







Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev   <b>01</b>   Page   <b>2</b>   of   <b>14</b>

## CONTENTS:

1	PROJECT DESCRIPTION & BRIEF SCOPE OF WORK .....	3
2	DEFINITIONS .....	4
3	DETAILED SCOPE OF WORK .....	4
4	DESIGN AND DETAIL ENGINEERING .....	5
5	EQUIPMENT, INSTRUMENT, LINE TAG NUMBERING & DRAWING/DOCUMENT NUMBERING .....	6
6	CONTRACTOR'S SCOPE OF SUPPLIES .....	6
7	CONSUMABLES .....	7
8	MANDATORY SPARES .....	7
9	TOOLS & TACKLES .....	7
10	MISCELLANEOUS .....	7
11	PROCUREMENT SERVICES .....	8
11.1	PROCUREMENT .....	8
11.2	EXPEDITING .....	9
11.3	INSPECTION .....	9
12	PROJECT MANAGEMENT SERVICES .....	10
12.1	PROJECT MANAGEMENT .....	10
12.2	PLANNING, SCHEDULING & MONITORING .....	10
12.3	COST MONITORING & CONTROL .....	11
13	CONSTRUCTION SERVICES .....	11
14	PRE-COMMISSIONING .....	12
15	COMMISSIONING AND PERFORMANCE TRIALS .....	12
16	TRAINING .....	13
17	PROJECT DOCUMENTATION .....	13
18	WARRANTY PERIOD .....	13
19	PROJECT CLOSURE .....	14

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 <b>नेशनल एल्युमिनियम कम्पनी लिमिटेड</b> <b>National Aluminium Company Ltd.</b>
				Rev <b>01</b> Page <b>3</b> of <b>14</b>

## 1 PROJECT DESCRIPTION & BRIEF SCOPE OF WORK

Owner "NALCO" is installing 5th train of 1.0 MTPA ALUMINA REFINERY at Orissa. Process Licensor is Rio Tinto and tkIS is consultant for this project. This plant will be located near existing facility.

This document describes the various requirements for the implementation and execution of tender. The document shall be read and construed in conjunction with other sections of other tender documents & drawings. The work is subject to all the terms and conditions detailed in Volume-I "General Condition of Contract (GCC)" of this tender.

In case of conflict between various documents, same shall be brought to the notice of the Owner/Consultant. In case of clearly defined requirement, the stringent one shall prevail. In case of ambiguity, Owner/Consultant's decision shall be binding on the Contractor.

Contractor's scope of work shall consist of Residual basic Engineering, Detailed Engineering including interface requirements with other Contractors and existing facilities, Civil and Structural design based on Soil Investigation report provided by Owner, Procurement Services, Inspection & Expediting, Supplies, Project Management Services, Overall Construction, Construction Management Services, Pre-commissioning, Commissioning & Performance Test Run till handing over for the Plant / System and related facilities within the defined Battery Limits. Performance guarantee of the scope of supply is also with the Contractor. The scope is also elaborated in Project Execution plan requirement.

**This LSTK package consists of Bauxite storage, handling and secondary crushing details as per tkIS doc. no. 6695-PIP-552-EC-0002), conveyor interconnection between existing ( Stream 4 ) Grinding silo building and new Grinding silo building and dust suppression system for the complete package. The package scope includes all internal as well as interconnecting piping/ducting/conveying systems between units as applicable. The scope also includes civil/structural/electrical/instrumentation work within the battery limit as detailed in the tender documents volume 2. This complete package shall be executed on Lump sum Turnkey basis.**

**Flow diagram (tkIS doc. no. 6695-PIP-552-FB-0001) shall be referred for overall scope description in regards to all units included in the package. For battery limits, (tkIS doc. no. 6695-PIP-552-CA-0004) shall be referred.**

### **Rerouting of existing lines beyond the new transfer tower :**

The existing lines shall be rerouted beyond the new transfer tower.

The lines shall be routed at their present lower elevation along the side of the elevated new road, move around the elevated stockpile area and join the existing line routing before entering the culvert below railway line.

Since the rerouting shall be completely outside the elevated area, pipes shall be supported on new sleepers.

The road crossings shall be carried out using short length culverts as required.

The lines have to be routed close to the new roads as future coal stockpiles are also planned in adjacent area.

Since the roads shall be at high elevation, retaining wall shall be required along the road till the location where the lines can be located at greater distance from the road.



These being ash and slurry lines, stress analysis is also in the scope of the LSTK contractor.

All the piping and civil related works like design, laying of new sleepers, retaining wall, culverts etc. is in the scope of the LSTK contractor.

All the materials required for execution like piping bulk mto, pipe supports etc. is also in the scope of supply of the LSTK contractor.

Evaluation of capacities of the existing pumps is in the scope of the contractor. Contractor shall submit adequacy check report for the existing pumps. Contractor to obtain the necessary documents and data related to existing pumps from the OWNER.



Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 <b>नेशनल एल्युमिनियम कम्पनी लिमिटेड</b> <b>National Aluminium Company Ltd.</b>
				Rev   <b>01</b>   Page   <b>4</b>   of   <b>14</b>

Contractor to co-ordinate with OWNER for shutdown and related activities that will be required to carry out the rerouting work.

Refer attached conceptual plot plan having doc no. 6695-LAY-552-LD-0001 and the drawings depicting the existing routing of the lines in the tender.

These part plans are indicative. It is the responsibility of the LSTK contractor to check the feasibility and prepare detailed drawings for execution.

The Contractor, prior to bidding, must visit site and collect all information necessary for correctly estimating the extent of work and the conditions under which the Contract will be carried out. Any variations of OWNER furnished data with the actual data obtained during the execution will not be the cause for any price change.

**Bidder shall refer the Topographical survey sheets, 3 nos, attched under volume 5.**

## 2

### DEFINITIONS

Wherever used in this document, the following expressions shall have the meaning as given hereunder:

- "Owner" means M/s National Aluminium Company Limited (NALCO) having its Registered office at NALCO BHAWAN, P-1 Nayapalli, Bhubaneshwar-751 013, Orissa.
- "Consultant" means thyssenkrupp Industrial Solutions (India) Pvt. Ltd., (hereinafter referred to as tkIS India or EPCM consultant) the EPCM agency engaged by Owner as Consultant for their Project.
- "Contractor" means any person, company, firm or body who may be engaged by Owner for works and services connected with construction, installation, erection and commissioning of the facilities for the Project with or without supply of equipment/material. The terms " Contractor " and " LSTK Contractor" are synonymous.
- "Licensor" means Rio Tinto Alcan International Limited (RTAIL)

## 3

### DETAILED SCOPE OF WORK

Detailed scope of work and supplies shall include but not limited as defined in the other documents of this section (Volume-2, Section-6).

**Scope of work includes obtaining all input or interface information required by Contractor for successful execution of the Contract, from Owner, other contractors or any other agency.**



These specifications / documents are intended to cover the design requirement, manufacture, assembly, testing at manufacturer's works, packing and forwarding, supply and delivery duly packed for transportation at site of all equipment and accessories in the scope of the Contractor, including insurance, unloading, storage, testing, calibration & handling at site.

Effort is made to define the scope of work explicitly without any ambiguity. Any work that is not covered under this tender document, but which is required for successful completion of the tender shall be in scope of work of Contractor, without any additional cost and time implication to the Owner.

The contractor shall be responsible for providing all material, equipment and services, which are required for completion of the job meeting the specification requirement ensuring high degree of reliability, availability, operability and maintainability. The equipment and system / sub-system shall conform in all respects to high standards of Engineering, design and workmanship and shall be capable of performing in continuous commercial operation in a reliable and efficient manner.

**Acquiring all necessary information related to existing facilities of plant, new facilities being installed by Owner (either directly or through other LSTK contractors) which is required for successful completion of work of tender, remains the responsibility of Contractor.**

Contractor to ensure that lessons learned from their various executed projects either related to Customer feedbacks for the earlier executed projects, ongoing project/s, related to Safety or process requirements shall be taken care in Contractor's detail design engineering specification,

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev   <b>01</b>   Page   <b>5</b>   of   <b>14</b>

as part of good engineering practices. Recommendation from any reviews (e.g. Design Reviews, Hazop, SIL, 3D PDMS Model Reviews, Constructability Reviews, etc...) shall be taken care by Contractor in detail design engineering specifications, selection of equipments, items along with equipments at no extra cost to Owner. HAZOP to be carried out in Contractor's office.

It is not the intent to specify completely herein all details of the equipment & installation. Nevertheless, the equipment & installation shall be complete & operative in all aspects & shall conform to highest standard of engineering, design & workmanship.

Contractor to note that the information furnished in the specifications and drawings regarding the site represent the best available data and are solely for the purpose of information / guidance. Contractor prior to bidding, may visit site and collect all information necessary for correctly estimating the extent of work and the conditions under which the Contract will be carried out. Any variations of Owner furnished data with the actual data obtained during the execution will not be the cause for any price change.

**Contractor shall fulfill the requirements (as applicable for the Package) of Environmental Clearance certificate and PCB certificate attached in Volume-5**

#### **4 DESIGN AND DETAIL ENGINEERING**

The materials, design and workmanship shall satisfy the applicable standards, the specifications enclosed & codes referred to. Where the specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.

In the absence of any standard / specifications / codes of practice covering any part of the work covered in the scope of work, Contractor shall develop the required specifications and implement the same with the approval of Owner/Consultant. Contractor shall apply sound engineering and manufacturing practice and shall include all equipment and services not mentioned but necessary to complete the work for the required functionality, matching the present industry standard. Unless otherwise specified, relevant latest standards shall be followed.

The drawings / documents and other attachment with Tender define the basic system design for the entire tender. This is based on preliminary data, conceptual layouts and same are for guidance / information only. Contractor shall develop further and update all engineering documents / drawings.

Equipment ratings, wherever specified are indicative only. Contractor shall be responsible to verify these ratings and submit the offer accordingly. Contractor shall develop the documents attached in this tender along with other detailed engineering documents to 'Issued For Construction (IFC)' status, taking into account the detailed requirements of the Project and documents contained in this tender.



The contractor shall review the surface contour drawing attached in the tender with respect to actual ground elevations available at site and shall prepare necessary site grading drawings (if required).

Contractor to note that the review / approval of the documents wherever applicable shall be limited only for the revisions duly clouded and change list provided. Any changes, which are not marked / clouds or are not part of change list shall not be reviewed. Contractor shall be responsible and liable to correct the same at any stage as required without any cost and time implication to the Owner. As-built documents shall be issued by Contractor for records only.

With every issue of revised document, Contractor shall provide a Comment Resolution Sheet (CRS) which shall include the comments provided by Owner/Consultant and the corresponding closure action taken by Contractor.

Design, engineering, erection, testing and commissioning must be done in the best engineering practice's and workmanship. Established standard practices and latest statutory regulations applicable in the country shall be followed.

The contractor needs to ensure continuous flow of issue of construction drawings (Progressive) as per Contractor's Project schedule to Owner, so that there is no delay in site work and it is carried out smoothly, meeting the Overall Project schedule requirements.

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev   <b>01</b>   Page   <b>6</b>   of   <b>14</b>

Contractor shall be required to furnish the documents for review (wherever applicable) and shall not expect Owner/Consultant to volunteer any review if Contractor does not furnish such documents by error or oversight. It is the responsibility of Contractor to fully comply with the engineering guidelines and specifications included in the tender for executing the scope of work defined in the tender.

Contractor to note that review and approval by Owner/Consultant does not absolve the Contractor from their responsibility of delivering the product and individual components meeting the requirement of the tender. In case of any non-conformity found with respect to tender at any stage, Contractor has to rectify / re-supply the non-conforming material without any cost and time implication to the Owner.



After completion of work, and prior to start-up all equipment / systems, Contractor shall **update**, the 'As Built' details / information on all 'Issued for Construction (IFC)' drawings / documents and Manufacturer's drawings / documents related to the works and submit the same to Owner/Consultant.

All tests results, **protocols and check list** and associated checklists generated as part of the 'Mechanical Completion', pre-commissioning checks, testing and commissioning of the systems / equipments / package units shall form a part of the Final Documentation submitted by Contractor to Owner.



**Environmental Clearance has been granted for Alumina Refinery (Stream – 5) project in Damanjodi, Odisha by Ministry of Environment, Forest and Climate Change vide F. No. J-11 011/65/2008-IA II (I) dated 12-Apr- 2017. The GENERAL CONDITIONS and SPECIFIC CONDITIONS mentioned in the Environmental Clearance shall be applicable.**

**NALCO has obtained Consent to Establish from State Pollution Control Board, Odisha on 21-Apr-17. The GENERAL CONDITIONS and SPECIAL CONDITIONS mentioned in the Consent to Establish shall be applicable**

**5**



## **EQUIPMENT,ELECTRICAL ITEMS,INSTRUMENT, LINE TAG NUMBERING & DRAWING/DOCUMENT NUMBERING**

The equipment, Instrument tag numbering, **electrial equipment numbering** and document / drawing numbering philosophy as attached in the Tender shall be followed by the contractors.

Tag numbering of all new equipment,**Electrical items**, instruments and lines as outcome of detailed engineering shall be done by Contractor in line with the tag numbering philosophy. It is the responsibility of the Contractor to check and uniformly modify the tag numbers of all equipment, instruments etc. Contractor to ensure uniqueness and consistency.

Any deviations or discrepancies in equipment tag numbers observed, even after approval of the relevant document, contractor shall rectify the same immediately without any time and cost implication to Owner.

Simillarly, all documents and drawings prepared by Contractor shall be numbered as per the guidelines specified in the tender. This philosophy shall be also applicable to all sub Supplier deliverables. It is the sole responsibility of the respective contractor to ensure consistency and accuracy in assigning Drawing / Document numbers as per the described Drawing / Document numbering philosophy in all deliverables including Supplier's / subsupplier's deliverables.

## **6 CONTRACTOR'S SCOPE OF SUPPLIES**



Contractor's scope of supplies shall include but not limited to the following :

1. All the items along with their spares, special tools, First fill of lubricatnts and oils and other items (If any) necessary for their safe & trouble free operation.



**Start up & commissioning spares to be provided as required. price to be included in proposal.**



Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 <b>नेशनल एल्युमिनियम कम्पनी लिमिटेड</b> <b>National Aluminium Company Ltd.</b>
				Rev   <b>01</b>   Page   <b>7</b>   of   <b>14</b>



**Recommended spares list for “One year operational and maintenance spares for trouble free operation” shall be quoted along with the bid (list only for unpriced bid and list with price for price bid. Nalco will consider the list with successful bidder. The price for such spares shall not be included in the lump sum price of the Contract. validity period of the offer for spare parts shall be one year.**



2. All equipment / packages along with all electrical, instrumentation and controls, supports for equipment, piping, ducting etc.
3. All the in-line items as per P&ID (e.g gaskets, flanges, valves, strainers etc..not listed specifically else where in the tender) & accessories along with their spares, special tools, lubricating oils and other items (If any) necessary for their safe & trouble free operation.
4. Cement & structural steel, **cabling, sand , gravel, reinforcement.**

## 7 CONSUMABLES

Contractor shall identify & procure all required material for Mechanical Completion, Pre-Commissioning, Commissioning of the System / Equipment / Packages



## 8 MANDATORY SPARES

Contractor shall provide all mandatory spares as per spare philosophy document included in this tender under Volume 2. **Bidder shall furnish list of Mandatory spares (List only with unpriced bid and list with price for price bid) which will be included in the proposal and will be taken into account for bid evaluation.**

### TOOLS & TACKLES



Contractor shall supply all tools & tackles and miscellaneous accessories for maintenance and operation of all material for satisfactory completion of the project. Any special tool required from manitenance point of view shall also be supplied. **Bidder shall furnish list of special tools and tackles (List only with unpriced bid and list with price for price bid) which will be included in the proposal and will be taken into account for bid evaluation**

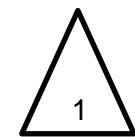
### MISCELLANEOUS



Any additions due to residual engineering, HAZOP study, SIL study, **electrical system study** and ergonomics study are also included in the Contractor's scope of supply without any schedule and cost implications to Owner.

Contractor shall permit the participation of representatives of the Owner/Consultant during the detailed engineering phase at Contractor office for review of the any engineering deliverables as deserved / necessary by Owner/Consultant.



All equipment shall be new with state of the art technology and proven track record. Prototype equipment shall not be offered.



**Isolation facilities shall be provided at all tie-in points to enable independent testing, commissioning, or maintenance of facilities within and outside the battery limits.** apart from those mentioned in the battery limit drawing / documents attached in the tender volume 2 section 5, in consultation with Owner/Consultant.

Spool pieces wherever required for the easy maintenance / removal of machinery items shall be provided by Contractor.

Contractor shall provide temporary start-up equipments / items (e.g. Strainers, Blind flanges, Vents, Drains with Isolation Valves, Gaskets, Fasteners, etc...) during flushing in pre - commissioning stages wherever required to avoid damage to Main equipment.

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev   <b>01</b>   Page   <b>8</b>   of   <b>14</b>

Any other item though specifically not asked for in the document but required for safe and efficient Commissioning & Operation of the plant and equipment shall be supplied by Contractor at no extra cost to Owner.

All items / components of the packages shall be procured in line with the relevant project standard and design basis included in this Tender.

**Contractor shall make arrangements for temporary power supply of adequate capacity and reliability, if required, to proceed with his testing, pre-commissioning and commissioning activities in case Owner's external power supply is not available.**

## 9 PROCUREMENT SERVICES

### 9.1 PROCUREMENT

- 9.1.1 Preparation of contract related commercial terms and conditions for all procurement activities in line with the commercial conditions defined in the tender documents volume 1. These commercial terms and conditions shall form part of all inquiries and purchase orders.
- 9.1.2 Contractor shall follow the Equipment Vendor / Supplier list enclosed in the tender documents for all their procurement activities. For items not listed therein, contractor shall prepare the vendor list and submit to Owner/Consultant for their approval and acceptance before initiating procurement action.

In case of any deviation from the Vendor list, contractor has to take Owner's approval.

- 9.1.3 Float inquiries to the approved vendors, follow-up for offers, carry out technical & commercial review of offers to ensure compliance to the conditions listed in the tender documents.
- 9.1.4 Contractor shall forward technical as well as Commercial bid evaluation (TBE & CBE) final report and recommendation (TR) for procurement of the critical items listed elsewhere in this tender to Owner/Consultant for their review and comments before order placement.
- 9.1.5 Contractor shall forward purchase requisitions and purchase orders for all major and critical items to Owner/Consultant for their review. However, the Contractor shall ensure proper / complete documentation and compliance with the project specification, spare parts and other specific requirement mentioned elsewhere in the Contract.

- 9.1.6 Contractor shall submit material movement and handling procedure to the Owner/Consultant for their review / approval. The equipment complete with its accessories, spares, special tools and tackles shall be suitably protected by respective packing for shipment considering handling during transit, distance and weather conditions involved **and for preservation during storage at site.**

The Contractor shall submit the packaging method for shipment to be adopted by him, if so desired by the Owner and / or its representative.



- 9.1.7 Contractor shall be fully responsible for Port and Custom Clearance including Stevedoring, Loading, Unloading, Handling, Storage and for satisfying all port and custom formalities for the clearance of goods. Contractor shall be fully responsible for any delays, penalties, demurrages, deduction and other charges and losses, if any, in this regard.

Equipment shall be packaged for transportation so as to meet the space and weight limitation of transport facilities. The contractor shall obtain approval from concerned authorities for transportation of over dimensioned consignment/ package, if any, before starting manufacture of such equipment. Transportation to site of all indigenous and imported material required to the site.

- 9.1.8 Any material or accessory which may not have been specifically mentioned but which is necessary or usual for satisfactory & trouble free operation & maintenance of the equipment shall be furnished without any extra charge.

- 9.1.9 Any material / services towards modification work in existing area shall be carried out by Contractor at no extra cost to Owner.





Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 <b>नेशनल एल्युमिनियम कम्पनी लिमिटेड</b> <b>National Aluminium Company Ltd.</b>
				Rev   <b>01</b>   Page   <b>9</b>   of   <b>14</b>

## 9.2 EXPEDITING

- 9.2.1 After the order is placed, hold kick-off meeting with the Supplier to discuss the scope of work in detail. Prepare Minutes of Meeting and submit to Owner.
- 9.2.2 Contractor to consolidate & provide the name & contact details of all the sub vendor & suppliers on whom the final order has been placed.
- 9.2.3 Obtain from the Supplier, a detailed bar chart for execution of order. Scrutinise, approve and submit the same to Owner.
- 9.2.4 Obtain fabrication drawings from Suppliers in time and ensure their timely approval from TPI (if any as applicable) and for specified items from Owner. Also, obtain approval from statutory authorities, where applicable.
- 9.2.5 Pay regular expediting visits to the Supplier's shop on a weekly / fortnightly / monthly / daily basis or as per project schedule requirements, to assess the delivery schedule and monitor the progress. Submit detailed expediting reports to Owner/Consultant, highlighting areas of concerns and suggesting remedial actions.

## 9.3 INSPECTION

- 9.3.1 Based on Owner/Consultant Project Inspection and Test Plan, Contractor shall submit Overall Project Inspection and Test Plan Plan to Owner/Consultant for review and approval which as a minimum shall consist of :
  - Inspection and Test Plans for all types of Equipments / Items
  - In-house inspection programs.
  - Inspection and Expediting procedures consistent with mandatory codes.
  - Procedures for material identification and transportation.
  - Certification of non-destructive testing.
  - Independent inspection of all Equipments / Items at Supplier's works and issue of inspection reports along with factory acceptance test reports to Owner.
- 9.3.2 Contractor shall obtain detailed Inspection test Plan (ITP) from suppliers and shall review the ITP for meeting requirements of Owner/Consultant's approved Project Inspection and Test Plan requirements, equipment design data sheet, project specification and applicable codes and shall approve the same. ITP for critical equipment if called for, may required to be submitted to Owner/Consultant for review. Contractor shall co-ordinate with sub-vendor / supplier for approval of ITP.
- 9.3.3 Carry out stage-wise inspection, starting with material identification, qualifications of WPS, Weld set-ups, NDT requirements as per relevant codes, PMI testing, Dimensional checks, Hydro/pneumatic testing and final inspection, covering all requirements of Owner/Consultant
- 9.3.4 Submit manufacturing & inspection schedules at the beginning of every month to Owner/Consultant.
- 9.3.5 Maintain the records of QA / QC system during the execution of orders.
- 9.3.6 Control and approve non-conformity.
- 9.3.7 Ensure colour coding of all 'Bulk' materials as per Owner's specification.
- 9.3.8 After the completion of the final inspection and issuance of inspection Release Note, Contractor shall submit the documents to Owner/Consultant.
- 9.3.9 Ensure complete final documentation from Suppliers in required number of sets and soft copies in CD/DVD's. as per Documentation Management Plan (part of this tender)
- 9.3.10 Owner/Consultant reserves right for inspection at supplier.

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev 01 Page 10 of 14

## 10 PROJECT MANAGEMENT SERVICES

### 10.1 PROJECT MANAGEMENT

10.1.1 Complete Project Management in terms of Contract shall be carried out by Contractor. Project Manager appointed by Contractor shall be responsible for all the project activities viz. Residual Engineering, Detailed Engineering, Procurement Services including supplies, inspection & expediting, Project Management Services, Construction & Construction Services, Pre-commissioning, Commissioning and Performance Test Run and related facilities within the defined Battery Limits for better coordination of the project.

10.1.2 Establish procedures for all stages of the project for internal working and for working with Owner/Consultant/Suppliers/Other agencies & Project Stakeholders.

Developing Overall Project Execution Philosophy Coordination Manual shall comprise:

- Project Execution Procedure, including Interface Management
- Resource Deployment Plan
- Project Organization Chart (Home office / Construction Site)
- Project information and reporting system

10.1.3 Organize and participate in regular Project Review Meetings / Interface Management Meetings.

10.1.4 Issue Project Progress Reports to Owner/Consultant (Monthly Basis).

10.1.5 Establish and implement Project Control System to control the Project & report to the Owner/Consultant.

10.1.6 Provide effective, continuous liaison and control both at Site and Engineering Office to ensure prevention of slippage in Overall Project Schedule.

10.1.7 Evaluate the status of the project, identifying critical activities, and taking action to complete the project within schedule and cost.

10.1.8 Establish Change Order Management procedure and get it approved by Owner/Consultant.

10.1.9 Establish overall safety management plan for project and ensure adherence to Owner safety policies & practices.

10.1.10 Establish overall Quality Assurance / Control (QA / QC) & HSE Plan for the project and ensure adherence to design control as per ISO 9001.

10.1.11 Coordinate Planning, organizing, monitoring and controlling the Project to ensure no overlapping or left out activities in the total project work.

10.1.12 Ensure all drawings / documents are prepared conforming to statutory regulations and standards.

10.1.13 Ensure integration of all the project activities and sort out discrepancies between various agencies.

10.1.14 Establish and co-ordinate billing break up / billing schedule to NALCO.

10.1.15 Close follow up / expediting of delivery of critical equipments.

### 12.1.16 Conducting Safety audits in accordance with requirements of Statutory Authorities



### 10.2 PLANNING, SCHEDULING & MONITORING

10.2.1 Develop scope and procedures for planning, scheduling & monitoring system.

10.2.2 Organize setup and softwares for planning, scheduling and monitoring.

10.2.3 Arrange and participate in kick-off meeting.

10.2.4 Preparing and updating networks for Project scope for periodic evaluation and review.

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev <b>01</b> Page <b>11</b> of <b>14</b>

- 10.2.5 Identify the critical activities and its close monitoring to adhere to the project schedule.
- 10.2.6 Prepare and update various schedules like Front End Schedule, 90 days Look ahead Schedule, Master Schedule, and Overall Schedule & Functional Schedules.
- 10.2.7 Prepare and update Overall 'S' curves and Establish Progress Measurement Methodology.
- 10.2.8 Prepare and update Recovery Schedule to cover up the delays, if any including delay analysis.
- 10.2.9 Prepare Monthly programmes quantitatively with list of resources.
- 10.2.10 Report various progress periodically to evaluate the project status
- 10.2.11 Review meetings shall be conducted regularly. Planning & Project Control Engineer shall participate in at least the monthly progress review meetings.
- 10.2.12 Prepare Expediting report for critical supplies.
- 10.2.13 Refer document "Project Planning, Scheduling & Monitoring System for Contractor" for detailed planning scope requirement. PRIMAVERA schedule shall be considered. Refer software list given in this tender documents for detailed software requirements.



### 10.3 COST MONITORING & CONTROL

- 10.3.1 Prepare Expenditure, billing and cash flow forecasting for the project at the beginning of the project
- 10.3.2 Prepare, checking and submitting the billing break-up, billing schedule to Owner/Consultant for approval.
- 10.3.3 Preparing, checking and submitting the invoices for engineering, procurement and construction work of the Project scope.
- 10.3.4 Submitting "No-claim letter" from supplier / sub vendors, pertaining to this contract, before final payment is claimed from Owner.

## 11 CONSTRUCTION SERVICES

- 11.1.1 Establish site office with all the necessary facilities (taking care of HSE requirements) for smooth execution of construction activities.
- 11.1.2 The construction, development, maintenance and subsequent demolition / area clearance of such facility shall be at Contractor's own cost.
- 11.1.3 Carry out complete construction and erection work at site consisting of civil and structural work, field fabrication, erection, NDT and testing of equipment and piping where applicable, erection of equipment and piping, installation of electrical and instrumentation works, painting and insulation and fire proofing & floor treatment. The Contractor shall carry out these activities either himself or through the services of one or more sub-contractors.
- 11.1.4 Contractor should consider removal / dismantling of miscellaneous items of structures / foundations / piping / cables / fences, etc. above or below ground that may be encountered during construction. The contractor shall be responsible for planning, designing, reshaping and contouring the site to final grade elevations after study and verification of the existing site conditions. **Rerouting of existing underground facilities such as cables and pipelines, rerouting of trenches may also be required.**
- 11.1.5 In case the Contractor decides to sub-contract the construction activities, he shall be fully responsible for the co-ordination, interface management and execution of all the activities of the various sub-contractors and also for the safety and quality of their work. Contractor shall depute their qualified and competent team to supervise the entire job at site and take single point responsibility for Owner.
- 11.1.6 Contractor shall ensure that all applicable safety practices have been followed by all site persons including contractor's / sub-contractor's / vendor's personals, Owner/Consultant's representatives etc.
- 11.1.7 Establish and operate a covered store & open yard at site for materials management and spare parts management.



Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 नेशनल एल्युमिनियम कम्पनी लिमिटेड National Aluminium Company Ltd.
				Rev   <b>01</b>   Page   <b>12</b>   of   <b>14</b>

- 11.1.8 Prepare detailed Construction Schedule, Various Construction Procedures, ITP's, Method Statements, Constructability plans and Construction Quality Assurance Plan and submit to Owner/Consultant for review and consent / approval.
- 11.1.9 Develop a comprehensive Health, Safety and Environment (HSE) Protection Plan and ensure that all construction activities are carried out in line with it. Ensure compliance with the prevailing local labour laws and regulation of the Owner. Contractor shall be fully responsible for HSE at site.
- 11.1.10 Carry out all site inspections, tests, audits as required and maintain proper reports and records of the same.
- 11.1.11 Establish fabrication facilities, workshop facilities as necessary at site for carrying out the construction activities.
- 11.1.12 Ensure availability of adequate skilled / unskilled manpower, supervisory staff, material and machinery / tools & tackles, adequate capacity Cranes to achieve project completion schedule, safety and quality in construction. Emphasis shall be given for mechanizing construction activities as far as possible.
- 11.1.13 Prepare records of all changes and modifications at site and ensure that these are incorporated into 'As-built' documents and drawings.
- 11.1.14 Establish / Set up arrangements and facilities for distribution of construction power and water.
- 11.1.15 Perform continuous house-keeping activities to keep the site tidy and clean.
- 11.1.16 Co-ordinate with various statutory authorities during their site visit to obtain clearances and approvals.
- 11.1.17 Arrange for Supplier specialists and experts during erection and installation of equipment and items, as applicable.
- 11.1.18 Provide round the clock security at the site for safeguarding the property.
- 11.1.19 Provide guarding, barricading and warning arrangements / safety signs.
- 11.1.20 Make arrangements for bringing material from any specific designated area at site, to Contractor's stores or plant for installation.
- 11.1.21 Remaining materials after reconciliation shall be delivered to Owner's stores duly tagged and with proper list for identification.
- 11.1.22 Transportation of all Contractor's materials left out after construction, out of refinery / process plant premises at no extra cost to Owner/Consultant.

## 12 PRE-COMMISSIONING



The Contractor shall arrange adequate manpower, tools, tackles, chemicals, instruments, **testing equipment along with skilled personnel to carry out tests and record the results. and all such** equipments, tools to perform all the functions and activities related to the above in a timely and orderly manner. All the checks and tests carried out as part of these activities shall be meticulously documented and certified.

## 13 COMMISSIONING AND PERFORMANCE TRIALS

The Contractor shall carry out following activities:

- 13.1.1 Prepare a commissioning schedule and submit Owner/Consultant for approval
- 13.1.2 Calibrate and check various instruments to be used in plant commissioning.
- 13.1.3 Carry out all activities for commissioning and testing of various systems in accordance with the start-up schedule.
- 13.1.4 Prepare a check list of all defects and take or arrange corrective measures.



Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 <b>नेशनल एल्युमिनियम कम्पनी लिमिटेड</b> <b>National Aluminium Company Ltd.</b>
				Rev <b>01</b> Page <b>13</b> of <b>14</b>

- 13.1.5 Monitor and take corrective actions on recording, sampling and interpretation of operating parameters.
- 13.1.6 Operate and monitor the plant till the plant has stabilised. Contractor to run the plant till required parameters are met.
- 13.1.7 Carry out the analysis and evaluation of test results obtained during commissioning in order to determine actual performance of equipment w.r.t Supplier's / System/ Equipment guarantees, as applicable and as mentioned in GCC (Volume 1 – Commercial documents) .
- 13.1.8 Carry out one or more performance test runs to demonstrate various guarantees.
- 13.1.9 For further details refer General Conditions of Contract (GCC) included under Volume 1 – Commercial documents.

## 14 TRAINING

Contractor shall provide training for OWNER's engineers in two different batches separately for each equipment type for a period of at least one week at manufacturer's works / site as applicable.

Contractor shall submit separate price for above in the price format mentioned elsewhere in the tender.



## 15 PROJECT DOCUMENTATION

- 15.1.1 Contractor shall develop a comprehensive HSE plan and implement the same to ensure the highest level of Health, Safety and Environment (HSE) Protection during all phases of the project.
- 15.1.2 Contractor shall develop a Contract Related Quality Manual (CQM or Project Quality Manual) and enforce the same to ensure a high standard of quality during all phases of the project.
- 15.1.3 Contractor shall undertake management of archives including proper documentation, listing, indexing and updation of all documents / drawings for the project.
- 15.1.4 Contractor shall undertake to prepare documents and drawings meeting the various statutory code requirements and perform all activities as necessary (including submission of documents to statutory approval). Necessary charges required for approval shall be borne by Contractor. The Contractor has to submit approved drawings from the statutory bodies to the Owner as per documentation requirement.
- 15.1.5 Contractor shall develop a Interface Managment Plan for better interfaces with other plants.
- 15.1.6 Preparation of any additional drawings and documents which are required for the smooth execution of project shall be undertaken by Contractor without extra time and cost implication to the Owner.

## 16 WARRANTY PERIOD

The Contractor shall provide adequate manpower during the warranty period of the Contract to resolve problems / defects / non-functioning of the items of the plant and ensure that the problems are rectified and plant is put into normal operation, with minimum loss of down time.

For further details about Warantees, please refer General Conditions Of Contract (GCC) included as part of Volume 1 of this Tender

Plant <b>1.0 MTPA ALUMINA REFINERY STREAM-5</b>	Client <b>NALCO</b>	Contract Code <b>NAL</b>	Document ID <b>6695-PIP-552-CA-0005</b>	Contract No. <b>66-6695</b>
	<b>Scope of Work for Contractor – General</b>			 <b>नेशनल एल्युमिनियम कम्पनी लिमिटेड</b> <b>National Aluminium Company Ltd.</b>
				Rev <b>01</b> Page <b>14</b> of <b>14</b>

## 17 PROJECT CLOSURE

At the end of Project, Contractor shall submit Contract closure report. The report shall comprise of minimum following, but not limited to following:

- Demonstration of Performance Guarantee Parameters (as applicable and covered under GCC)
- Warehouse / Store Closure
- Material Reconciliation Report
- Commercial Reconciliation Report
- As-Built Documentation Report
- Manuals of boughout equipments
- Final Deliverable List
- Final Supplier Documentation (including packages, Equipments. Items supplied by sub supplier)
- Final Documentation Report
- Statutory Approvals / Certificates
- Milestones Completion Certificates
- No Claim Certificate & Contract Closure checklist

It is to be noted by Contractor that recovery of any outstanding payments, pending settlement of LD or any extra claim (Positive or negative) etc.. are not constraints for closing Contract. In certain cases, Owner may continue to utilises certain services (e.g. manpower assistance), even after completion of scope of work and closure of contract, as per the rates and other terms & conditions provided in contract. In other cases, after closure of contract/s, Contractor may have to carry out certain services and / or supplies in accordance with the warantee provision in the contract.

During the Project Close out phase, Contractor shall ensure that all the contracts entered between the Contractor & Sub-Contractor(s), Supplier(s) are duly closed out.