a full functional demonstration of I/O, DCS & ESD systems.	I	W		
	i. Fine tune response characteristics of control system post MCC.			X	W
	j. Continuity check alarms, computer inputs, digital inputs and other wiring.	I	W		
	k. Install analyzers and check continuity.	I	W		
	l. Micrometer and inspect all meter runs.		W		R
	m. Commission all emergency, isolation and safety systems for operability.			X	O-I
	n. Provide calibration gas and test analyzers. Synchronize transmitter and receiver, bring onstream and fine tune.	I	W	X	E&I-W
	o. Complete Control System/Site Acceptance Test		W		
	p Complete ESD Fire & Gas Site Acceptance Tests		W		
	q. Complete Metering Systems Site Acceptance Tests		W		
	r. Complete all Auxiliary Systems Site Acceptance Tests (Burner Systems, Compressor Controls etc-)		W		
9.	<u>CATALYST, CHEMICALS AND DESICCANTS</u>				
	a. Inspect all towers and drums for cleanliness before loading catalysts, etc	I	W		
	b. Install first loading of any chemical purchased as a package with the equipment.		W		R
	c. Supply supervised labor to load all other chemicals and catalyst, catalyst baskets, tower packings. (Operations schedule and direct).			X	O-I
	d. Air blow if required.			X	O-I
	e. Inspect after final loading. Obtain samples of all.				O-I