CEYLON PETROLEUM CORPORATION

Project Title:

CONSTRUCTION OF A JET A-1 TRANSFER PIPELINE FROM MUTHURAJAWELA TO BIA KATUNAYAKE AND CONSTRUCTION OF JET A-1 STORAGE TANKS AND ASSOCIATED FACILITIES WITH MODIFICATIONS TO THE EXISTING TERMINAL FACILITY AT MUTHURAJAWELA

Document Title:

TECHNICAL SCOPE OF WORK

FOR

ENGINEERING, PROCUREMENT, CONSTRUCTION

TURNKEY CONTRACT

PART-[B]: CONSTRUCTION OF JET A-1 STORAGE TANKS AND ASSOCIATED FACILITIES WITH MODIFICATIONS TO THE EXISTING TERMINAL FACILITY AT MUTHURAJAWELA

Project Owner: CEYLON PETROLEUM CORPORATION (CPC)

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CONTENTS

1 INTRODUCTION

1.1 The present document defines the TECHNICAL SCOPE OF WORK which has to be executed by the EPC/Turnkey CONTRACTOR (hereinafter referred as CONTRACTOR) in order to perform the detailed engineering design and fabrication drawings, supply of equipment and materials, installation, inspection, mechanical testing, internal & external painting, insulation, obtaining third party inspector's approval, pre-commissioning, start-up, commissioning, delivery and operation (hereinafter referred as WORK) of a Tank Farm (hereinafter referred as PROJECT) owned by Ceylon Petroleum Corporation (CPC), (hereinafter referred as OWNER) and proposed at Muthurajawela area, as well as a piping interconnection with the aviation fueling terminal located at Bandaranaike International Airport (BIA), Katunayake, Sri Lanka. The Tank Farm shall be the main storage unit for receiving Jet A-1 fuel from ocean tankers, storage and transportation of Jet A-1 fuel through a 10-inch pipeline to BIA aviation fuelling terminal at Katunayake, Sri Lanka.

1.2 The TECHNICAL SCOPE OF WORK refers to the content of the overall scope of the quality, HSE, engineering, design, procurement, construction and inspection activities, actions, collaborations and synergies, which must be effectively, efficiently, successfully and timely organized, staffed, developed, monitored, executed and closed-up by CONTRACTOR and its Subcontractors, partners, vendors and manufacturers, with respect to the agreed, terms, conditions, content, budget and timeline of the Contract Agreement (hereinafter referred as CONTRACT) that CONTRACTOR, as an entity qualified to perform the PROJECT, shall countersign with OWNER, in order to perform and deliver the PROJECT to OWNER.

1.3 The present TECHNICAL SCOPE OF WORK is supported by a number of appendices, which are fully included parts of the CONTRACT and comprise technical data, information, drawings, specifications, material requisitions of specific to the PROJECT Front End Engineering Design (FEED). CONTRACTOR shall take into consideration, review, improve and revise the FEED material in the terms of its responsibilities to perform the PROJECT in accordance of the provisions of the CONTRACT.

2 ABBREVIATIONS & UNITS

2.1 Abbreviations

AFC	:	Approved for Construction
ALARP	:	As Low As Reasonably Practicable
API	:	American Petroleum Institute
ASME	:	American Society of Mechanical Engineers
ATEX	:	Atmosphères Explosibles (or Explosive Atmospheres)
BEDD	:	Basic Engineering and Design Data
BIA	:	Bandaranaike International Airport
BOQ	:	Bill of Quantities
BVS	:	Block Valve Station
CAPEX	:	CapitaL Expenditures
CCTV	:	Close Circuit Television
CEB	:	Ceylon Electricity Board
CIP	:	Chemical Injection Package
CSR	:	Corporate and Social Responsibility
COPC	:	Construction Organization and Planning Chart
CP	:	Cathodic Protection
CPC	:	Ceylon Petroleum Corporation
CPM	:	Critical Path Method
CSP	:	Constructability Program
CSPL	:	Capital Spare Parts List
CPSTL	:	Ceylon Petroleum Storage Terminals Limited
DCS	:	Distributed Control System
DIN	:	German Institute for Standardisation

DMCS	:	Documentation Management and Control System
DP	:	Differential Pressure
DTM	:	Digital Terrain Model
EDMS	:	Electronic Document Management System
EDR	:	Engineering Document Register
EFD	:	Engineering Flow Diagram
EIA	:	Environmental Impact Assessment
EIS	:	Environmental Impact Statement
EMMP	:	Enviromental Monitoring and Management Plan
EMS	:	Emissions Schedule
EPC	:	Engineering, Procurement and Construction
ERP	:	Environmental Reinstatement Plan
ESD	:	Emergency Shut Down (valves)
EQRIA	:	Environmental Qualitative Risk Assessment
FAC	:	Final Acceptance Certifcate
FAT	:	Factory Acceptance Test
FJC	:	Field Joint Coating
FCP	:	Field Coordination Procedure
FEED	:	Front End Engineering Design
FORC	:	Field Organization Chart
FOC	:	Fiber Optic Cable
FTD	:	Final Technical Documentation
GIS	:	Geographic Information System
HAZOP	:	Hazardousness and Operability (study)
HAZID	:	Hazards Identification (study)
HDD	:	Horizontal Directional Drilling

HDPE	:	High Density Polyethylene Pipe
HMI	:	Human Machine Interface
HSE	:	Health, Safety and Environment
HV	:	High Voltage
HVAC	:	Heating, Ventilating and Air Conditioning
JIG	:	Joint Inspection Group
IATA	:	International Air Transport Association
IEE	:	Initial Environmental Examination
I/O	:	Input/Output
ISO	:	International Organization for Standardization
ISR	:	Inquiry Status Report
ITP	:	Inspection and Testing Plans
JIG	:	Joint Inspection Group
LAS	:	Look Ahead Schedule
LOI	:	Letter of Intent
LV	:	Low Voltage
MCC	:	Mechanical Completion Certificate
MOM	:	Minutes of Meetings (also known as: Notes of Meeting-NOM)
MOV	:	Motor Operated Valve
MPR	:	Monthly Progress Report (or Project Master Schedule)
MPS	:	Master Project Schedule
MTO	:	Material Take Off
MV	:	Medium Voltage
NCS	:	Noise Control Study
NDT	:	Non Destructive Test (or NDE: Non Destructive Examination)
NOS	:	Noise Specification

NSR	:	Noise study Report
O&M	:	Operation and Maintenance
OCS	:	Overall Construction Schedule
OPEX	:	Operational Expenditures
PAC	:	Provisional Acceptance Certificate
P&ID	:	Process and Instrumentation Diagram
PCCS	:	Project Cost Control System
PCMP	:	Project Construction Management Plan
PE	:	Polyethylene
PFD	:	Process Flow Diagram
PLC	:	Programmable Logic Controller
PMT	:	Project Management Team
PO	:	Purchase Order
POC	:	Project Organization Chart
PPC	:	Public Power Company (organization for electricity)
PPT	:	Public telephone and Communication (organization)
PRSC	:	Procurement Schedule
PRMP	:	Project Risk Management Plan
PRV	:	Pressure Relief Valve
PSPL	:	Permitting and Safety Plan
PWHT	:	Post Welding Heat Treatment
QA	:	Quality Assurance
QC	:	Quality Control
QHSE	:	Quality, Health, Safety and Environment
QM	:	Quality Manager
QMN	:	Quality Manual

QMS	:	Quality Management System
QNRA	:	Quantitative Risk Assessment
QPL	:	Quality Plan
ROW	:	Right of Way (also defined as working zone)
RPDP	:	Roads and Plant Drainage Plan
PDMP	:	Project Demobilization Plan
PQR	:	Performance Qualification Record
PRV	:	Pressure Relief Valves
PVSL	:	Potential Vendors and Subcontractors List
SAT	:	Site Acceptance Test
SBCL	:	Subcontrcators List
SBCPR	:	Subcontracting Progress Register
SCADA	:	Supervisory Control and Data Acquisition
SCLPP	:	Social Care and Livelihood Proetction Plan
SDA	:	Static Dissipator Additives
SGWPP	:	Surface and Groundwater Protection Plan
SMP	:	Stakeholders Management Plan
SMYS	:	Specified Minimum Yield Strength
SoW	:	Scope of Work
SPIR	:	Spare Parts List and Interchangeability Record
TMP	:	Traffic Management Plan
TPI	:	Third Party Inspection
T/R	:	Transformer Rectifier
TRV	:	Thermal Relief Valve
VCFS	:	Visual Check Fuel Sampler
VDU	:	Visual Display Unit

WBS	:	Work Breakdown Structure
WMP	:	Waste Management Plan
WPR	:	Weekly Progress Report
WPS	:	Welding Procedure Specification
WPQ	:	Welder(s) Performance Qualification

2.2 Units

barg	:	bar gauge
°C	:	Degree Celcius
mm	:	Milimeters
cm	:	Centimetres
m	:	Meter
km	:	kilometer
cm^2	:	sqaure centimeter
m^2	:	square meter
m^3	:	cubic meter
g	:	gram
Kg	:	kilogram
m^3/sec	:	cubic meter per second
kW	:	Kilowatt
MW	:	Megawatt
t	:	Tonne
Mt	:	Metric tonne
Pa	:	Pascal
kPa	:	Kilo-Pascal
Kg/cm^2	:	Kilogram per square centimeter
N	:	Newton
kN	:	kilo-Newton

3 DEFINITIONS

CPC	CEYLON PETROLEUM CORPORATION. Also referred as OWNER of the Project
CONTRACT	The content of the entire EPC/Turnkey CONTRACT
CONTRACTOR	The Engineering, Procurement and Construction (EPC) contractor is a single or joint venture business entity which will carry out the detailed engineering design of the project, procure all the equipment and materials necessary, and then construct to deliver a functioning facility or asset to the Owner.
Environmental Impact Assessment (EIA)	Environmental impact assessment (EIA) is the formal process used to predict the environmental consequences (positive or negative) of a plan, policy, program, or project prior to the decision to move forward with the proposed action. Formal impact assessments may be governed by rules of administrative procedure regarding public participation and documentation of decision making, and may be subject to judicial review. An impact assessment may propose measures to adjust impacts to acceptable levels or to investigate new technological solutions. It is also referred as Initial Environmental Examination (IEE).
Environmental Qualitative Risk Assessment	Is the document presenting the results of estimating risks and impacts to populations and the environment by hazardous substances or activities emanating from the construction and operation of the Project
Mechanical Completion	The checking and testing of equipment and construction to confirm that the installation is in accordance with drawings and specifications and ready for commissioning in a safe manner and in compliance with project requirements.
Non-destructive Testing (NDT)	Non-destructive testing (NDT) is a wide group of analysis techniques used in science and industry to evaluate the properties of a material, component or system without causing damage to it. NDT does not permanently alter the article being inspected. Common NDT methods

	include ultrasonic, magnetic particle, liquid penetrant, radiographic, and eddy-current testing.
OWNER	CEYLON PETROLEUM CORPORATION
PROJECT	Construction of a Jet A-1 transfer pipeline from Muthurajawela to Bandaranayake International Airport, Katunayake and construction of Jet A-1 storage tanks and associated facilities with modifications to the existing terminal facility at Muthurajawela
Punch List	A Punch List describes incomplete work or malfunction of equipment or construction.
Right of Way (RoW)	A narrow, un-obstructed strip or corridor of land of a specific width directly above the pipeline and around the supporting facilities, where some of the property owner's legal rights have been granted to a pipeline owner.
Stakeholder	A person, group, organization, member or system who affect/benefit or can be affected/benefitted by the project.
Stakeholder engagement	Stakeholder Engagement is a process of sharing information and knowledge, seeking to understand the concerns of others and building relationships based on collaboration
TECHNICAL SCOPE OF WORK	The description for the technical scope of services of the Engineering, Procurement and Construction CONTRACTOR

4 SCOPE OF WORK IDENTIFICATION

4.1 General

4.1.1 CPC intends to select a suitable contractor to design, construct, pre-commission, commission and handover and defects rectification of a Tank Farm for receiving of Jet A-1 aviation cargo from ocean tankers, storage at Muthurajawela area, Sri Lanka. The operation of the Tank Farm shall enable the transportation of Jet A-1 fuel through a dedicated 10-inch belowground pipeline to the aviation fuelling terminal of BIA, at Katunayake, Sri Lanka. The PROJECT constituents are the following:

a) Five (5) steel tanks of 92,000 m^3 total capacity dedicated for storage of Jet A-1 fuel; two (2) of these tanks shall have 30,000 m^3 capacity (net pumpable capacity of 25,000 m^3), each; the two (2) tanks shall have 15,000 m^3 capacity (net pumpable capacity of 12,500 m^3), each, and one (1) tank shall have 2,000 m^3 capacity. All product storage tanks, except the tank with 2,000 m^3 capacity, shall be equipped with floating suction units with facilities to obtain three level samples from the tanks and separate Fast Flush tanks and VCFS (Visual Check Fuel Sampler) units shall be provided for each product storage tank.

b) One (01) Dewatering tank having 50 m^3 capacity and one (01) Product Recovery Tank having 15 m^3 capacities.

c) A Pump Station comprising two (02) pumps for the Jet A-1 fuel transfer from the Tank Farm to BIA, two (02) tank recirculation pumps, two (02) pumps for the Dewatering tank, two (02) pumps for the Product Recovery tank and two (02) pumps for road tanker loading facility with two (02) independently operated gantries.

d) Two (02) Micro-Filter units and Six (06) Filter Water Separator units to be installed in the Tank Farm at Muthurajawela.

e) Installation of all required piping, equipment, instrumentation, and software for proper interconnection with the CPSTL and BIA facilities.

f) All necessary developments related to building, piping, mechanical, civil, electrical, instrumentation & control, SCADA integration, telecommunication, cathodic protection, leak detection, fuel sampling, Jet mixers for storage tanks, fire-fighting, emergency shutdown, IP surveillance, PABX, public address system, fingerprint attendance etc. systems.

g) Main Administration Building, Control room, operation buildings, rest rooms, Security Offices, Pump Stations, Buildings for Substations, Motor Control Centre, Workshop, warehouse, sheltered parking, bowser loading gantry, guard houses, shelters, etc.

h) Power supply Systems, Fire fighting systems, fire alarm system, water collection and drain collection tank, oily water management system, sewerage treatment plant, deep borehole well, plant utilities, sanitary facilities, internal access roads and pavements, engineered landscaping, fencing, steel platforms, etc.

i) Utilities and operability infrastructures, such as HVAC, watering, fuelling, sewerage, draining, Parking Management Systems, etc.

j) An internal 16-inch Jet A-1 fuel pipeline section, shall be installed in Muthurajawela and shall be connected with the existing 18-inch white products unloading pipeline of CPSTL with the piping connecting the new Jet A-1 storage Tank Farm. Installation of a product interface detection system to the existing 18-inch white products unloading pipeline of CPSTL connected to the SPM facility.

k) Interconnection with the Scraper station (launching) of the dedicated 10-inch Jet A-1 fuel pipeline which shall be constructed to send the stored Jet A-1 fuel from Muthurajawela Tank Farm to BIA fuelling terminal.

l) Installation of a metering system.

m) Interconnection with the CPSTL Firewater system through a metered connection. Separate fire fighting foam storage tanks and foam injection system shall be installed at the new aviation fuel storage tank farm.

n) Two (02) Chemical injection units including accessories and auxiliaries.

4.1.2 CONTRACTOR shall perform a complete review, checking and updating of all aspects of FEED documentation, production of detailed engineering and design studies, procurement of materials and equipment, shop and worksite testing, material receipt and storage at PROJECT sites, fabrication, construction, assembly, installation, inspection, testing, mechanical completion, pre-commissioning, initial acceptance, commissioning, Submission of as built drawings, manuals and other documents related to the project, rectification of defects and start-up of the entire PROJECT and training of OWNER'S personnel in accordance with the provisions, requirements, instructions, datasheets, specifications, drawings and any other aspects, issues and documents included in the tendering documentation incorporated into the CONTRACT.

4.1.3 CONTRACTOR shall be fully responsible to carry out and deliver to OWNER a ready for operation PROJECT and its constituents, planned, permitted, designed, constructed, equipped and tested in full accordance with high standards for transportation and storage facilities of liquid hydrocarbons industry as appropriate for fuelling of aviation systems and associated developments. Also, CONTRACTOR shall provide all required effort, resources, materials, synergies and technological means to carry out the entire PROJECT and shall, also, guarantee the level of the required quality and performance.

4.1.4 CONTRACTOR shall comply with the conditions stipulated by the stake holder organizations including the Central Environmental Authority (CEA) and Road Development Authority (RDA) mentioned in the PART-4, Reference Documents of the Bidding document.

4.2 Main Project Objectives

4.2.1 The main objectives of the PROJECT are, but not limited to, the following:

- Design, construction, Testing, Commissioning and Operation of a Tank Farm for receiving Jet A-1 fuel from ocean tankers; storage and supply Jet A-1 fuel to the BIA aviation terminal, in order to fulfil the daily demand of the target year 2030 which is predicted to be 3.5 million litres per day.
- Delivery of a Jet A-1 fuel Tank Farm of high performance, operability and reliability at CPC Terminal, Muthurajawela.
- Delivery of an Interconnection piping and accessories to deliver Jet A-1 fuel to BIA aviation fuelling terminal.
- Delivery of product interface detection system for the existing 18-inch white products unloading pipeline of CPSTL.
- Delivery of an internal 16-inch Jet A-1 fuel pipeline to connect the existing 18-inch white products unloading pipeline system of CPSTL.
- Delivery of an Interconnection piping and accessories to obtain metered fire water connection from CPSTL firewater system.
- Delivery of a sampling system and dewatering system to increase the quality of the product.
- Supply, Construction, Fabrication and installation of 02 Nos. of independently operated road tanker bottom filling Gantries to fill the Jet A-1 product for bowsers

having the capacity up to 40,000 litres, with shelters complete with batch controllers, hoses, flow meters, safety devices, fittings, pipework and all necessary accessories.

- Production of specific to the PROJECT and high quality detailed engineering and design outcome responding and complying to:
    a) The applicable international industry standards, codes, regulations, and recommended/best practices.
    b) The environmental, social and safety regulations and legislation and instructions addressed by stakeholders and authorities of Sri Lanka, being compulsory and appropriate to the PROJECT.
    c) The FEED studies, specifications and drawings and any other technical and technological input mentioned in the CONTRACT.
- Provision of high quality construction outcome with respect to international HSE and Risk management standards, ensuring avoidance of undesirable incidents during, and because of, the execution of all related to the PROJECT construction and erection activities.
- Procurement of high quality equipment and materials along with manufacturers' certifications and guarantees for long term operation, performance, serviceability and integrity.
- Provision of high quality pre-commissioning, commissioning, start-up and put in operation services with respect to international industry standards.
- Provision of any required support, training, knowledge transfer and technology updates to OWNER'S personnel throughout the PROJECT.
- Provision of any other means, resources, materials, effort and studies required for the proper and successful construction and operation of the PROJECT.

4.3 Scope of Work

4.3.1 CONTRACTOR shall be fully responsible to perform the entire TECHNICAL SCOPE OF WORK including the complete detailed engineering and design studies, procurement of materials and equipment, testing at manufacturer's shop and worksite, receipt and storage at worksite, fabrication, construction, assembly, installation, inspection, testing, mechanical completion, pre-commissioning, obtaining of Third Party Inspector's certifications, acceptance, commissioning, start-up and rectification of

defects, training of OWNER'S personnel in accordance with the CONTRACT and as indicated in the studies, specifications, datasheets and drawings of the FEED content.

4.3.2 The TECHNICAL SCOPE OF WORK of CONTRACTOR includes the following, but not limited to, principle activities:

- Review, evaluation, verification, correction, improvement, endorsement and incorporation into detailed engineering and design studies of the FEED technical documentation.
- Performing of the necessary for the PROJECT value engineering as appropriate for the proposed technical solutions, material selection and any other services related to the PROJECT execution.
- Establishment of a PROJECT specific Engineering and Construction Management system related to: production of time schedule(s), project and construction plans, organization charts, documentation management and control, progress monitoring, reporting and controlling, contract administration, risk management, manpower allocation and performance, interface management, subcontracting and full OWNER'S support
- Establishment of a specific to the PROJECT Environmental and Social management and permitting system to satisfy all the official permit requirements advised/instructed by authorities of Sri Lanka and to monitor/prevent and control any impacts identified in the specific to the PROJECT Initial Environmental Examination (IEE) documentation and conditions stipulated by the CEA.
- Performing of a PROJECT specific full package of detailed engineering and design studies relevant to all aspects of Aviation fuel storage Tank Farm area and interconnection design: topographical survey, civil and structural engineering, process and fire-fighting design, safety and risk studies, HAZOP and HAZID studies, access and pavement design, foundations, supports, levelling and pavement, retaining walls, temporary facilities design, underground utilities design, buildings and operating facilities design, control room design, geological/ geotechnical/ soil/ hydrogeological investigations, close circuit sampling system, design of a slop tank, product recovery tank, bowser loading gantry, guardhouse and sheltered parking design, seismic hazard assessment, coastal hazards assessment, stress analyses, tanks mechanical and piping design, dikes, roof walk ways connecting all the main storage tank roofs & delivery tank roofs, tank interconnecting piping, piping infrastructures (sleepers, pipe-ways and platforms), electrical and HVAC systems design, IP Surveillance Systems, PABX, Access

Control Systems, pump station and filters design, utilities design (sewerage treatment system, watering, drainage system, sanitary system, etc.), water proofing, cathodic protection, leak detection, Jet mixers for storage tanks, overhead cranes, design of instrumentation and control, telecommunication, SCADA integration and design of the PROJECT interfaces.

- Preparation and submission of an animated 3D model & video presentation for the entire Tank Farm by the selected bidder including the software applicable for reviewing model.
- Provision of Procurement services including but not limiting to: purchasing, shipping, receipt, transportation, storage, protection, delivery and certification of materials, equipment and accessories for all mechanical, piping, steel structural, concrete, aggregates, asphalt, electrical, HVAC, instrumentation, control, earthing, telecommunication items and cathodic protection, emergency shutdown system, IP surveillance system, fingerprint attendance system. Also, spare parts required for pre-commissioning, commissioning, start-up and spares for two (2) years operation and the list of spares mentioned in the bidding document shall be provided by the CONTRACTOR.
- Construction, erection, installation, fabrication and testing of, not limiting to: Jet A-1 storage tanks, down grading tank, dewatering tank, sampling system, Product recovery tank, fast flush tanks, Visual Check Fuel Sampler (VCFS) units, dykes, piping supports/sleepers/platforms/ roof walk ways connecting all the main storage tanks, belowground and aboveground piping, pipe racks, pumps and pump-house, water collection tank, oily water management system (e.g. API separator), filtering systems, fire-fighting, fibre optic cable (FOC), HDPE pipes, internal access roads/pavements, concrete/steel structures, concrete elements for the piping support, tie-ins, fabrication, installation and laying of the welded and tested piping and the 16-inch internal pipeline section, mechanical, electrical, instrumentation, fuel sampling, inventory management system, leak detection, Jet mixers for storage tanks, cathodic protection, emergency shutdown system, IP surveillance system, Client's own use diesel storage tank with two fuel dispensing pumps and canopies, deep borehole well, engineered landscaping; also, field reinstatement and PROJECT delivery.
- Installation of temporary site facilities: Air conditioned administration offices with furniture, utilities for watering, sewerage, and drainage, material storage yards, field logistics, first aid and sanitary facilities with janitorial services, transportation means, telecommunication, security services, office automation facilities, computing etc.

- Preparation and delivery of all applicable and PROJECT specific documentation: engineering and design reports/drawings/calculations, data sheets, material requisitions, inspection and testing reports for all aspects of design and construction of the PROJECT.
- Establishment of PROJECT specific Quality and HSE Management systems (QHSE), Risk management system, preparation, application and follow up of QHSE issues, plans and procedures covering all the PROJECT activities.
- Organization, planning, execution and follow up of all pre-commissioning, commissioning, start-up and put into operation activities.
- Provision of assistance to OWNER in all aspects of the PROJECT, and also, training of OWNERS personnel to all systems of the constructed PROJECT facilities.
- Production of the PROJECT final documentation packages including all the as-built drawings, reports, calculations, operating manuals, data sheets, material requisitions, construction documentation, inspection and testing reports, welding documentation, procurement and shipping documentation, mechanical catalogues, non-conformance reports, QHSE records, etc.
- Obtaining approvals and permits from stake holders and government authorities wherever applicable for the execution of above works.