


TENDER NO. PROC-FC/CB/PROD/NASHPA-3200/2018
SCADA SYSTEM FOR NASHPA WELLS

Nashpa Well SCADA System

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 Oil & Gas Development Company Ltd. Islamabad PAKISTAN				Project: Nashpa Well SCADA System	
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NASHPASCADASYSTEM

CONTENTS

No.	DESCRIPTION	PAGE
1	GENERAL.....	3
2	GENERAL DESIGN CRITERIA	11
3	SYSTEM PHILOSOPHY	14
4	SCADA CONTROL STATION	15
5	REMOTE TERMINAL UNIT (RTU) / PLC	35
6	ELECTRICAL REQUIREMENTS.....	50
7	COMMISSIONING SPARES.....	52
8	DOCUMENTATION.....	52
9	SHIPPING, STORAGE &PROTECTION.....	54
10	WARRANTY.....	54
11	TESTING & SERVICES.....	55
12	TRAINING FOR OGDCL PERSONNEL.....	58
13	TERMS & CONDITIONS.....	59
14	PROPOSED VENDOR LIST.....	61
13	BILL OF QUANTITY.....	62
14	NASHPA FIELD MAP.....	68
15	NASHPA SCADA SYSTEM.....	69
16	NASHPA SCADA CONTROL STATION.....	70

1.0 GENERAL

1.1 INTRODUCTION

Oil & Gas Development Company Limited (OGDCL) is operating Nashpa Oil & Gas Field located in Khyber Pakhtoonkhuwa province of Islamic Republic of Pakistan. The nearest city is Kohat, which is about 36 Kms from Nashpa Oil & Gas Field.

Nashpa Oil & Gas Field has currently seven producing wells surrounded within 10 km radius and Plant area for processing.

OGDCL intends to install Telemetry based Scada system at Nashpa Oil & Gas Field to monitor and control 07 producing wells through main Scada control Station at Plant area.

Nashpa Wells Parameter

Wells	Well head Flowing Pressure (Psig)	Line Pressure (Psig)	Well Head Flowing Temperature (deg °F)	Oil Production (BBLs/day)	Gas Production (MMSCFD)	Water Production (BBLs/day)
Nashpa #01	2927	1120	110	5867	28.75	54
Nashpa #02	1803	1135	170	4736	16.48	44
Nashpa #03	2042	1115	150	3310	13.74	34
Nashpa #04	2163	1135	160	4442	19.62	63
Nashpa #06	2262	1135	120	3366	12.32	67
Nashpa #07	1863	1127	140	3359	9.43	44
Nashpa #08	3000*	1130*	160*	5000*	25*	50*

*Expected

Location Co-ordinates & Distance of Wells from Nashpa SCS

Location	Co-ordinates		Distance from SCS
	Latitude	Longitude	
Nashpa # 01	33 DEG 15' 01.25" N	71 DEG 19' 26.36" E	2.8 km
Nashpa # 02	33 DEG 15' 24.70" N	71 DEG 19' 00.60" E	1.8 km
Nashpa # 03	33 DEG 15' 25.274" N	71 DEG 20' 12.294" E	3.7 km
Nashpa # 04	33 DEG 14' 48.16" N	71 DEG 18' 02.79" E	2.9 km
Nashpa # 06	33 DEG 15' 15.35" N	71 DEG 21' 36.40" E	7.0 km
Nashpa # 07	33 DEG 15' 15.582" N	71 DEG 18' 06.318" E	1.7 km
Nashpa # 08	33 DEG 15' 85.4263" N	71 DEG 19' 31.986" E	2.2 km
SCS	33 DEG 15' 57.3156" N	71 DEG 18' 26.4024" E	-

Note: Existing newly-built Control Center at Nashpa Field will be used for Scada Control Station. Nashpa Scada Control Station building Height is 5.2 meters. However tower cannot be installed on roof top of SCS.

Gas Composition of Nashpa Field

Components		MOLE %
Methane	C1	85.01
Ethane	C2	6.84
Propane	C3	3.19
Iso-Butane	i-C4	0.56
N-Butane	n-C4	0.9
Iso-Pentane	i-C5	0.27
N-Pentane	n-C5	0.23
Hexane Plus	C6+	0.36
Carbon dioxide	CO2	1.85
Nitrogen	N2	0.79
Specific Gravity	-----	0.68
Calorific value	BTU/Cuft	1148

1.2 SCOPE OF WORK

This specification defines the minimum mandatory requirements for Telemetry based Supervisory Control and Data Acquisition (SCADA) systems for Oil and Gas Development Company Limited (OGDCL) for its Nashpa Oil & Gas Field. The SCADA is a system primarily intended for data acquisition and limited remote control.

Telemetry based Supervisory Control and Data Acquisition (SCADA) systems shall have the capability to remotely control and monitor total 20 producing wells of NASHPA Oil & Gas Field. The system will be integrated with 07 current wells (under the scope of this project) and 13 more future wellheads in future (total 20).

Scope of work for Supplier shall include design, engineering, configuration, testing, supply, integration and shipment of Telemetry based SCADA system with installation & commissioning of complete system. The scope of supply / work / services shall include:-

- Design, engineering, configuration, testing & integration of Telemetry based Scada System in accordance with all technical requirements mentioned in this document.
- Supply, Engineering and Commissioning of data communication equipment radio modems, towers, repeater stations (if required between remote site and base station) etc at all well site and base station (SCS).
- Supply, Engineering and Commissioning of SIL 2 Certified Master Telemetry Unit (MTU) / Master PLC at Nashpa SCS & SIL 2 Certified Remote Telemetry Units (RTU) / PLC at each well site.
- Supply, Engineering, installation and commissioning of Solar Power Systems.
- Interfacing of SCADA system with communication system.
- Provision of OPC interface for future integration with Plant DCS.
- Integration of RTUs with communication systems.
- Supply, configuration, installation & commissioning of Field instruments (Static Pressure Transmitters, Temperature Transmitters, Flame Detectors, Hydrocarbon detectors, CCTV system, Flow Control valves etc)
- Supply and configuration of redundant servers, engineering station & operator stations with HMI, historian application and respective clients, Web server & remote clients and OPC.
- Factory Acceptance Test (FAT)

- Site Acceptance Test (SAT)
- Shipment
- Training at OEM Facility and at site
- Documentation including those related to engineering / design as well as training manual, operation and maintenance manuals.
- Configuration softwares.
- Installation & Commissioning.
- Sustained Performance Test (SPT) for 30 Consecutive Days

The SCADA System and Telemetry supply shall include SIL-2 certified RTU Controllers, I/O modules, Communication equipments, cabinets, communication cabinets, data servers, workstation and other associated required equipment for complete and reliable operation.

The SCADA System and Telemetry System Hardware, Software, Spares and all other associated equipment shall minimum meet the requirements as mentioned in this specification.

The SCADA System and Telemetry System vendor shall be responsible for the complete engineering of the system. Minimum following services for engineering of SCADA System and Telemetry System shall be provided by the supplier:-

- a. Engineering Services for MTU/RTU PLC Programming and HMI Development (Logic Development of RTU PLC, RTU Panel Wiring and Testing, MTU Panel Wiring & Testing, Redundant System Configuration, Communication with Ethernet Switches & Wireless Link)
- b. Engineering Services for Wireless Link Communication and Configuration of Field Instruments
- c. Configuration and Software Engineering Works for RTU & MTU PLC :-
 1. Design, engineering, configuration, testing & integration of Telemetry based Scada System in accordance with all technical requirements.
 2. Integration of RTUs with communication systems.
 3. Engineering and configuration of redundant servers, engineering station & operator stations with HMI, historian, web server & OPC,

4. Engineering and Commissioning of Master Telemetry Unit (MTU) / Master PLC at Nashpa SCS & Remote Telemetry Units PLC at each well site.
 5. OPC interface for future integration with Plant DCS.
 6. Configuration of complete SCADA & Telemetry System hardware
- e. Wireless Communication System Installation, Testing & Commissioning

The SCADA System and Telemetry System package supplier shall be responsible for the complete and successful commissioning of the SCADA System and Telemetry system. The supplier shall provide complete support and assistance during startup.

The SCADA System and Telemetry supplier shall be responsible for complete arrangements and planning for Factory Acceptance Test (FAT), Site Acceptance Test (SAT) and Training.

Third Party Inspection will be engaged by OGDCL and will be carried out at vendor's site. However vendor shall provide facilities and support to Third Party Inspector.

1.3 CODES AND STANDARDS

Following codes and standards, in addition to the others, Contractor recommend to use, shall be applicable:-

ANSI	American National Standard Institute
API RP-500	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum, Facilities
CPU	Central Processing Unit
DC	Direct Current
DCS	Distributed Control System
GSM	Global System for Mobile communication
GPRS	General Packet Radio Service
HMI	Human Machine Interface
ISA-584.01	Application of Safety Instrumented System
I/O	Input/Output
IEC-31	Electrical apparatus for explosive atmosphere
IEC-79	Electrical Equipment for Explosive Gas Atmosphere.
IEC-331	Fire Resistance Characteristic of Electrical Cables
IEEE 802.3	Ethernet TCP/IP
ISO	International Organization for Standardization
IT	Information Technology
LCD	Liquid Crystal Display
LAN	Local Area Network
MTU	Master Telemetry Unit
ODBC	Open Database Connectivity
PLC	Programmable logic Controller
P & ID	Process & Instrumentation Diagram
RAM	Random Access Memory
ROM	Read Only Memory

RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SAT	Site acceptance test
SCS	Scada Control Station
TCP/IP	Transmission Control Protocol/Internet Protocol
UPS	Uninterruptible Power Supply

1.4 **UNITS OF MEASUREMENT**

Pressure	Psig.	Pounds per square inches of gauge.
Temperature	°F	Degree Fahrenheit.
Mass Flow	lb/h	Pounds per Hour.
Density	lb/cu ft	Pound per cubic ft.
Heating value	MMBTU/ h	Million BTU per hour.
Volume Flow	MMSCFD	Million standard cubic feet per day.
Pipe diameter	in	Inches

1.5 **AREA CLASSIFICATION**

All instruments shall be certified as EEx'd IIA / IIB per ATEX /UL Directive. All electrical installation materials shall be suitable and certified for use in this area classification and shall have weather protection to IP 65 as minimum.

1.6 ENVIRONMENTAL CONDITIONS

Care should be taken during the selection of the instrument, so that the selected item can withstand the effects of moderate ambient temperatures coupled with high humidity.

- Ambient Temperature Range 0-50 °C
- Relative Humidity 20-65 %
- Maximum Rainfall (Annual) 175 mm
- Wind Velocity 10 - 120 Km/hr

1.7 DESIGN LIFE

The equipment and accessories shall be suitable for a minimum period of 15 years continuous operation, without the need for a complete system revamp due to technological obsolescence. Bidders to provide written confirmation in their technical bids. It shall be noted that obsolete, discontinued or expected to be discontinued in near future products are not acceptable and may lead to rejection of bid.

1.8 Deviations

All deviations from the requirements of any of the listed or attached Data sheets, specifications, codes, standards, regulations, guidance notes, etc. shall be clearly stated in the bid and agreed with OGDCL before proceeding.

2.0 GENERAL DESIGN CRITERIA

- a) As general criteria, the design of all system shall be in accordance with:-
 - a) Approved safety codes and local regulations
 - b) Good engineering practices and design guidelines
- b) The SCADA equipment shall be a standard product with minimal modification to suit the project needs.
- c) System security shall be maintained using an "area of responsibility" login and multilevel password system, which will allow specified levels of system access according to the password assigned.

- d) All systems shall be based on open architecture with full support to third party DCS, PLC, transmitters, hardware, software, etc.
- e) The SCADA / HMI software will of latest version and complete in all respects including compiler, editor (with hard lock / soft key if applicable), screen developer, database handler, programming / operational manuals, etc.
- f) All computer systems shall consist of industrial grade products designed to work in a control room environment with no special air conditioning requirements.

2.1 SYSTEM SIZE AND EXPANDABILITY

SCADA system shall be sized with sufficient spare capacity to allow for expansion and flexibility of operation. System sizing shall be based on an estimate of functionality of the 20 Nos. RTU. This shall include SCADA IOs, Tags, displays, Database, memory, Master Radio Capacity, MTU processor speed/memory sizing, no. of communication ports and all respects not mentioned here.

In addition to above requirement, SCADA system shall be completely modular in terms that it should be expandable by addition of proper software / hardware modules when capacity is required for more than 20 wells.

2.2 RELIABILITY

SCADA system shall have a high level of reliability achieved through redundancy and the design of the system. The system shall be designed such that the occurrence of a single unplanned incident will not result in the loss or degradation of performance of any data monitoring or control, In addition, as a result of such an incident, no damage to any process or loss of delivery or acceptance of product on the SYSTEM shall occur.

The system shall perform periodic checks of its own health and promptly report any problems to the operator. The system shall also monitor the status of communication circuits and maintain statistics to warn maintenance personnel and aid in troubleshooting.

2.3 AVAILABILITY

The SCADA system shall have an availability of at least 99.9%. The system failure time shall be reckoned as the time that the full functionality of the system is not available and this period of time shall be measured in hours and whole minutes, during which the productive work of operators cannot be carried out due to a failure of any item of hardware or software comprising the system.

Intervals between successive periods of system failure time that are 30 minutes or less are deemed to be system failure time. The system failure time shall not exceed 0.1% when calculated on a monthly basis.

The design shall ensure that no interruption of the real time system occurs when the system is concurrently performing other functions (printing, programs, displays, etc.)

2.4 OPEN SYSTEMS

The system shall be open such that SCADA system shall allow for access to the realtime SCADA data by other application programs and other users within the organization.

2.5 MODULARITY

The design of the system at the NASHPA Scada Control Station shall be modular so that modules can be added, removed and relocated without reloading and reconfiguring the core SCADA system.

The hardware shall be modular in nature to allow for future expansion in capacity and performance. The system shall allow the easy addition of disks, memory, terminals, processors and peripherals without disrupting the on-line operation of other parts of the network.

2.6 FLEXIBILITY

The system shall allow any of the workstations to perform any of the functions provided with appropriate access level. For example, any of the workstations at the NASHPA Scada Control Station can be used as an operator's terminal.

3.0 SYSTEM PHILOSOPHY

OGDCL Nashpa SCADA System shall be composed of main Scada Control Station and the following Wellhead locations:-

PLC / RTU No.	LOCATION
PLC / RTU – 1	NASHPA-01
PLC / RTU – 2	NASHPA-02
PLC / RTU – 3	NASHPA-03
PLC / RTU – 4	NASHPA-04
PLC / RTU – 6	NASHPA-06
PLC / RTU – 7	NASHPA-07
PLC / RTU – 8	NASHPA-08

The SCADA Control Station (SCS) will consist of a Redundant SIL2 Certified Master PLC / MTU, Redundant SCADA Servers, Operator Work stations, Historian, Web Server / Remote Web Clients, EWS Station, Network Cabinet, Redundant Master Radio and Printer. Each wellhead will be equipped with an SIL2 Certified RTU, Radios, communication antennas, various transmitters & sensors. The entire system will be remotely monitored and operated from the SCADA Control Station.

At HMI Layer, SCADA Servers shall act as main controller for the SCADA system. The system shall be based star topology network with the SCADA Server as its hub, and the wellsite RTUs/PLCs as the nodes.

4.0 SCADA CONTROL STATION (SCS)

4.1 **GENERAL**

The SCADA Control station will monitor and control the operation of 07 wellhead remote terminal units/PLC's.

The SCADA Control station shall include, but not necessarily be limited to the following equipment:-

- One Telecom cabinet with 1+1 Redundant Radio System
- Redundant Ethernet based Network Backbone
- SIL2 Certified redundant Master PLC/MTU, Cabinet and Accessories
- Cables and connector
- Communication Antennas
- Redundant SCADA Servers, 03 Operator Stations along with necessary OS, application runtime and development software, web application, OPC application, Historian license
- 01 EWS station for SCADA with necessary OS, development, configuration, modification software & licenses for SCADA application + HMI + MTU + Radio
- Firewall for web connectivity
- Web client licenses (05)
- 01 Color LaserJet Network Printer
- Workstation furniture (Console + Chair) 05 sets complete with power distribution and wiring arrangement.
- 1 Mobile Workstation (Laptop) with necessary OS and RTU development, configuration, modification software & licenses

The SCADA host equipment, located at the Central Control Center (CCR), shall be based on a Client-Server architecture (Mandatory requirement). Stand-alone or independent nodes based OWS options are not acceptable. All servers, workstations, MTU, Printer etc. are interconnected by a LAN.

At SCS, there will be two Master radios for redundancy purpose covering entirely 180 degree angle and if one fails, other radio automatically takes over the entire communication links. Each radio at well site will communicate with the Master radio.

Data shall be available on the Local Area Network (LAN) via OPC server from the main control system. This includes operator monitoring on the workstation, printing out data on printer, transfer of data and importing of data.

The system data highway shall be capable of doubling of a node and capacity without any downgrading of performance, As far as possible data highway shall be configured to keep as much of the system live as possible in the event of an explosion or fire in a localized area of the facility, This shall include considering the segregation of loops, rings, sections of highway/ peer way etc. This shall also mean that loops/rings/highways/ peer ways shall have the redundant cable run by completely separate routings as far as practical.

4.2 MASTER PROGRAMMABLE LOGIC CONTROLLER (PLC)/ MTU

TUV SIL2 Certified redundant Master PLC / MTU (Master Telemetry Unit) will be used for all data interface and control for the SCADA system. Using a base radio unit, Master PLC will poll data or directly communicate from each one of the well sites RTU's/PLC's. Mode of data transmission will be full duplex. Master PLC/MTU will start scanning the remote RTU's/PLC's and generates an alarm, if any one of the RTU/PLC does not acknowledges. 07 wells will communicate with the Scada Control Station (SCS). The SCS will be configurable to link with minimum of 20 wells without upgradation or addition in the SCS hardware / software.

Master PLC/MTU will have redundant processors, redundant communication cards and redundant system & bulk power supply for redundancy purpose. Line conditioners will be supplied and installed with the Master PLCs/MTUs for protection against power surge and spike.

General:-

a	Processor	32-bit
b	Memory	Minimum 4 Mb System memory
c	Non Volatile RAM	CMOS RAM with lithium battery retains contents for 2 years with no power
d	External Storage	Option for extendable SD card option
e	Time stamp Resolution	5 ms or better
f	Hot Replacement Under Power	Yes (including controller modules)
g	Bump-less Transfer between CPUs	Yes
h	Power Input:	220 VAC (Input from UPS provided by OGDCL)

i	Construction	Modular Construction (On-board IOs are not acceptable). Each IO module shall have its own terminal block
j	Enclosure Type	NEMA 12 / IP56, Powder Coated Sheet Steel Installed in SCS Cabinet Room
k	Operating Temperature	0 – 60 Deg. C

Redundancy:-

a	CPU	Yes
b	System Power Supply	Yes
c	Field Power Supply	Yes
e	Communication	Yes
f	CPU Chassis	Yes
g	IO Channels	No (Simplex)

Communications:-

a	Serial Ports	RS-232 (01), RS-485 (02)
b	Serial Protocols	Modbus RTU, Modbus ASCII, Profibus, field bus,
c	Ethernet Port	RJ45, 10BaseT (02 ports)
d	Ethernet Port Protocols	Modbus TCP, Modbus RTU in UDP, Modbus ASCII in UDP,
e	Network Protocols	IP: ARP, TCP, TFTP, UDP, ICMP

Input/Output:-

a	Analog Inputs	One AI card, 4~20 mA, Total 8 Channels
b	Analog Outputs	One AO card, 4~20 mA, Total 4 Channels
c	Digital Inputs	One DI card, Total 16 Channels, 24 VDC All DI's should be short circuit protected.
d	Digital Outputs	One DO, Total 16 channel, 24 VDC All DO's should be short circuit protected and have interposing relays.

All installed cards must be fully wired till marshalling

Certifications:-

a	SIL 2	MTU shall be SIL2 Certified from TUV. TUV Certificates shall be submitted along with bid package
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MTU will be interfaced with Nashpa Plant DCS/ESD through Hardwired signals. These signals will be used for tripping purpose. In case of any shut down situation, signals from plant DCS/ESD will be received in MTU through DI module. MTU will further transmit alarm signals to SCADA servers and shutdown signals to Nashpa field wells through radio communication.

Master PLC/MTU shall support data manipulation, such as alarm configuration, timer / counter operation, elementary mathematical operations, and scaling of analog inputs.

Minimum of following communication ports are required:-

- With redundant radios for communication to Wellhead RTUs/PLCs.
- For connection with 16-port network switch for onward communication with Servers, EWS stations, printer, Master Radio, Operator Stations & DCS etc.
- For Master PLC/MTU programming.

Bidder can offer any system equivalent or better than the above recommended Master PLC/MTU based design. The proposed alternate solutions shall be capable of handling all the design parameters, stated in this ITB. Complete PC based solution will not be acceptable.

4.3 COMMUNICATION SYSTEM & RADIOS

Supplier shall provide and establish the license-free communication system between Scada Server Station & remote well sites.

Master radios at the Scada Control Center will be redundant to communicate with the remote radios at well-sites for data & video communication with automatic changeover to the redundant radio link at SCS in case of Master link failure. Radio communications shall have enough bandwidths to accommodate data & video with 50% free spare bandwidth. Vendor to estimate the bandwidth requirement as per RTU traffic & CCTV data. Vendor to provide bandwidth calculations with technical proposal to prove this.

Supplier is responsible for carrying out field survey for the communication systems. In this regard, procurement & installation of communications towers, laying of necessary cables & wiring from antenna to radio system will be the responsibility of Supplier.

Supplier to ensure with warranty that all communications between Scada Control Station & remote RTUs/PLCs shall takes place with 100% satisfaction and in accordance with the design of ITB documents.

Surge protection will be supplied with each Radio at site. Supplied radios shall have auto sequence mode.

Supplier shall ensure that newly installed radio equipment shall not cause interference to existing installations or be interfered by any equipment or frequency.

4.3.1 SPECIFICATIONS

1. Operating Performance

- a) Active standby redundancy shall be provided at Master Radio Station.
- b) Radio station at RTUs and SCS shall have both Serial RS485/RS232 and Ethernet ports.
- c) Offer a QoS (Quality of Service) that enables prioritized handling of 802.1p tagged traffic.
- d) Support CIR to guarantee minimum bandwidth to users and PIR to control maximum bandwidth to users to support tiered services.
- e) Capability to program with separate service flows to support serial data, video surveillance, Internet browsing from the same location.
- f) Support latency less than 12 msec for PMP systems.
- g) Provide support for optical-line-of-sight (OLOS) and non-line-of-sight (NLOS) capabilities.
- h) Offer adaptive modulation and coding with modes available from BPSK 1/2 to 256 QAM 7/8.
- i) Provide support for transmission of 240,000 packets-per-second (pps) without loss of data while passing both small and large packets.

2. Throughput

- a) Flexible frame size and variable DL/UL ratio permitting higher uplink capacity for applications such as SCADA and high-definition video.

- b) Support of MIMO-A, MIMO-B and OFDM in the uplink and downlink directions.
- c) Packet transmission: Pass >240,000 packets per second without loss in latency or data capacity performance.

3. **Security**

- a) Secure transmissions with an equivalent military level/standard of encryption.
- b) System shall offer AES encryption with 128 or 256 bit key level options.
- c) Be compliant with National Institute of Standards and Technology FIPS 140-2 Level 2 standard.
- d) Support security for management access using SSH and HTTPS.

4. **Video Performance**

- a) Custom software for video applications to support:-

- i. Caching I-Frame bursts

- Processing P-Frame small packet showers

- iii. Multicast video support

5. **Safety**

- a) System shall be certified to IEC, EN, and UL/CSA 60950. These certificates shall be provided with the bid package.

- b) Support active safety programs:-

- i. OSHA

- ii. Job Safety Analysis (JSA)

- iii. Subcontractor Qualification

- Program

- iv. ISNetworld-Safety Statistics Tracking and Reporting
- v. Risk Assessment and Mitigation vi. Incident vii. Emergency Response Program (ERP)

6. Environment

- a) Extended temperature: Operate from -10°C to +60°C
- b) Corrosion proof
- c) Hazardous certification: ATEX/UL/Class 1 Div. 1/2
- d) Availability of industrial accessories: Cables, mounts, surge arrestors
- e) Meet ETSI EN 301 489-1 V1.4.1 and ETSI EN 301-489-3 V1.4.1 for RFI/EMC
- f) Water/Dust impermeability: Certified for IP-67 and IP-68 Ingress Protection

Note:

Satellite communication can be quoted instead of radio communication or as optional communication. However it shall meet the specifications already mentioned in the clause 4.3 of tender documents. Please note that if the quoted main communication does not meet the tender specifications, then its optional quoted redundant communication will also be rejected. For Satellite communication, bidders must quote the following:-

- a. Minimum 10 Mbps bandwidth dedicated uplink from each well head to Nashpa Control Centre.
- b. Minimum 3 Mbps bandwidth dedicated downlink from Nashpa Control Centre to each well head.
- c. Minimum 80 Mbps bandwidth dedicated downlink for Nashpa Control Centre.
- d. Minimum 24 Mbps bandwidth dedicated uplink for Nashpa Control Centre.

In order to bring the Satellite communication at par with other license free bands, all costs and charges (installation, maintenance & monthly rental charges) to be incurred for a period of 15 years (the design life of Scada system as per clause 1.7 of tender specifications) for the Satellite communication shall be borne by the vendor and shall be provided & incorporated in the financial bid. This shall include (but not limited to)

initial supply, engineering & installation, maintenance, monthly/yearly subscription fees and any other charges.

4.4 SCADA CONTROL STATION SERVERS

Scada Control station shall consist of a redundant configuration, hot standby, industrial grade, high end, server computer system. Redundant server computers will be interlinked on a high speed Ethernet, using a redundant network switch, with each machine database maintained synchronized. In the event of a failure, the standby machine will automatically assume control of all peripherals and the communication lines without initiating a re-boot of the standby computer.

Each Server computer will have two hard disks connected through RAID controller. The mirror hard disks will automatically backup entire data of the master hard disk. Upon failure of the master hard disk, mirror hard disk will take over the operations, automatically or through operator assistance, without causing a re-boot of the computer.

Each Server computer will have OPC application for maintaining data in OPC database and Web server application for providing access to 05 remote clients.

One peripheral high speed color LaserJet network printer will be supplied, automatically accessed on Ethernet by either Server machine or Operator stations. Printer will be primarily used for printing events, system alarms, status changes, system reports, screen prints, graphs and historical trends.

SERVER STATION & REDUNDANT SERVER STATION

ITEM	DESCRIPTION
Processor Type	1 x Intel Xeon
Memory Type	32 GB (2 x 16GB) DDR4, Expandable

HARD DISCS Type	2 x 1TB, Hot-Pluggable Hard Discs
Operating System	Windows Server 2012 or latest including Antivirus software
DVD Drive	1 x DVD-RW Drive
Network Interfaces	2 x Gigabit Ethernet Ports
RAID Controller	SATA Array Controller with minimum 1GB Cache with support for RAID 0, 1, 5
Power Supply & FAN	Simplex fans & power supplies
System Peripherals Ports	VGA port, USB ports, management LAN etc
Form Factor	Rack/Tower with required mounting kit to accommodate servers in cabinet.
Rack Console	Min 17" Monitor with Touch with Mouse & Keyboard Console kit
Warranty & Support	3 Years on site by authorized service partner backed by manufacturer

4.5 16-PORT NETWORK SWITCHES

Supplier shall provide two 16 port network switches for interconnection of servers, EWS, operator stations, fire wall, master radio, printer & other peripheral devices. These must be Layer 2 managed switches for better security of data and network.

4.6 OPERATOR WORK STATION (OWS)

Supplier shall provide 03 Operator Stations interlinked with Server machines through HMI application on a high speed Ethernet.

Operator Station	
i	Intel Latest
ii	16 GB RAM
iii	1 TB Hard Disk
iv	24" color LED monitor
v	WINDOWS latest version, 64 bit
vi	Licensed Anti-virus

vii	External speakers for audible alarm annunciation
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These Operator stations obtain data from the main Scada Servers databases through HMI application and display them on monitor screens for the operators to supervise and make adjustments to set points, to tweak processes and start or stop certain parts as and required operationally.

It shall be noted that One OWS station shall be installed at telemetry office which is around 800m apart from SCS. This OWS shall also be a client to SCADA servers located in SCS. LAN network shall be extended using 12 core fiber optic network for this OWS station at telemetry office. OGDCL will supply and lay fiber optic cable between SCS and telemetry office. However supply, splicing, installation and commissioning of fiber optic accessories at both ends will be responsibility of the SCADA contractor.

It shall be further noted that display of the OWS station installed in telemetry office is also required to be displayed in adjacent Field Manager’s (FM) office as well. This means that one 24” display will be supplied with OWS in telemetry office and one 40”/42” display shall be supplied in adjacent FM office.

Remaining Two OWS stations shall be installed at SCS along with SCADA servers. These two OWS will have single display.

4.7 ENGINEERING STATION

Supplier shall provide 01 Engineering Station complete with HMI Design Software, MTU/PLC application software, Radio configuration software and any other software/licenses which are necessary for desired operation SCADA system as a whole.

Engineering Station	
i	Intel Latest core i7
ii	16 GB RAM
iii	1 TB Hard Disk
iv	24" color LED Display
v	WINDOWS latest version, 64 bit
vi	Anti-Virus License

4.8 ENGINEERING LAPTOP

Supplier shall provide 01 Engineering Laptop complete with RTU application development software, Radio configuration software and any other software/licenses which are necessary for desired operation SCADA system as a whole.

Engineering Station	
i	Intel Latest core i7
ii	16 GB RAM
iii	1 TB Hard Disk
iv	15" Display
v	WINDOWS latest version, 64 bit
vi	Anti-Virus License

4.9 WEB/REMOTE CLIENT STATIONS

The bidder shall provide a remote access mechanism for Enterprise-network viewer or remote HMI which makes use of an encrypted communication path.

The encryption model used to secure remote viewer and connections shall be based on an industry-recognized cryptographic algorithm and shall not depend on proprietary solutions.

A web server shall not be necessary for the use of remote access connections to provide viewer to a remote HMI to minimize the security risks inherent in the deployment and maintenance of a web server.

The SCADA system shall provide client access using Microsoft® Windows Terminal Services. Windows Terminal Services gives users the capability to start an application on a central server within the SCADA system, and view and interact with it from their remote computer as if it were running locally. Users can navigate through displays, select items, make, view trends, view events, and perform all of their tasks. No special setup or conversion is required. All of the display navigation, toolbar buttons, alarm banners, and data work exactly the same as on a standard Operator Station.

Using the Windows Terminal Services Client the user views a single window on their local desktop (the Terminal Services Client window). This client visually "contains" the entire desktop of the Terminal Server, and the SCADA client application windows within.

The SCADA system will support the use a solution similar to the Microsoft® Terminal Services solution. The solution will not constrain the user experience to a single window that "contains" the entire desktop of the Terminal Server. This will appear the same as if the client application was running locally on the user's Computer.

The remote client will have displaying capability exactly similar to the display of local HMI stations of the SCADA system. However remote clients will be used for monitoring purposes only and functionality to send any control commands will not be provided/available for remote client users.

A total of five (05) remote clients are to be offered by bidder in his proposal. Software and Licenses of the remote clients should be offered as such that five (05) remote clients can be logged-in or connected to the main servers simultaneously.

Using all remote clients simultaneously should not degrade or limit performance of any remote clients, local HMI clients or overall SCADA system in any respect.

Security of data is essence of remote communication. Bidder should include in his bid any hardware like firewalls, DMZ etc. bridge machines and software like anti-Virus etc. for the protection of data and to ensure overall cyber and network security of the system.

4.10 OWNERSHIP OF SOFTWARE

All software licenses should be issued/registered in name of OGDCL and this registration should be verifiable from OEM database. Trial / Demo /Cracked versions are not acceptable.

All licenses shall be perpetual and for life time registered in name of OGDCL.

4.11 DATABASE

The system shall have an intuitive on-line database builder capability which shall allow the operator to define and revise the system database, with field areas for tag name, description, engineering units, engineering conversion factors and alarm levels fields and alarm action fields. The database construction procedure shall be simple fill-in-the-blank format with associated help "pop-up" dialogs.

The constructed database shall be searchable by simple software query language statements. The system database may be constructed off-line by standard PC application programs and allow direct bi-directional database exchange with standard PC software. DATABASE shall also be used for OPC application.

Bi-directional Dynamic Data Exchange (DDE) capabilities will be provided between the system and PC application database and spreadsheet programs.

4.12 HUMAN MACHINE INTERFACE (HMI) SOFTWARE

The graphical user interface (GUI) based HMI editor will allow the system designer to intuitively define and build on-line, one-line and tabular screens to display dynamic, schematic and system diagrams. The full graphics editor will allow the creation of custom display backgrounds using a full set of graphic drawing tools: lines, rectangles, polyline, circle, arc, rubber-banding, flood fill, bit-map editor, cut and paste, etc., and a library of industry typical symbols.

Graphical displays shall show all primary process lines, major equipment and actuated valves. All equipment shall be shown tagged with proper identification. All dynamic displays shall be linked to and updated from the real time database. Functionality and aesthetics of the system shall be optimised.

HMI software shall be properly licensed on the name of the Company. Supplier shall submit the relevant licensing document and agreement to the company before handing over the project. Preference will be given to soft key based license. Supplier shall be asked to avoid, if possible, use of hard lock key / dongle type HMI license protection.

4.12.1 HMI SOFTWARE OPERATION

The Customised HMI software / application will be capable to give the operator system control from the workstation. The application shall include the following screens:

- Overview screen
- Graphical interface for the entire SCADA System

- Alarm summary with standard sequence
- Controller faceplate for each PID block c/w tuning accessibility
- Real time trending for all analog inputs
- Menu

All screens layout and system functionality shall be subject to OGDCL approval. The application shall also be responsible for all data management related to the SCADA system, received from the RTUs/PLCs. The application shall decode all data and write it into the real time database files as necessary for system operation.

4.12.2 HMI SECURITY LEVELS

The SCADA System will have provisions to limit access by password assignment of an operator to assigned levels within the system. Overall system security will be distributed on following levels:

Password Level	Access
Operator	View, Print
Supervisor / Engineer	Change set point, view, print
System Designer	Configuration, set points, menu / system edit, forced values
Remote Monitoring	Monitoring only. No change allowed.

4.12.3 NAVIGATION

Navigation down one level will be through icons or function keys. Navigation up one level will be through the escape key. Moving between Units or Systems is allowed only through the overview screen.

The primary display screen for the SCADA System will be a map showing location of wells and pipelines. When a user clicks on a location on the map, a detailed display will be shown. Each type of site will be represented by a unique symbol.

The map display will show the location of the sites and their status, generally the alarm status. This status will be green for site within limits, red for a site with an alarm. A site in alarm will flash red until the alarm is acknowledged (normally by the operator, although old alarms are sometimes acknowledged automatically by the system if it is configured to do so.) A site where nothing is currently in alarm, but had a previous unacknowledged alarm that occurred and then cleared, will be yellow.

The user can use the mouse to select an area of the map and zoom in on that area. This will provide better map detail, and will also provide better definition of the sites for which he is responsible. He will also be able to choose to view the map with cultural detail shown (roads, pipelines, waterways) or uncluttered by this information. Cultural maps should be easy to import using graphic file formats.

The SCADA System will also provide a flyover capability. When the user positions the cursor over a site on the map, additional information about that site will be displayed in a small popup box. For example, positioning the cursor over a well would display specific information about that well.

4.12.4 COLOR CODING

Following shall be the object colours for the HMI application:-

Background	Blue
Active Line	Green
Passive Line	Yellow
Valve Fully Open	Green
Valve Fully Closed	Yellow
Faulty Condition	Flashing Red
Alarm	Flashing Red

For items display not listed above, use industry standard color coding.

4.12.5 ALARM PROCESSING AND ESD ACTIONS

The system shall provide timely and secure detection, processing and annunciation of alarms. Incoming alarms shall be time stamped upon receipt at the Scada Control Station. Alarms may be categorized as events, alarms (audible, visual, printed), critical and ESD. ESD alarms will immediately action audible annunciation.

Status, analog and system alarms will be maintained until acknowledged by the operator and will be maintained in a retrievable chronological historical descending log display starting from the most recent ones to the most previous.

Incoming events will be written to an event log and an alarm log. Events/alarms will be held in the log in chronological order. The alarm log will identify the event as an unacknowledged alarm until action by the operator. The alarm log can be filtered for alarms acknowledged or unacknowledged and can be filtered for display in categories by RTU/PLC, by Master MTU/PLC, by status, and by analog. The operator can acknowledge a single alarm or can highlight a group of alarms for acknowledgment. Alarms from shutdown facilities and failed IO may need to be inhibited to eliminate distracting alarms. Alarms must be inhabitable both individually and by group. A list of all currently inhibited points must be available.

The alarm software subsystem shall be capable of processing alarms at a continuous rate of at least 60 per second. Alarms in excess of the maximum rate shall accumulate in a queue capable of buffering a minimum of 1,000 alarm events without loss of any alarms.

Events/alarms shall appear on the display and print logs shall be formatted to provide at least the following data:

- date and time alarm received
- tag number of the instrument
- description of the device
- alarm condition or alarm value (with engineering units)
- RTU/PLC name

4.12.6 HISTORICAL DATABASE AND TRENDING

Dedicated historian application for Servers and OWS with historian capability shall be provided with the SCADA system which shall retain minimum 02 years of complete data of SCADA operation.

Data points in the system shall be assignable into an historical database. Points can be defined as entered into the database on a defined frequency and/or on the basis of a

delta change in value. Points may be retrieved from the database for trending display on the operator workstation. The trend display shall be scalable as to time period, time duration and value scaling. The precise value in the trend shall be displayed by a point and click method.

Real-time trends are records of readings as SCADA Host receives them-the reading at the current time. SCADA Host does not retain the readings when you close the trend function. This function is useful as an operational tool e.g., checking the current status of any point or device.

Historical trends are records of readings that the SCADA Host stores when it is connected. The points must be configured for historical trending to retain readings. The database contains records from any time in the past as well as current time. These trends also come from field device stored trends.

The SCADA Host must have the capability to trend all database points sourced from trend files, history files, AGA files and real-time data. Trend views for a specific point may be accessed with a right mouse click on the selected point from a viewing screen or by selecting trending from a tool bar.

The trending function will allow user configurable multiple trend display windows for any data stored within the system.

Each window supports user selected multiple trend displays for a user selected time period. These trend points, obtained from pick lists, may be selected from the same RTU, multiple RTUs, calculated values or any combination.

Multiple trend windows may be open at the same time.

Users may access trend views by selecting “new” or “saved view”. Trend views can be manipulated using standard Windows copy, paste, save, save as functionality. Saved views will be managed by user login. Saved view files may be e-mailed to another user.

Each window may display real-time or historical data or a combination. Maximum of 12 items could be trended on one Trend screen. Trend screens can be displayed with a shared Y- axes, combined Y- axes or a stacked Y-axes. All axes should be color-coded and labeled with the appropriate symbol. The X axes will represent time and date. The trend

windows should incorporate zoom in/out capabilities. For each trend view a tabular representation will be available.

The historical data may be selectively extracted by point, duration and value for analysis by third party application software.

The trend display may be viewed dynamically as points are entered into the historical database.

Alarms may be set in the historical database to print, annunciate or perform actions on crossing an historical level rate of change.

4.12.7 REPORT PRINTING

In addition to reports generated by the SCADA system, the user shall have the ability to define any graphic display in the database for periodic or manual printout as a hard copy report. This function shall include manual print screen actions and scheduled automatic hard copy logging of operator screens and historical data trend graphs.

The utility shall allow the operator to incorporate, import or insert predefined objects (OLE) such as company logos, symbols or pictures into the report. Predefined trend graphs may be incorporated in or appended to a report.

4.12.8 GENERAL FEATURES OF HMI

The HMI package should support OPC, ModBus, TCP/IP communication protocols. The HMI package displays shall be based on the P&ID diagram with dynamic displays of valve status, pressures, temperatures, detected HC level, chemical tank level, and pressure status points.

The HMI Package must have the following features:-

- ODBC compliant -Provide corporate connectivity for multiple remote masters (servers). This would provide a corporate database that would be automatically updated for selected fields and newly created data points in the remote masters, providing true global data point additions.

- Ability of host to communicate with and automatically update clients utilizing a minimum bandwidth.
- Ability to support intranet style thick client access and client to inter/intranet web server.
- Form approach to adding additional points.

Supplier shall provide, in writing, five years HMI Software Operational Guarantee (SOG) for providing technical support, through email, telephone, fax, courier etc. during debugging, fault rectification and/or modification of the HMI software. Supplier will not be required to depute its system engineer to site, but only be required to coordinate and provide assistance through means of communication available. If software problem exists, then Supplier or its system developer can have access to the Scada Control Station, using latest internet communications.

The SOG shall cover service and support for the HMI master software, through HMI software vendor, and HMI engineering support through the Supplier or its subcontractor's system software developer / engineer. During entire period of SOG, response time for assistance should not exceed one working day.

HMI software shall have the capability to reconcile the flow values with main header and shall incorporate a correction factor if there is a difference in flow calculated by RTU at each well and flow at common header. For this reconciliation, OGDCL will measure the flow of each well at common header by portable type multiphase flow meter and if there will be a difference, OGDCL SCADA operators shall be able to input a correction factor in HMI so flow, displayed and recorded, in SCADA system shall be based on both values i.e. RTU reading and correction factor.

4.12.9 FLOW CONTROL LOOP

The process data associated with the Flow control loop in HMI would include:

PV or MV

The process variable or measured variable. This is the measured value of the process output – in this case, the flow measurement. This value resides in RTU and is calculated on AGA based after the inputs of Static pressure transmitter, Differential pressure transmitter & Temperature transmitter.

SP

The setpoint value, which is the desired value for the process variable (PV). The desired setpoint value can be entered by an operator or can be received from other systems as well (such as plant DCS/ESD system).

OP

The output variable from the RTU. The output signal is transmitted from the RTU to an actuator of FCV through electro-pneumatic positioner to make an adjustment, if necessary, depending upon the difference between PV/MV and SP. **Mode of operation**

The RTU controller receives the setpoint value (SP) from MTU and get the measured value of the process variable (PV) & position transmitter, then calculates and sends an output signal (OP) to the actuator accordingly.

4.12.10 DIAGNOSTIC AND MAINTENANCE

The Packager / Vendor shall provide Diagnostic software to generate, display and print diagnostic reports on all of hardware components of the system.

A comprehensive set of diagnostic facilities shall be provided and shall include following basic requirements:-

- Software Fault and Error Detection and Reporting;
- Hardware Fault Detection and Reporting;
- Peak System Computer Loading Statistics;
- Data Communications (Radio health status, Faults/alarms, Alarm logs, Configuration, Administration).

Error conditions caused by either software or hardware shall be clearly distinguished. The system shall contain a comprehensive error detection system to ensure errors are detected and reported as an error message on the system.

It shall be possible to isolate and troubleshoot individual communication links without impacting the operation of the rest of the SCADA system.

4.13 PANEL BOARD

A separate Panel board (power distribution board) for meeting power requirement of the Scada Control Station equipment, shall be installed at a location marked by the company. The Panel board shall be floor mounted at least 4 feet from the finished floor.

Power input of this panel board will be output of UPS system which will be provided by OGDCL. Vendor to submit total power requirement of SCADA system along with all peripherals for proper UPS sizing by OGDCL.

All cable entry shall be from the side, bottom or top. Entry holes or knock-outs shall be gasketed after cable installation.

Feeder connections to the main Breaker shall be made with appropriate size lugs for each wire. Phases shall be marked using a ribbon or sleeve to identify each wire in a circuit.

After installation and wiring, the inside of the panel board shall be cleaned and vacuumed to remove all metal filings and other bits of debris. All circuit breakers shall be left in the off position.

Panel board shall be designed for 150% of the maximum load calculated for the Scada Control Station. Spare breakers (for the remaining 50% load) shall be provided within the panel board for future load requirements.

4.14 Floor Standing Modular Indoor Enclosure for Master PLC/ MTU

A dedicated floor mounted modular indoor enclosure is required to accommodate redundant PLC/MTUs.

4.15 Networking Cabinet

A dedicated networking cabinet 42U is required for Ethernet Switches, Servers etc.

5.0 REMOTE TERMINAL UNIT (RTU) / PLC

One TUV certified SIL-2 RTU / PLC shall be supplied with weather proof enclosure and back panel sun shed stand for each wellhead. RTU shall be modular in construction with dedicated Processors, power supplies and IO modules. On-board IO based RTUs are not acceptable.

All instrumentation will be wired to RTU/PLC through a weather proof marshaling box. The Remote Terminal Unit (RTU) / PLC enclosure will be mounted in a non-hazardous area (outside 30 ft. radius of wellhead). The RTU/PLC enclosure will be stainless steel NEMA 4X / IP-65, weather proof (i.e. protected against vertical-falling drops of water 'condensation' and protected against water from all directions). The RTU/PLC enclosure shall be lockable through specialised keys. At least three sets of all keys shall be provided. The RTU/PLC enclosure shall be equipped with sun shed cover and a back panel for surface mounting of equipment.

RTU/PLC will monitor the local analog and digital inputs and will perform local control operations. Data will be reported on a per scan basis to the Nashpa SCADA Control Station. Control operations, set point changes and data may be downloaded to the RTU from the SCADA Control Station either by operator action or as required by the system software.

Each RTU/PLC memory shall be capable of keeping the record of all measured and calculated parameters for minimum of thirty days (one month). The RTU/PLC should not lose the record on failure of power supply.

Transmitter signal, power and control signal cables will be wired through armored cable, running in conduit pipes, buried 3 ft. in the ground. A power isolation switch will be installed at the RTU/PLC assembly for maintenance purposes. Fuses on transmitter power lines will be provided at the RTU assembly. All cable support systems, conduits, junction boxes shall be under vendor's scope.

All instruments on each well-site shall be connected to its respective RTU/PLC. This will include process related instrumentation as well as F&G detectors. Distance between RTU/PLC and Wellhead is 50 meters.

RTU/PLC shall be responsible to monitor and isolate / shutdown (in case of process or fire related upsets) the wellhead on activation of pre-designated process sensors or F&G sensors, The shutdown sequence shall be based on pre-defined cause and effect.

RTU/PLC shall also be responsible to communicate all wellhead parameters (indications, alarms, status, etc.) to SCADA Server for monitoring, recording and supervisory control at Scada Control Station.

RTUs/PLCs shall also receive supervisory signals from SCADA Server (such as remote ESD, alarm set points, etc) and shall act accordingly.

General:-

a	Processor	Multi Core micro-controller with integrated watchdog timer
b	Memory	Minimum 2 Mb System memory
c	Non Volatile RAM	CMOS RAM with lithium battery retains contents for 2 years with no power
d	External Storage	Option for extendable SD card option
e	Flow Calculations	AGA-3 and API based flow calculations
f	Power Input:	11 - 30 VDC

Redundancy:-

a	CPU	No (Simplex)
b	Power Supply	No (Simplex)
c	Communication	No (Simplex)
d	IO Channels	No (Simplex)

Communications:-

a	Serial Ports	RS-232 (02), RS-485 (02)
b	Serial Protocols	Modbus RTU, Modbus ASCII,
c	Ethernet Port	RJ45, 10BaseT (02 ports)
d	Ethernet Port Protocols	Modbus TCP, Modbus RTU in UDP, Modbus ASCII in UDP,

Input/Output:-

a	Analog Inputs	Total 8 Channels, single-ended, 4-20mA (16 bit resolution), Suitable for 2 wire, 3 wire and 4 wire connections For level indicators, Temperature & Pressure Transmitters, HC Detector, Solar Panel Battery Voltage
b	Analog Outputs	Total 2 Channels, output range 4-20mA (12 bit resolution)
c	Digital Inputs	Total 12 channels 1 for SSV Pressure Switch* 1 for SSSV Pressure Switch* 1 for SSV Pilot Pressure Switch* 1 for SSSV Pilot Pressure Switch* 1 for ESD Pressure Switch* 1 for Fusible Plug Pressure Switch* 1 for Fire Detector 5 for spare All DI should be short circuit protected.
d	Digital Outputs	Total 8 channels 4 for Solenoid Valve 1 for Sounder Alarm 1 for Beacon Light 2 for spare All DO should be short circuit protected

Certifications:-

a	SIL 2	RTU shall be SIL2 Certified from TUV. TUV Certificates shall be submitted along with bid package
b	Hazardous Locations	Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations. Temperature Code T4 Or equivalent

***Pressure Switches & solenoid valves are already installed at site and are not in the scope of supply.**

5.1 RTU /PLC FUNCTIONALITY

The RTU/PLC will perform the following functions:-

- a) Monitor the DC voltage of the solar power batteries; indicate low voltage detection at the RTU/PLC.
- b) Performs the ESD action through solenoid valve, installed in the Wellhead Control Panel, on activation from SCADA Control Station.
- c) Monitor the HC & fire detection sensors continuously and activate the LED beacon & alarm sounder on detection of Gas leakage or fire and perform ESD action to the Wellhead Control Panel through solenoid valve.
- d) Monitor & display the readings of Temperature, Wellhead & line Pressures etc on its own display or to the attached display.
- e) Monitor the level of corrosion inhibitor tank of Chemical Injection System at each well site and activates the LED beacon & alarm sounder on detection of low level.
- f) Local & remote facility to reset the LED beacon and sounder.
- g) Activates the LED beacon & alarm sounder on ESD at regular interval for a period up to 3 minutes.
- h) Calculate the flow of gas from the well through AGA based function blocks.
- i) Transmit & receive all data to / from Scada Control station through the communication radio systems.
- j) Monitor the flow-line pressure and execute an ESD shutdown on detection of very high line pressure (1600 psi) or very low line pressure (400 psi). Set point of the high & low pressure readings must be adjustable locally or through Scada Control Station.
- k) The RTU/PLC will have a dedicated configuration/ diagnostic/ test port which will allow an operator to connect a laptop computer to locally configure the RTU/PLC, set engineering units, adjust set points / limits and perform test / diagnostic routines. This dedicated port will be available at all times, without going through any hardware alteration, such as jumper selection, wire cross-over, BIOS enabling, etc. Local operation of the laptop will not interrupt normal communications to the SCADA Control Station.

5.2 POWER / DATA CONNECTIONS

Power and input / output signals will be distributed from the RTU/PLC enclosure to the Transmitters & sensors etc. Glanded entries will be provided in the base of the RTU/PLC enclosure. Proper sized SS glands shall be used for cable entries.

Distance between RTU/PLC and Wellhead is 50 meters. Supply, laying and termination of all power, data cables, and communication cables are in the scope of supplier and its quantity will be based accordingly. However quantities of data cables are mentioned in the BOM. All cables will be armored and direct buryable.

5.3 BEACON LIGHT & SOUNDING ALARM

A warning beacon light with sounding, for all critical alarms, will be installed on a separate pole structure. The pole structure will be located outside the wellhead classified zone, and will be in safe area as close to the well site entrance gate as possible, but not posing any hindrance to movement of vehicle and work over rig. The distance between RTU/PLC and beacon light pole shall be maximum 20 meters.

5.4 **FIRE & GAS DETECTION**

Minimum of two (02) IR Flame and two (02) HC detectors will be supplied and installed near the wellhead, classified area, and wired into the RTU/PLC. The alarm beacon light will be energized upon detection of fire or gas leakage, at well site, outside acceptable limits set in the local RTU/PLC. SCADA Control Station can reset or over-ride the alarm or alarm limits.

Combustible Gas Detector & Transmitter	
Specification:-	
a	Sensor Type = continuous Diffusion, low temperature catalytic bead
b	Measuring Range = 0 to 100% LEL
c	Measuring Resolution = 1% LEL
d	Supply Voltage = 24 VDC
e	Indications = 3 Digit Display
f	Output = Digital & Analog outputs (user selectable) 4-20 mA
g	Application = Hazardous Area
h	Operating Temperature = - 10°C to + 55°C
i	IP Class = IP65/67
j	Termination = EExd II Terminal blocks

IR Flame Detectors	
Specification:-	
a	Sensor type = Multi-Spectral IR
b	Max. Range = 230 feet
c	Supply Voltage = 24 VDC
d	Output = Digital outputs (user selectable)
e	Approvals = CSA / FM/UL/ATEX/IECEX, Class 1 Div 1
f	Operating Temperature = - 10°C to + 55°C
g	IP Class = IP65/66/67
h	False Alarm immunity
i	Accessories = Mounting brackets

5.5 ESD / ON-DEMAND SHUTDOWN FUNCTIONS

Producing wells are operated through Wellhead Control Panels (pneumatically operated), which can shut down well through cutting off of the hydraulic supply to the Surface controlled valves.

SCADA system will have shut down functionality on various levels of the system. Some of the following shut down scenarios are below for bidder's understanding. However complete shutdown philosophy shall be approved by OGDCL before implementation.

- 1) Manually from the Wellhead Control Panel (not in vendor's scope).
- 2) Automatically through pneumatic pressure sensors (not in vendor's scope).
- 3) By HMI (at SCS) upon SCADA operator's decision, which actuates the solenoid valve (installed in the Wellhead Control Panel) through RTU/PLC via MTU and Radio.
- 4) By plant DCS/ESD system signals in SCADA MTU, which actuates the solenoid valve (installed in the Wellhead Control Panel) through RTU/PLC via MTU and Radio.
- 5) RTU/PLC itself on detection of fire and/or gas from F&G sensors.
- 6) RTU/PLC itself on variance of line pressure, depending upon pressure set points.

Scada Control Station system will initiate Emergency shutdown of the well through energizing the solenoid valve of wellhead control panel remotely via RTU/PLC. Similarly resetting option will also be initiated through SCS.

Please note that Wellhead control panels are already installed at all well sites of Nashpa Field and are not in the scope of supply.

5.6 STATIC PRESSURE TRANSMITTER (PT)

The static line pressure of well pipeline shall be measured by an electronic SMART series static pressure transmitter with HART protocol with signal 4-20 mA. Pressure Transmitter shall have an integral local LCD indicator meter with scale in engineering units. The static pressure transmitter associated shall be mounted on a pipeline. A multiport gauge and bleed/ 2- valve manifold shall be provided to isolate the transmitter for calibration. The

manifold and transmitter shall have a pressure rating equal to or greater than the process piping design pressure. A double block and bleed valve is required at the process line tapping point for gas service as per piping specification.

Pressure transmitters shall be 24 VDC, 2-wire SMART and support HART Protocol. The pressure transmitter output signal shall be wired to the RTU/PLC.

Specification:-

1	Case Material = Baked Epoxy Coated for anti-corrosion
2	Mounting = 2" Pipe
3	Enclosure Class = IP65/67
4	Power Supply = 24 VDC
5	Output Signal = 4-20 mA
6	Element Type = Diaphragm
7	Process Connection = 1/2 inch NPT
8	Accuracy: $\pm 0.05\%$ of the span
9	Operating Pressure Measurement Range: 0-3000 psi
10	Electrical Classification = Flame Proof EExd CExI Approval
11	Remote Communication = Via HART Protocol Universal Communicator
12	Diaphragm Material = 316SS L
13	Fill Fluid = Silicone Oil
14	Gasket Material = PTFI
	Standard Accessories:-
i	Two valve Manifold = Required
ii	Cable Gland Size = 1/2" NPT Female
iii	Pipe Mounting Bracket = 2" Pipe mount Bracket
iv	Local Display = Digital Display

5.7 Differential Pressure transmitter (DPT)

The differential line pressure of well pipeline shall be measured by an electronic SMART series differential pressure transmitter with HART protocol with signal 4-20 mA. Pressure Transmitter shall have an integral local LCD indicator meter with scale in engineering units.

The differential pressure transmitter associated shall be mounted on a mounting panel. A multiport gauge and bleed/ 5 - valve manifold shall be provided to isolate the transmitter for calibration. The manifold and transmitter shall have a pressure rating equal to or greater than the process piping design pressure. A double block and bleed valve is required at the process line tapping point for gas service as per piping specification.

The pressure transmitter shall be of an **accuracy equal or better than ±0.05%** of the span at reference conditions to be used and have internal span and zero adjustments. Pressure transmitters shall be 24 VDC, 2-wire SMART and support HART Protocol. The pressure transmitter output signal shall be wired to the RTU/PLC.

Specification:-

1	Case Material = Baked Epoxy Coated for anti-corrosion
2	Mounting = 2" Pipe
3	Enclosure Class = IP65/66/67
4	Power Supply = 24 VDC
5	Output Signal = 4-20 mA
6	Element Type = Diaphragm
7	Process Connection = 1/2 inch NPT
8	Operating Range: 0-150" W.C. (Range of Flow is 5-45 MMSCFD)
9	Approvals = UL/ATEX / IECEx / Class 1 Div 1
10	Remote Communication = Via HART Protocol
11	Diaphragm Material = 316SS L
12	Fill Fluid = Silicone Oil
13	Gasket Material = PTFI
	Standard Accessories:-
i	5 valve Manifold
ii	Cable Gland Size = 1/2" NPT Female
iii	Pipe Mounting Bracket = 2" Pipe mount Bracket
iv	Local Display = LCD

5.8 TEMPERATURE TRANSMITTER (TT)

The process stream temperature shall be measured by a 3-wire RTD temperature element inserted in a properly sized raised face flange thermowell with insertion length equivalent to ¾ of the 4" pipeline size.

A high accuracy platinum RTD sensor is required; class A improved characteristics per **IEC 751**. The sensor shall be platinum RTD calibrated to 100 Ohms at 0°C.

The temperature transmitters shall have an integral local LCD indicator meter, scale in °F.

The temperature transmitter shall be 24 VDC, and support the HART Protocol with 420mA output.

The temperature transmitter output signal shall be wired to the RTU/PLC. The accuracy of the temperature measurement shall be equal or better than ±0.03% of calibrated span and the corresponding readout should have a resolution of at least **0.5°F**.

Specification:-

1	Case Material = Baked Epoxy Coated for anti-corrosion
2	Mounting = 2" Pipe
3	Enclosure Class = IP65/66/67
4	Power Supply = 24 VDC
5	Output Signal = 4-20 mA
6	Element Type = PT100
7	Operating Temperature Range = 15°F to + 140°F
8	Remote Communication = Via HART Protocol Universal Communicator
9	Approvals = UL/ATEX / IECEx / Class 1 Div 1
	Standard Accessories:-
i	Cable Gland Size = 1/2" NPT Female
ii	Pipe Mounting Bracket = 2" Pipe mount Bracket
iii	Local Display = Digital Display

5.8.1 THERMO WELLS

Thermo wells shall be tapered **316 stainless steel 1½"** flanged raised face with ANSI rating equal to piping rating. Thermo wells provided without instrument shall have a stainless steel plug and chain.

Thermo wells bodies shall be 316 stainless steel machined from one piece bar stock.

Thermo well shall protrude into the pipe to at least one half the nominal pipe diameters and shall normally be installed in the vertical position (top of pipe).

5.9 ORIFICE ASSEMBLY FOR FLOW CALCULATIONS

For the purpose of flow calculation of produced gas on a well site, an orifice assembly will be provided by the successful bidder for each well site. Differential pressure across the assembly will be input to the differential pressure transmitter. Process values of DPT, PT and TT will be fed to AI inputs of the supplied RTU and flow will be calculated by RTU controllers with AGA-3 flow calculation.

Vendor shall provide orifice assembly with following specifications:-

Orifice Connections	RF Flanged
Class	1500
Testing	Ensures no leakage between flange tap holes
Material	SS316
Accessories	Reducers, Fittings, Nuts and Bolts etc. as per requirement

Vendor shall also provide orifice plates (Size 4 inch) to cater the minimum & maximum gas flow rates of all individual wells. Note that maximum gas flow rates have been mentioned in section 1.1. In this regard, bidder will provide the quantity of the quoted orifice plates with exact minimum & maximum flow rates in its technical bid.

5.10 LEVEL TRANSMITTER

Supplier shall provide & install 01 Magnetic Float level transmitter each for the corrosion inhibitor tanks at all 07 wells of Nashpa Oil & Gas Field. Corrosion inhibitor is being injected into pipeline continuously at ambient temperature. Quantity has been depicted in the BOQ list.

Specification:-

1	Explosion proof Class 1 Div 1 / ATEX Ex II 2G Ex d IIB / UL / IECEx
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2	Continuous Self Diagnostics
3	Enclosure Class = IP65/67
4	Power Supply = 12 24 VDC
5	Output Signal = 4-20 mA HART
6	Mounting = From Top
7	Temp = -10°C to +55°C
8	For Sensor length Corrosion Inhibitor Tank height = varies from 4 feet 3 inch to 4 feet 9 inch

5.11 HART COMMUNICATOR & PRESSURE CALIBRATOR:

Supplier to provide 01 Latest version of Hart Communicator (compatible with the installed equipment) & 01 Pressure calibrator with pressure modules (Fluke 721 or equivalent) for the maintenance & calibration of transmitters & pressure gauges.

5.12 WELLHEAD CCTV SYSTEM

Supplier shall provide CCTV System consist of monitoring & recording system at SCS & Telemetry office and one CCTV camera for each well-site. Details are mentioned below:-

- a. Color PTZ CCTV Camera with IR LEDs for night vision, With Weatherproof enclosure, IP Camera with Ethernet connectivity, Pipe mount, at each well
- b. Dedicated 40/42" LED monitor (Power Supply: 220 VAC) for online video image viewing at SCS as well as Telemetry office.
- c. Ethernet switches

5.12b CCTV CAMERA SPECS:-

1. PTZ IP Camera
2. 1080P or Higher
3. 25x optical zoom
4. Min 25/30fps@1080P
5. Tripwire, Intrusion, Abandoned / Missing, Face Detection Alarm
6. Support PoE+
7. Min IR distance minimum 100m
8. IP66 or higher

5.12c Video Recording / Control / Viewing Unit (02 Nos – For SCS and Telemetry Office)

Contractor shall provide CCTV recording / monitoring systems at two locations i.e. SCS and Telemetry office. Both locations are geographically apart from each other with a distance of approx. 800m. View of CCTV video at each location shall be through 40/42" LED monitor. CCTV data from SCS will be transmitted to telemetry Office via fiber optic cable. OGDCL will supply and lay fiber optic cable between SCS and telemetry office. However supply, splicing, installation and commissioning of fiber optic accessories at both ends will be responsibility of the SCADA contractor.

Each system will contain at least following components:

1. 4 x 2 TB Storage Capacity
2. Surveillance Systems of up to 32 Channels
3. Graphics 1 x USB DVI port, onboard graphics VGA port
4. Network 1 x 1 GbE RJ45 port
5. 40/42" LED monitor
6. Joy Stick Setup to remotely control PTZ cameras

5.13 FLOW CONTROL VALVES

Supplier shall provide 07 flow control valves for installation of one unit at each 4 inch pipeline of Nashpa wells. These flow control valves will be operated through RTU to adjust the flow rate of the wells. Flow adjustments shall be made through HMI.

DATA SHEET

FLOW CONTROL VALVE (Angle Type Choke valve), 5000 PSI W.P., as per API 6A latest edition, ISO 9001 with actuator and accessories.

S.No	Equipment / Description	Specification
1	Valve Type	Angle type choke control valve
2	Size/Rating	4", API 5000 PSI
3	Design standard	API 6A Latest edition , NACE MR-01-75
4	End Connections	RTJ flanges, API-5000 as per API 6A
5	Trim type	Cage type, with fully guided pressure balanced Plug
6	Seat	Metal to metal
7	Seat leakage	Class V (five) per ASME/FCI 70.2
8	Characteristic	Linear
9	Material standards	API 6A, NACE MR-01-75

10	Actuator type: Design:	Spring closing pneumatic piston/Diaphragm type. Fail to close upon loss of signal & supply. Fitted on the Choke valve assembly.
11	Min.Supply pressure	80 psig (4 bar g)
12	Accessories	Explosion-proof Electro-pneumatic positioner with pressure gauges for input & output supply, Position transmitter, supply pressure regulation system for Inlet Gas supply ¼" NPT 80-120 psig, filter regulator, etc. Stainless steel tubing and fittings. Mating/companion flanges/gaskets to be provided along with FCV.
13	Input signal	4-20mA for Electro Pneumatic Positioner
14	Output signal from Position Transmitter	4-20 mA, 2- wire system
15	Quality standards	API 6A, ISO 9001
Material Selection for Choke Valve Angle type		
16	Body	ASTM A487 GR. CA6NM CL B(13% CHROME SS)
17	Piston Sleeve	Tungsten carbide (SOLID)
18	Cage	Tungsten carbide (SOLID)
19	O-Rings	FKM
General Data for CV Calculation		
20	Inlet pressure	200 psi (min), 1500 psi (max)
21	dP	30psi (max)
22	Design Temp.	250 deg F (max)
23	Up/ Downstream Pipe Size	4 inch Sch. 80
Flow rates (MMSCFD)		
24	Mixed Flow	8 (min), 30 (operating), 40 (max)
25	Max allowable noise	85 dBA
26	Process Fluid	Natural Gas (Sp Gravity 0.6-0.7)

Working Principle:-

1. Flow, Pressure and temperature transmitters will measure the flow, pressure and temperature of gas respectively and provide signal to RTU (SIL-2).
2. Position Transmitter will send 4-20 mA signal to RTU to give the exact valve opening.
3. AGA-3 calculations will be performed in SIL-2 RTU.
4. Set value of the desired flow will be entered by operator in HMI or can be received from other systems as well (such as plant DCS/ESD system).

5. HMI directs the instruction to RTU through MTU. Then 4-20 mA signal will be provided from RTU to Electro-pneumatic positioner of flow control valve to attain desired flow.
6. Electro-pneumatic positioner on the valve will ensure that the desired opening of valve is achieved.

Notes:-

- 1). The manufacturer of Choke valve/Actuator must have 15 years manufacturing experience & have API 6A certification from the last 15 years consecutively. Manufacturer/Supplier to provide valid & old API 6A certificates.
- 2). Manufacturer/Supplier to provide detailed drawings/ schematic diagram with material list of components of Choke valve/Actuator/control panel etc.
- 3). Manufacturer/Supplier to provide 03 sets of installation /operation / maintenance manual
- 4) Air supply of 100-120 psi is available at Nashpa Wells.

5.14 SOFTWARE'S WITH SCADA SYSTEM

Supplier shall provide all software's in English Language. Supplier shall provide the below mentioned required software's as minimum:

- i) All associated softwares mentioned in this specifications ii)
Lifetime Licenses for all softwares in favor of OGDCL.
- iii) All soft licenses shall be provided on CD/DVD. (02 sets)

5.15 DIAGNOSTIC

Diagnostic of system and related equipment & accessories shall be available to engineering workstation and data servers.

On-line and off-line diagnostics shall be provided to assist in system maintenance and troubleshooting. Diagnostics shall be provided for every major system component and peripheral. If diagnostics do not exist for particular peripheral devices (for example printer and terminals,) the system must detect and provide an error indication for the failure of these devices.

5.16 IDENTIFICATION

All cables and wires shall be identified with loop number or circuit number using a sleeve type PVC marker.

All operator devices, distribution panels, switches, and electrical enclosures shall be properly labeled. Supplier shall provide an identification nameplate for each item.

Nameplates shall be the engraved-type, 10 mm high black characters on white background, size 50 x 100 mm, or larger.

6.0 ELECTRICAL REQUIREMENTS

6.1 WELL HEADS

Electric power available shall be 24 VDC supplied through vendor provided power system. Power source shall be from Solar Cells, designed for 36 hours back-up time.

Supplier shall supply all necessary power transformation equipment for any other voltage levels required by the system.

6.1.1 SOLAR POWER SYSTEM

Each RTU/PLC, radios & other field instruments will be powered by a solar power system, with 36 hour standby batteries. Total design capacity of the solar system shall be 150% of maximum system load. Maximum system load shall be calculated considering maximum load of each components at a given time & worse condition possible. Batteries will be maintenance free dry batteries with shelf life of two years at zero charged. Batteries will be securely placed in an enclosure, placed as close to the solar panel as possible. The solar panel batteries (12/24 VDC) will be installed in a battery box on the base of the structure and wired into the RTU/PLC enclosure. Solar panel control/charger unit will have separate IP65 rated enclosure. Charge controller shall be separate and completely independent from load controller.

The battery enclosure will provide the batteries a degree of protection against mechanical damage, risk of explosions, free / easy access to the battery units, or conditions such as moisture, falling dirt, rain, sleet, snow, windblown dust, splashing water, and hosedirected water. The free and easy access to the batteries shall be restricted using some type of locking mechanism (open-able with special purpose key only) on the battery enclosure. Battery enclosure shall be designed with proper consideration for ventilation.

The RTU/PLC, radio system and solar panels will be mounted on a skidded structure set on a gravel base. The base structure will be firm enough to avoid vibration and swing due to wind.

A voltage sensor shall be supplied with solar system. This sensor will transform the voltage value to 4~20mA Analogue signal for the RTU.

Vendor shall be responsible for complete package of solar system including any structure, foundation, equipment pads, all type of interconnect cables, cable glands etc. Detail is also provided in BOQ. Vendor is also advised to carry out & provide OGDCL wind velocity study for structure / poles and accordingly these structures / poles shall meet the minimum requirement of wind velocity / speed.

Solar supply voltage, RTU voltage and field instruments supply voltage should be same. However in case of difference of supply voltages, then vendor will provide the DC TO DC converters.

6.2 NASHPA SCS

Electric power available shall be 230VAC, 50 Hz single phase from UPS system procured by OGDCL. Vendor shall supply all necessary power transformation equipment for any other voltage levels required by the SCADA supplier's equipments requirement.

7.0 COMMISSIONING SPARES

Supplier to quote & provide commissioning spares for the complete Scada Systems (Servers, Communication System, PLC, Field Instruments etc) , not exceeding the amount of USD 15,000. Spares will be rationalized / reduced from the BOQ if the quoted amount exceeds the USD 15,000. Quoted commissioning spares will be part of the financial evaluation.

8.0 DOCUMENTATION

The Supplier shall supply documentation in accordance with applicable codes and standards. All additional documentation required by this Specification shall also be provided by the Supplier. All documents shall be in English language.

SCADA System supplier shall provide the documents for the installation of operating system software, SCADA system software, Configuration of SCADA and Telemetry System as per this specification for each mode of operation etc.

Supplier shall provide all the documents and details mentioned in this specification.

Supplier's documents shall include the following information as a minimum:

- i) Operation manuals
- ii) Maintenance manuals
- iii) SCADA and Telemetry operating Manual for Operators, Engineers etc
- iv) Operating system installation
- v) SCADA and Telemetry system installation
- vi) SCADA and Telemetry configuration
- vii) Full range of Engineer configuration manuals
- viii) Equipment manuals
- ix) SCADA and Telemetry system operational flowchart
- x) Loop diagrams
- xi) Wiring diagrams
- xii) I/O schedules
- xiii) Heat Dissipation / Load Lists

- xiv) System/ Marshalling Cabinet GA Drawings.
- xv) System Cabinet dimensioned layout drawings
- xvi) SCADA and Telemetry operator consoles dimensioned layout drawings
- xvii) Cable and cable gland schedule
- xviii) SCADA interface details
- xix) Equipment GA drawings xx) System communication details and drawings
- xxi) Color Graphic Sketches Prints.
- xxii) Inspection and certification.
- xxiii) Description of all implemented computational algorithms.
- xxiv) All system installation drawings.
- xxv) Complete "As-built" documents and drawings package.
- xxvi) Commissioning Manual.

Supplier shall provide three (3) hardcopies and two (2) soft copies for all documents.

Supplier shall also provide the individual hardcopies of operating manual to training operators (maximum 10 numbers).

Supplier shall provide compliance statement for the offered SCADA system as per specification and any deviation to the specification shall be highlighted for approval.

Language in all documents and drawings shall be in English; dimensions shall be in metric SI-units.

As a general rule, any document or drawing which may be needed to allow correct installation, start-up, operation and maintenance, even if not explicitly listed in this specification shall be provided by the Supplier.

9.0 SHIPPING, STORAGE & PROTECTION OF EQUIPMENT

9.1 The disassembled Supplier system shall be properly stored and protected from damage at all times. Storage and protection shall be in accordance with the Supplier's procedure.

- 9.2 Packing shall be carried out specifically by Supplier in order to permit the delivery of the Goods in good conditions to its destination.
- 9.3 Servers, switches and all electronic equipment's will be protected by sealed moisture protection barrier. Provision will be made to include desiccant materials i.e. silica gel in appropriate quantity. Then the packages will be made with wooden boxes suitable for transportation.
- 9.4 All shipping documents shall be in the English Language.
- 9.5 All delicate and sensitive instruments to be packed in separate wooden crates to avoid damage during shipment and put it in container along with other loose components. Anticorrosion material should be applied and filled, wherever necessary in the package to avoid corrosion during shipment and storage.
- 9.6 It shall be the Suppliers responsibility to ship the material to Pakistan port safely.

10.0 WARRANTY

- 10.1 Supplier shall have final and total responsibility for the design, configuration, communication and performance of the Scada System supplied. Supplier shall warrant the materials, communication and performance of the complete Scada System.
- 10.2 The Supplier will have to provide the warranty/guarantee for one year faultless functioning of the equipments from the date of commissioning including free of cost repair maintenance, procurement and installations of parts.

11.0 TESTING & SERVICES

11.1 FACTORY ACCEPTANCE TEST

The equipment and systems shall be tested before shipment in order to ensure performance and conformance to company specifications. Supplier shall submit the FAT (factory Acceptance Test) procedure for company's approval. Company reserves the right

to witness the FAT. In this regard, company reserves the right to depute its maximum of two representatives for witnessing the FAT. Details are as under:-

- a) FAT shall be carried out at vendor's facility. All equipment shall be subject to inspection by the Client or nominated representatives. The objective of the FAT is to verify that the purchased systems as configured for delivery to site meets or exceeds the specified designed functional requirements. The FAT shall be a 100% complete system functional test.
- b) Duration of the FAT shall be five days and shall be witness by Two (02) nominated professionals of OGDCL. Supplier shall arrange all boarding, lodging for the representatives. Air-tickets, boarding, lodging & TA/DA @ USD 350/ per person per day shall be borne by the supplier.
- c) The supplier shall submit a complete plan of the Factory Acceptance Test (FAT) with sufficient detail to indicate the exact nature of each test, time required, expected results and systematic procedure. The plan shall be submitted at least 45 days in advance to the FAT.
- d) It is the responsibility of the vendor to make all the arrangements to carry out the FAT effectively.
- e) The FAT shall include, but not be limited to the following:
 - i) Simulation and observation of 100% inputs/outputs (including used and spares) to confirm operation of SCADA and Telemetry system in accordance with the P&ID's, Control Philosophy, Cause and Effect matrices, Logic Diagrams and I/O Schedule.
 - ii) Confirmation of correct functions of all communication links.
 - iii) Confirmation of availability of all specified screen functions and Operator Interface functions, including a proof test of automatic switchover to the Redundant Hardware Equipment.
 - iv) A radio interference test shall be carried out or certification shall be provided in compliance to standard industrial requirements.
 - v) Verification of installation of required software.

11.2 Site Acceptance Test (SAT)

The supplier shall submit a complete plan for the Site Acceptance Test to Client. This plan must be complete and in sufficient detail to indicate the exact nature of each test, time required, expected results and systematic procedure.

The SAT shall include but not be limited to the following:

- i) A complete repeat of the FAT.
- ii) Full loop tests of all input / output to the field equipment. Supplier's responsibility limited to functional test for SCADA and Telemetry system or limited to Supplier Scope of Supply.

11.3 Sustained Performance Test

- a) A Sustained Performance Test (SPT) for the system shall be conducted. The objective of the SPT is to determine the long-term stability and availability of the systems under normal operating conditions. It will also verify the ability of the systems to report all malfunctions in an easy way to understand and the system supplier's ability to diagnose and fix and problem in a timely manner. The tests commence when the systems start to control and monitor a portion of the process.
- b) The Contractor will conduct the SPT over a sustained period of 30 consecutive days (or longer under agreed conditions). The criteria for success will include at least 99.9% availability (in the standard statistical sense) and not more than one hardware and / or software failure during the 30-days period. A failure is defined as any occurrence preventing full utilization of the systems availability. The SPT will be suspended in case of any failure caused by the project supplied equipment or services. During SPT, presence of Vendor's representative is mandatory.

11.4 SITE SERVICES

- a. Supplier shall be responsible for installation / installation supervision, communication links integration, SAT (Site Acceptance Test), start-up and

commissioning & troubleshooting of complete Scada System & Sustained Performance Test at Nashpa Oil & Gas Field on lump sum basis. Every activity shall be clearly defined in numbers by the bidder in technical & financial bids. Civil works & earthpits will be under OGDCL responsibility. This means that contractor will provide the design / drawings of all bases like RTU base, Solar structure base, poles & towers base etc. OGDCL will construct the bases (only civil related) as per vendor design. Supply and Installation of all equipment, material, Towers, structure, poles etc. will be vendor scope and responsibility.

- b. Supplier shall clearly state how site support will be provided during the warranty period (Min. 12 months from Commissioning) and how long term service will be provided for the installed system.
- c. Daily rates for special test equipment and tools, if any, shall also be provided by the bidder in commercial proposal. Note that all proper sized mechanical tapping points for inline and online instruments will be provided by OGDCL.
- d. Bidder to quote mobilization & demobilization cost including air travel, two nights hotel stay etc in the commercial offer. Please note that OGDCL shall be responsible for the pick & drop of the concerned professional from Airport/hotel to the Site location and vice versa. Similarly food/accommodation at site will be the responsibility of OGDCL.

1 2.0 TRAINING FOR OGDCL PERSONNEL:

A structured 5 day operational & maintenance level on-site training course for 10 personnel nominated by OGDCL shall be quoted & provided and will be held at Nashpa Field. The training shall include configuration operation and maintenance of SCADA and Telemetry system along with interfacing devices for other related systems. Methodology shall include classroom and hands-on training.

Similarly advanced level training shall be quoted for 02 OGDCL nominated professionals at OEM (Original equipment manufacturer) foreign training facility. The training shall

include engineering, design & configuration operation of SCADA and Telemetry system. Methodology shall include classroom and hands-on training. Training shall be for at least 5 working days. Air-tickets, boarding, lodging & TA/DA @ USD 350/ per person per day shall be borne by the supplier.

The content/format and schedule of the training course will be furnished for customer approval. Training will be in English and hard/soft copy of the course material will be provided to all participants.

Please note that FAT and foreign training will be held separately.

13.0 TERMS & CONDITIONS

1. Bidder/Principal (Foreign or Local Entity, to whom contract will be awarded) shall have at least 10 years of experience in providing & installing similar Scada Systems. List of such projects previously delivered by the bidder must be provided. Documentary evidence shall be provided for all projects in the list e.g. PO, Contract or Final Acceptance certificate etc.
2. Bidder must share detailed project organogram showing dedicated experienced project manager and an experienced team. Resumes of entire team shall be shared with OGDCL for evaluation.
3. Criticality of the job calls for bidder's knowledge of industry standards and prevalent and generally accepted practices. In order to prove its commitment and knowledge of industrial automation and standardized project execution, bidder shall possess and submit following certifications with bid:
 1. CSIA certified member certificate
 2. ISO 9001
 3. OHSAS 14001

Note: Bidder/Principal (Foreign / Local Entity, to whom contract will be awarded) shall possess above mentioned certificates in it's own name and these must be submitted with technical bid. Certificates from manufactures and/or partners are not acceptable. CSIA certificate shall be verifiable online.

4. Project scope includes F&G safety instrument and their interconnection with RTU and also Emergency Shutdown of the wellhead both locally and from remote SCADA control room, it is mandatory that application development of RTU should be done by TUV certified safety system engineer. TUV Certificate of the engineer with his/her resume is to be shared with OGDCL at bidding stage for evaluation.
5. Item wise cost (as mentioned in BOM vide clause 15.0) must be provided by the bidder in its financial bid, otherwise its financial bid will be rejected. Bidder to submit written confirmation in technical bid that they have submitted item wise cost in financial bid as mentioned in BOM vide clause 15.0.
6. The SCADA and Telemetry offered by the Supplier must have local after sales service set-up in Pakistan. Availability of spare parts within Pakistan shall be preferred. Supplier is requested to provide the details along with the bid.
7. Supplier shall provide support for the hardware & software for a minimum period of 10 years.
8. All PLC / MTU / RTU shall be SIL-2 certified. In this regard, bidder to submit TUV SIL-2 certificate of quoted model in technical bid.
9. Supplier/Manufacturer shall provide Original Testing and Calibration Certificates of all the instruments.
10. Supplier/Manufacturer shall provide Warrantees / Guarantees of complete Scada system.

11. Supplier/Manufacturer shall confirm material delivery within 05 Months after the establishment of L/C.
12. After material delivery, site will be handed over to contractor for carrying out installation & commissioning of the complete system. All site work must be completed in 3 months.
13. Functional design specifications, equipment datasheets, Integration philosophy for Scada System, Literature and details of offered SCADA software (Development Software, Historian, alarm & events, diagnostic etc), System Architecture Layout of the SCADA, Dimensional Drawings for Cabinets, Load List (approximate), Details for integration with Third Party Packages through OPC, tagging details and complete BOQ of material & services must be submitted with technical bid. Non-provision of such information may lead to disqualification of the bid.

14.0 PROPOSED VENDOR LIST

Equipment Description	Preferred Make
SCADA	CAC Baker/Schneider/Bristol Babcock/ El Sag Bailey/Emerson/GE/Honeywell/Nuovo Pignone/Rockwell Automation/ABB/ Siemens/Yokogawa or equivalent
RTU/PLC	ABB/ Schneider/ GE/ Honeywell / Hima / Rockwell/ Siemens/ Allan Bradley/ Troconex / Alstom /Motorola/ Omron/ Mitsubishi / Yokogawa or equivalent
MTU	ABB/ Schneider/ GE/ Honeywell / Hima / Rockwell/ Siemens/ Allan Bradley/ Troconex / Alstom /Motorola/ Omron/ Mitsubishi / Yokogawa or equivalent
HMI	Rockwell/ ABB / SENSYS / ICONICS / Wonderware, Intellution / Allan Bradley / Omron / GE Fanuc / Siemens / Yokogawa or equivalent
Servers	HP/Dell/ Lenovo / Fujitsu / Huawei or equivalent

Flow Control Valve	Mokveld / Dresser Italia/ Emerson / Samson / Metso Automation/ Norriseal / Control Components or equivalent
Solar Power	Solarcraft / Sunwize / Apollo Solar or equivalent
Transmitters	Rosemount, E+H, Honeywell, Siemens, ABB, Yokogawa or equivalent.

15.0 BILL OF QUANTITY

Following minimum material are services are required:-

Note: Each item below must be compliant with detailed specifications as mentioned in the ITB. It shall also be noted that quantities mentioned in below BOQ are for indicative purpose only. Bidder shall be responsible for complete working of the SCADA system as mentioned in ITB.

S.No.	DESCRIPTION	Unit	Qty.	FOB (Foreign component) Ex-works (local component) Lump sum for Services	CFR (Foreign component) Ex-site (local component) Lump sum for Services
MASTER PLC / MTU FOR Scada Control Station					
1	Redundant Master PLC / MTU, SIL 2 certified (accompanied with associated TUV certification), complete with controller, I/O modules, communication module, etc. Temperature: 0 °C to +55 °C ,	No.	1		
2	Floor Standing Modular Indoor Enclosure to accommodate redundant PLC/ MTUs. Tentative Size: 2000mm H x 1200mm W x 800mm D, Material: Powder Coated MS, IP42, Complete with key lock and accessories.	No.	1		

3	Floor mounted Panel Board/Distribution Panel for SCS. (Refer ITB for complete specifications)	No.	1		
Other Equipment/ HMI For Scada Control Station					
4	Master Server Station + HMI server application + OPC Application + Web server application+ Historian application, 1 TB HDD, Licensed MS Windows, MS Office and antivirus	No.	1		
5	Redundant Server Station + HMI server application + OPC Application + Web server application+ Historian application, 1 TB HDD, Licensed MS Windows, MS Office and antivirus	No.	1		
6	Operator Station Hardware with all necessary software (Operating System, Antivirus, HMI Software, Historian Capability etc.) 1 TB HDD, 16 GB RAM, 24" Color LED Display, External speakers Two stations will be placed in SCS and One will be in Telemetry Office.	No.	3		
7	EWS Station Hardware with all necessary software (Operating System, Antivirus, HMI Development, MTU Development, Radio Communication Configuration Software etc.),	No.	1		
8	40/42" LED Monitor for monitoring field KPI's at FM office, Full HD, Power Supply: 220 VAC, 50 HZ. Make: Samsung / Sony / LG	No.	1		
9	Router, Firewalls, Bridge Machines etc for Web connectivity	Lot	1		
10	Remote Client Station licenses	No.	5		
11	Networking Cabinet 42U for Ethernet Switches, servers etc	No.	1		
12	16-port Ethernet Network Switch, layer 02 managed switches	No.	2		

13	Ethernet to Fiber media converters & Networking accessories (Network cable, Fiber Optic Accessories etc.)	Lot	1		
14	Console/Table & Chair For 3 OWS, 01 EWS, 01 for CCTV Monitoring at SCS. Each Console have its own Power Supply Socket.	Set	5		
15	Color LaserJet Network Printer, Make: HP, Ethernet connectivity	No.	1		
RTU / PLC FOR WELLS					
16	Complete RTU/PLC (Remote) with Power Supplies, controller, I/O cards, communication cards, AGA-3 module etc. SIL 2 certified (accompanied with associated TUV certification). Input Voltage 24V DC, Approved for Class I Division 2 Group A,B,C,D Hazardous Locations, Temperature: 0 °C to +55 °C	No.	7		
17	RTU Enclosure with Door Handle & Cylinder Lock , Material: Stainless Steel (SS-304), Degree of Protection: IP 66 / NEMA 4x,	No.	7		
18	RTU Panel Shade, Material: Metallic	No.	7		
19	Mounting frame for RTU Panel	No.	7		
20	RTU Panel Accessories (Panel wirings like MCB, Lugs, Fused Terminal Strips, Relays, Tags etc.)	No.	7		
21	RTU/PLC Configurator /Laptop with configuration softwares, 17" screen, 1 TB HD, 8 GB RAM, Licensed softwares, Make: HP/Dell/ Sony	No.	1		
Transmitters / Sensors					
22	Orifice Meter with flanges , Orifice Assembly with Fittings and accessories, Line Size and Rating Class :4" 1500#, Pipe Schedule: SCH. 80 (3.826" I.D.), 4" 316SS Universal Orifice Plate,	No.	7		

23	Flow Control Valve , Size: 4 1/16"-3"-4 1/16" API 5000, Body: ASTM A487 Gr CA6NM CL B, Trim: 13%Cr4%Ni Stainless Steel, Actuator: M275-1VS-6, Pneumatic Spring to Close, other detail in ITB	No.	7		
24	Temperature Transmitter with RTD sensor & thermowell , Output= 4–20 mA with Digital Signal Based on HART Protocol, Product Certifications=FM Explosion-Proof; Dust Ignition-Proof, LCD Display, calibration certificate, Thermowell material: SS-316, Thermowell immersion length: vendor recommended for 4" Pipeline	No.	7		
25	Differential Pressure Transmitter , Transmitter Type = Coplanar Pressure Transmitter, Pressure Range = 0 ~ 150 inH2O, Transmitter Output = 4–20 mA with Digital Signal based on HART Protocol, LCD Display, Mounting Bracket for 2-in. Pipe, Product Certifications = FM Explosion-Proof, Dust Ignition-Proof , Complete with 5-Valve Manifold, other detail in ITB	No.	7		
26	Static Pressure transmitters , Pressure Range = 0 ~ 3000 psi, Transmitter Output = 4–20 mA with Digital Signal based on HART Protocol, Process Connection Wetted Parts Material = 316L SST, LCD Display, Mounting Bracket for 2-in. Pipe, Complete with 2-Valve Manifold, other detail in ITB	No.	14		
27	Fire (IR Flame) Detector , Maximum Range: 230 ft., Sensor Type: Multi-Spectral IR (MSIR) Sensor, False alarm immunity, Input Power: 24 VDC, IP Rating: IP65/66/67, W/Mounting Bracket,	No.	14		

	Approvals/Language = CSA/FM/UL/ATEX/IECEX (GMIL), Class I, Div 1, Groups B, C, D & Class II, Div 1, Groups E, F, G				
28	Combustible Gas Detector , Sensor Type: Continuous Diffusion, Low Temperature Catalytic Bead, Three-Digit LED Display With Gas Concentration, Measuring Ranges: 0 ~ 100% LEL, Input Power: 24 VDC, Class I, Division 1, Groups B, C & D; (Temp = -10°C to +55°C)	No.	14		
29	Magnetic Float Level Transmitter , ATEX Ex II 2G Ex d IIB / UL Class 1 Div 1, Temp = -10°C to +55°C, Make: FineTek or equivalent	No.	7		
30	Beacon Light , Color: Red, Voltages DC: 24 VDC, Approval: Flameproof/Exd/Zone 1 & Zone 2, Ingress protection: IP66, Glass lens & Stainless Steel Guard	No.	7		
31	Sounder , Voltages DC: 24V DC, Ingress protection: IP66/67, Color: Red Housing, Multi-tone, Approval: Flameproof/Exd/Zone 1 & Zone 2	No.	7		
32	Hand-Held Hart Communicator , Wide Screen LCD, Certified for Intrinsic Safe (Ex ia) areas according to ATEX, FM, UL	No.	1		
33	Pressure Calibrator , Fluke 721 or equivalent, with Pressure Modules (Range: 0 PSI to 3000 PSI), Hydraulic Test Pump (10,000 psi) with Hydraulic Test Hose and Pressure Relief Valve Kit,	Set	1		
34	Poles for Sounder/ Beacon / Flame & Gas Detectors	No.	35		

Communication system

35	Master Radio Set, Complete with 180-Degree covering Antennas and All Accessories, Frequency Band: 2.3-2.7 GHz / 4.9-5.8 GHz , Detail in specification sheet	No.	2		
36	Aggregation / Ethernet Switch	No.	1		
37	Remote Radio Set, Frequency Band: 2.3-2.7 GHz / 4.9-5.8 GHz , Complete with 90-Degree Sectoral Antennas and All Accessories, Detail in specification sheet	No.	7		
38	Antenna Tower with LED OB Light for MTU at SCS, Height: 150 to 200 feet, As per vendor recommended design	No.	1		
39	Antenna Pole for RTU Sites, Pole Height 20-150 feet depending upon communication survey / coordinates	No.	7		
IP Based CCTV system					
40	40/42" LED Monitor for CCTV Camera Surveillance at SCS & Telemetry office, Full HD, Power Supply: 220 VAC 50 HZ. Make Samsung/ Sony/LG	No.	2		
41	Video Recording Units at SCS & Telemetry office, 4 x 2 TB Storage Capacity, Surveillance Systems of up to 32 Channels, USB port, VGA port, Ethernet port,	No.	2		
42	PTZ Color CCTV IP Camera with IR LEDs for night vision up to min 100 meters, Weatherproof enclosure, Digital Zoom 25x, HD Resolution: 1080p, Support PoE+, Ingress Protection Rating: IP66, Pipe mount,	No.	7		
43	4 port Ethernet switch at remote well, Certification: UL/cUL: Class I, Division 2 Groups A, B, C, D, T4, Operating Temperature: -10°C to 55°C, 10/100/1000Base-T(X) PoE+ Copper Ports	No.	7		

44	Poles for PTZ Cameras at each well site, Height: As per vendor survey.	No.	7		
Solar Power System					
45	Polycrystalline Solar Module, Maximum Power: 200W, Junction Box Type: IP65 rated, Temperature Range: -140C - +55C,	No.	84		
46	Battery Bank, 24 VDC, for Solar, 36 hour backup time (Set)	No.	7		
47	Voltage Transducer	No.	7		
48	Solar Charge Controller & Load Controllers, Charge Mode: 4 Stage (Bulk, Absorption, Float, Equalized)	Set	7		
49	Battery Box, Degree of Protection: NEMA 4, with Heavy Duty Key Lock and Ventilation/ Breathing Glands	No.	7		
50	NEMA 4X SS Enclosure for Charge & Load Controllers and Array Combiner Box	No.	7		
51	Metallic Solar PV Module Frame, Size: As per Solar PV Modules Dimensions, PV Module structure must be able to withstand high winds speed up to 120 Km/Hr with Gust Factor of: 1.5. Drawing will be approved by OGDC prior to construction.	No.	7		
52	Wiring & Accessories for Solar System	No.	7		
Cables & accessories					
53	Ethernet Communication Cable for CCTV Camera, Type: CAT5E, Make: 3M/Equivalent	Roll	3		

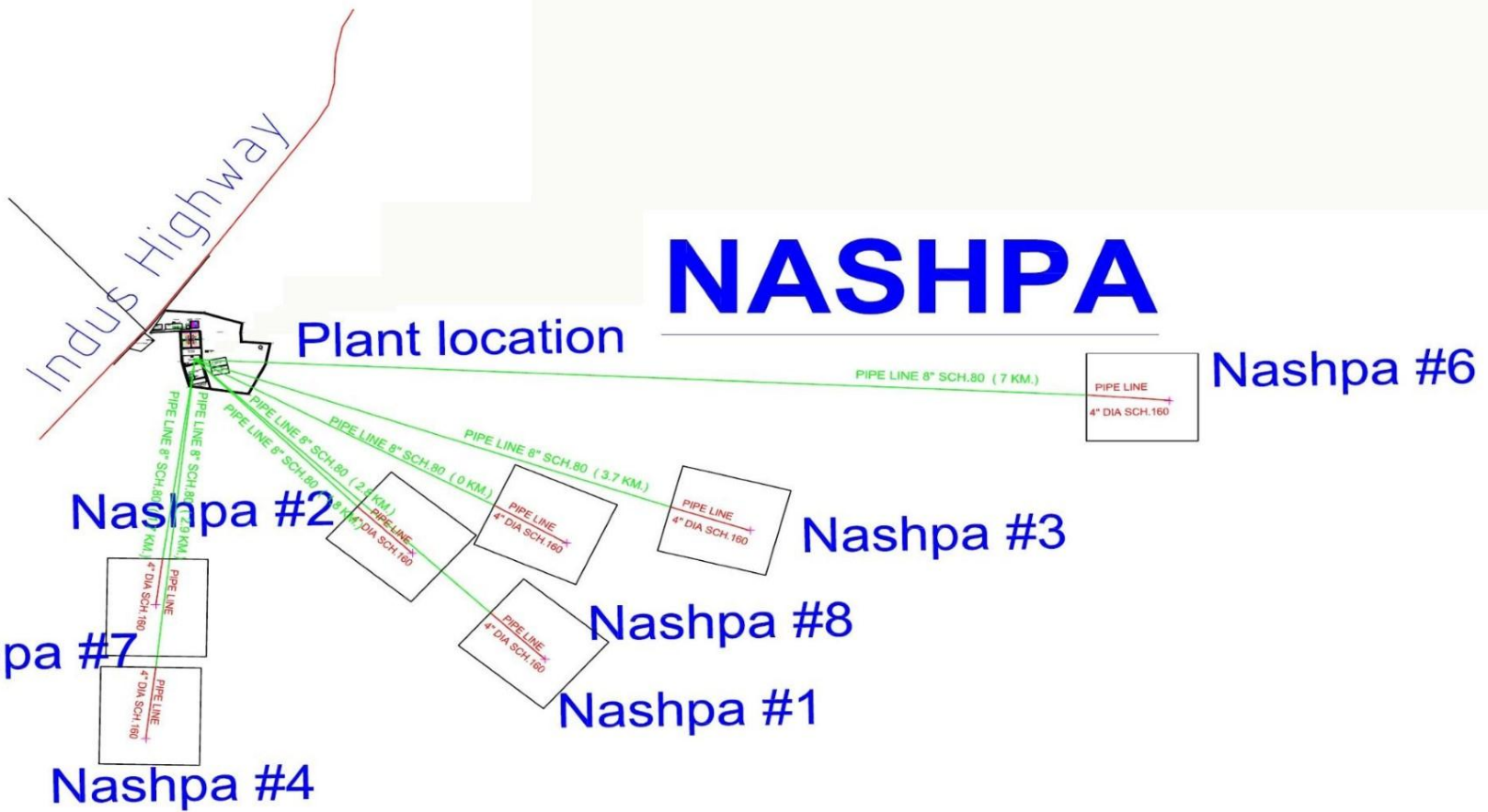
54	<p>Armored Control Cable for Connecting Field Intermediate JB (Digital) to RTU PLC Panel.</p> <p>10 Pair 1.5 Sq. mm Class 2 Stranded Plain Cu, Cable Construction: XLPE/IAM/CAM/LSZH/SWA/LSZH BLACK 300/500V</p> <p><u>Distribution of Conductor Pairs shall be as follows:</u></p> <p>1 Pair for SSV Pressure Switch, 1 Pair for SSSV Pressure Switch,</p> <p>1 Pair for SSV Pilot Pressure Switch, 1 Pair for SSSV Pilot Pressure Switch, 1 Pair for ESD Pressure Switch, 1 Pair for Fusible Plug Pressure Switch, 4 Pair for Solenoid Valves, 2 Pair for Flame Detector (2 Nos)</p> <p>2 Pair for Horn, 2 Pair for Beacon, Rest Pairs for Spare</p>	Meter	1480		
55	<p>Armored Control Cable for Connecting Field Intermediate JB (Analog) to RTU PLC Panel.</p> <p>12 Pair 1.5 Sq. mm Class 2 Stranded Plain Cu, Cable Construction: XLPE/IAM/CAM/ PVC/SWA/PVC RP BLK 500v RE2XSTYSWAY-PIMF,</p> <p><u>Distribution of Conductor Pairs shall be as follows:</u></p> <p>1 Pair for level Transmitter</p> <p>1 Pair for Temperature</p> <p>2 Pair for Pressure Transmitter (2 Nos)</p> <p>1 Pair for DP Transmitter</p> <p>2 Pair for HC Detectors (2 Nos)</p> <p>1 Pair for Solar Voltage Transmitter</p> <p>1 Pair for FCV</p> <p>Rest Pairs for Spare</p>	Meter	700		
56	<p>Armored Control Cable For Field Instruments (IR Flame, GDS, Beacon Light, Sounder), 2 Pair 1.5sqmm Class 2 Stranded Plain Cu, Cable Construction: PE/IAM/CAM/PE/SWA/PVC BLACK</p>	Meter	2100		

57	1 Pair Armored Control Cable For Field Instruments (PT, TT, DPT, LT), 1.5sqmm Class 2 Stranded Plain Cu, Cable Construction: PE/IAM/CAM/PE/SWA/PVC Black 500V	Meter	3500		
58	1 Core Instrument Grounding Cable, 6 sq. mm , pvc insulated	Meter	1050		
59	1 Core 10 sq. mm for Grounding, PVC Insulated	Meter	1050		
60	Explosion proof Cable glands / Stopping plugs (Lot) /accessories	Lot	1		
SS Tubing & Accessories					
61	S.S Tubing, Size: 1/4"T X 0.065" WT, TP316L/316 S.S, Seamless to ASTM A-269	Meter	350		
62	S.S Tubing, Size: 3/8"T X 0.049" WT, TP316L/316 S.S, Seamless to ASTM A-269	Meter	350		
63	Miscellaneous Connectors/accessories, SS-316	Lot	1		
Explosion proof S.S Terminal Junction Boxes					
64	Explosion proof S.S Terminal Junction Boxes , Size: 300 W x 300H x 150 D (mm), No.of TB's: 35 Nos., Approval: ATEX Approved /Class I, Division II, Group G. Hazardous Area, Material: SS-304, Degree of Protection: IP 66, (Certificates for IP and ATEX rating shall be provided)	No.	14		
65	Junction Box for POE Ethernet Switch	No.	7		
Commissioning Spares					
66	Commissioning Spares (Not more than USD 15,000)	Lot	1		
Services etc					

67	<p>Engineering Services for Programming and HMI Development</p> <p>Configuration, Communication with Ethernet Switches & Wireless Link. Engineering, HMI Development and configuration of redundant servers, operator stations with HMI, Historian, EWS, web server, Remote Clients</p> <p>OPC interface for future integration with Plant DCS.</p>	L.S.	1		
68	Engineering Services for Wireless Link Communication and Configuration of Field Instruments	L.S.	1		
69	<p>Configuration and Software Engineering Works for RTU & MTU PLC</p> <p>:- 1. Design, engineering, configuration, testing & integration of Telemetry based Scada System in accordance with all technical requirements.</p> <p>2. Integration of RTUs with communication systems. Hookup with field instruments.</p> <p>3. Logic and Application Development, Panel Design and Configuration of RTU and MTU PLC</p> <p>4. Engineering and Commissioning of Master Telemetry Unit (MTU) / Master PLC at Nashpa SCS & Remote Telemetry Units PLC/RTU at each well site.</p> <p>5. Configuration of complete SCADA & Telemetry System hardware</p>	L.S.	1		
70	Wireless Communication System Installation, Testing & Commissioning	L.S.	1		
71	Grounding & Earthing of Wireless Instruments/Panel/Antenna Tower & Poles	L.S.	1		
72	<p>Factory Acceptance Test, FAT Location:</p> <p>Vendors site, FAT Duration: 05 Days, Witness by 02 OGDCL Professionals,</p>	L.S.	1		

73	Foreign Training, Training Duration: 05 Days for 02 OGDCL Engineers,	L.S	1		
74	Operational & Maintenance Level on-Site Local Training, Duration of Training: 5 Days for 10 OGDCL officials	L.S.	1		
75	Installation , Testing , Commissioning & SAT For complete Scada System	L.S	1		
76	Sustained Performance Test (SPT) for 30 Consecutive Days	L.S.	1		
77	Project Documentation	L.S.	1		
78	Site Transportation Charges (Team Mobilization Charges)	L.S.	1		

Nashpa Field



NASHPA

Plant location

Nashpa #6

Nashpa #2

Nashpa #3

Nashpa #8

Nashpa #7

Nashpa #1

Nashpa #4

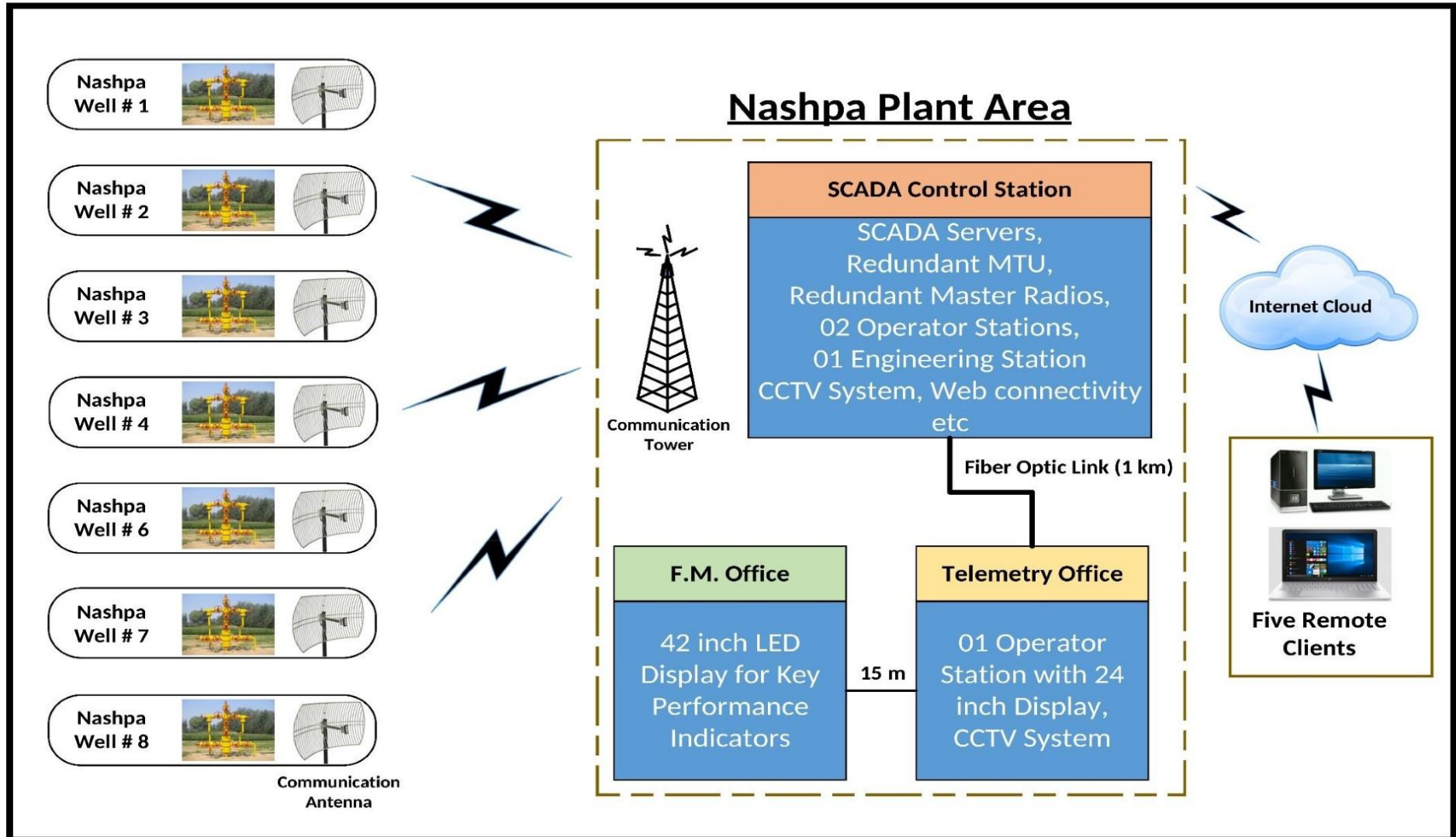
PLANT COORDINATES

CORNERS	NORTHING	EASTING
C1	1003944.30730	3050355.0801
C2	1003930.17070	3050517.2785
C3	1003917.79590	3050680.7233
C4	1004007.30160	3050680.4739
C5	1003923.31610	3050869.1744
C6	1004425.5640	3050675.7763
C7	1004071.22620	3050161.2646
C8	1003663.07950	3049957.5421
C9	1003707.50610	3050339.2516

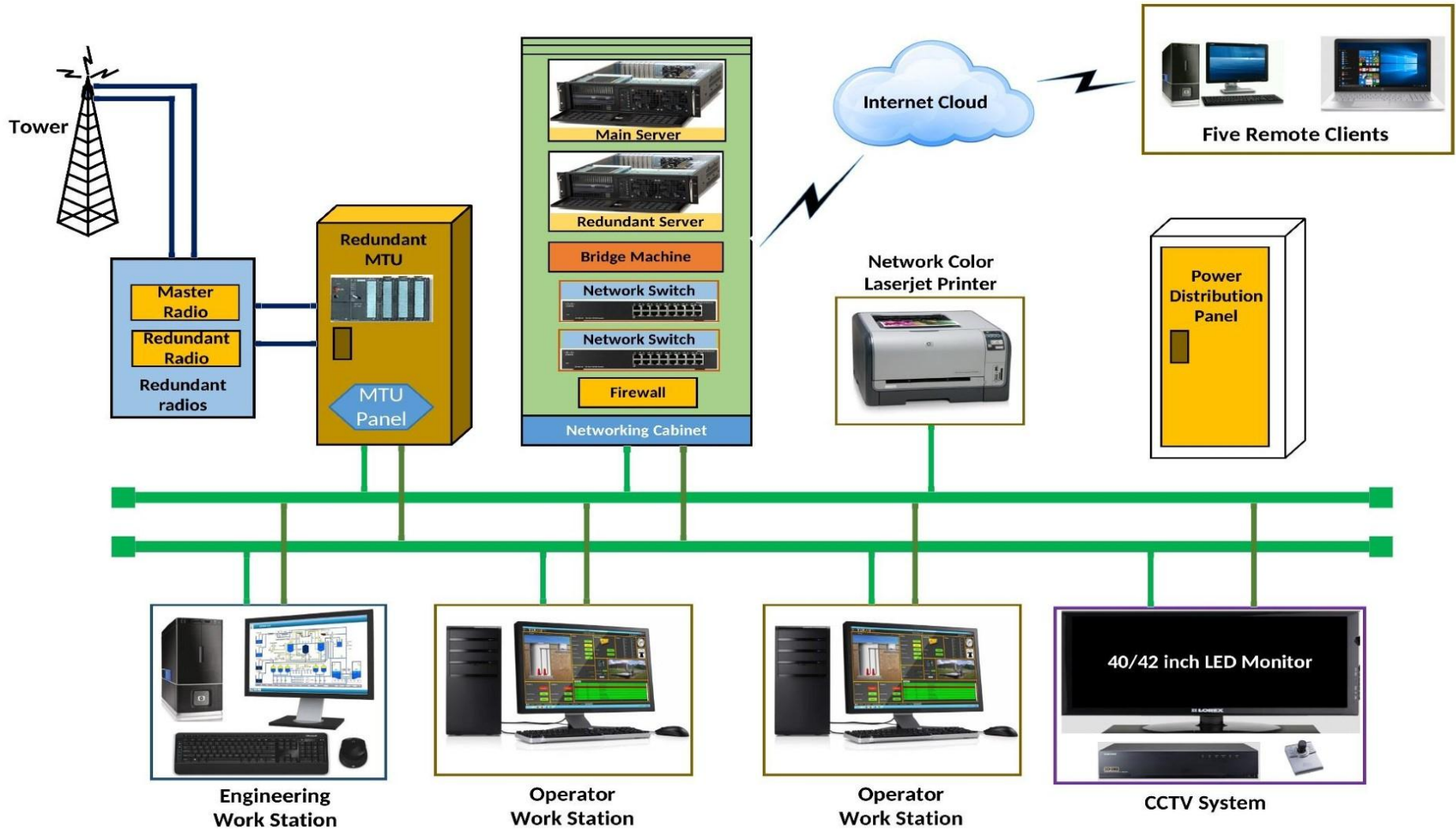
Itemref	Quantity	Title/Name, designation, material, dimension etc		Article No /Reference	
CAD BY	Checked by	Approved by	Drawing No.	Computer Code	upDate
Abdul Ghafoor Rashid	Fasil Qayyum		PF-NA-01-A	PFNA01.DWG	07-12-2017
Owner Oil & Gas Development Company Ltd. Petroleum Engineering & Facilities dept. Production Division ISLAMABAD			Title/Name NASHPA PLANT + LOCATION MAP		
Project: NASPA GAS FIELD			Scale XXXXX	Sheet XXXXX	

RevNo	Revision note	Date	Signature	Checked

Nashpa SCADA System



Nashpa Scada Control Station – Symbolic Architecture



TENDER NO. PROC-FC/CB/PROD/NASHPA-3200/2018
SCADA SYSTEM FOR NASHPA WELLS

1. The case will be processed on Single Stage - Two Envelop Bidding Procedure as per PPRA Rules. Master Set of Tender Document is available on OGDCL website.
2. The Commercial Evaluation will be based on the total of the price of the item listed above as per commercial evaluation criteria given in Tender Document based on exchange rate on the date of technical bid opening.
3. The Bid shall remain valid for 180 Days from the Date of Technical Bid Opening.
4. Bid Bond amounting to USD 25,000.00 (US Dollard Twenty Five Thousand Only) or Equivalent Pak Rupees as per tender documents Valid for 210 Days from date of technical Bid Opening is required upfront along with the Technical bid.
Note: BID BOND ISSUED BY RBS/NIB/SUMMIT BANK IS NOT ACCEPTABLE.
5. 10% Performance Bond (Attachment # 03) in case of award of contract) for full value shall be valid upto 24 Months form the date of shipment or Twelve (12) Months form the date of issuance of PACs/SAT. Whichever is earlier.
6. The Bidder shall confirm acceptance of complete tender documents.
7. Payment will be made as per Attachment No. 02.
8. Please attach Un-priced BOQ along with Technical Bid and Priced BOQ along with Financial Bid. In case of Non-compliance bid shall be rejected.
9. BOQ must show FOB Cost & CFR Cost separately (For Imported Material) and Ex-works and ex-site cost separately (for local material) for each line item of BOQ and lump sum cost for services portion.
10. The price shall be inclusive of all applicable taxes as per Tax Clause (Attachment # 5).
11. OGDCL reserves the right to increase / decrease the quantities/TOR/BOQ keeping in view its operational requirements.

**TENDER NO. PROC-FC/CB/PROD/NASHPA-3200/2018
SCADA SYSTEM FOR NASHPA WELLS**

Attachment # 2

PAYMENT TERMS

The payment shall be made as follow:-

A) Supply of Equipment/Material

For Supply Part Purchase Order (Foreign Purchase Order for imported equipment and Local Purchase Order for local component) will be issued and irrevocable Letter of Credit/Inland LC will be established by OGDCL. Supply LC payment terms are as follow:-

- a. Eighty (80) percent of Material LC/Purchase Order Price shall be paid by OGDCL on shipment of the complete material. The payment under the L/C shall be effected upon submission of following documents upon each shipment of material component:
 - I. Original Clean board ocean vessel Master Bill of Lading (For Imported Material) and Delivery Challan & Truck Receipt (For local Material).
 - II. Original detailed invoice showing material description, quantity unit price and total price strictly in line with the Contract.
 - III. Packing list
 - IV. Certificate and list of measurements and weight gross/net.
 - V. Mill Inspection/Quality Certificate.
 - VI. Insurance declaration.
 - VII. Warranty Certificate
 - VIII. Certificate of origin.
 - IX. Third Party Inspection report/certificate issued by any one of the following:
 1. M/s TUV Rheinland.
 2. M/s SGS
 3. M/s TUV Austria (Formerly Moody Intl)
 4. M/s Velosi
 5. M/s Bureau Veritas

- b. Twenty (20) percent of the Material LC/Purchase Order Price shall be released under the L/C after successful commissioning, performance testing, Site Acceptance Test (SAT) and issuance of Provisional Acceptance Certificate (PAC) / SAT Certificate upon submission of Invoice(s) duly verified by OGDCL.

B) Services

For Services Portion, **Installation, commissioning, start-up & Performance testing, Site Acceptance Test and Training of OGDCL operational and Maintenance staff at Plant/Site**, second Letter of Credit (L/C) shall be established. The Services LC shall be valid for Three (03) Months.

The charges for Installation, commissioning, start-up & Performance testing (including mobilization/de-mobilization for Nashpa Plant) Site Acceptance test and Training of OGDCL operational and Maintenance staff at Site shall be paid by OGDCL after successful commissioning on issuance of Provisional Acceptance Certificate/SAT Certificate and completion of training at each site against Supplier's invoice(s) duly verified by OGDCL.

Supplier's request(s) for payment shall be made to OGDCL in writing accompanied by an invoice describing, as appropriate, the equipment delivered or services performed, and by shipping documents, submitted pursuant to relevant clauses and upon fulfillment of all obligations stipulated in the Contract.

**TENDER NO. PROC-FC/CB/PROD/NASHPA-3200/2018
SCADA SYSTEM FOR NASHPA WELLS**

Attachment # 03

PERFORMANCE BANK GUARANTEE

Oil & Gas Development Company
Limited OGDCL House, Jinnah
Avenue, Blue Area, Islamabad,
(Pakistan)

Dear Sir,

Ref; our Bank Guarantee No. _____ in the sum of
_____ Account _____ in consideration of you having
entered _____ into _____ Contract
No. _____ Dated _____ with _____ Called
Contractor and in consideration for value received from CONTRACTOR. We hereby agree and undertake as
followings:

1 To make unconditional payment to you as called upon of (10%) ten percent of the Contract value of the contract price mentioned in the said contract, on your written FIRST and SIMPLE demand without further recourse, question or reference to CONTRACTOR or any other person in the event of default, non-performance or non-fulfillment by CONTRACTOR of his obligations, liabilities, responsibilities under the said contract of which you shall be the sole judge.

2 The accept written intimation from you as conclusive and sufficient evidence of the existence of the default or breach as aforesaid on the part of CONTRACTOR and to make payment immediately and forthwith upon receipt of your FIRST and SIMPLE written demand.

3 This Performance Bond shall remain valid and in full force and effect upto _____ or issue of statement of discharge by your authorized representative or return of original guarantee whichever is earlier.

4 **DEMURRAGE DUE TO DELAY IN RECEIPT / NEGOTIATION OF ORIGINAL SHIPPING DOCUMENTS.**

If clean documents are not negotiated within Negotiation Period allowed in Letter of Credit or documents are with held by Bank on account of any discrepancy:

- If the Demurrage, if any incurred due to late negotiation of the Clean Documents and paid by OGDCL will be realized from the beneficiary of L/C, by encashing this Performance Bond to the extent of demurrage amount. In case demurrage amount exceeds the total value of this Performance Bond the balance amount will be payable by the beneficiary.

1 That no grant of time or other indulgence to, amendment in the terms of the Contract by Agreement between the parties, or imposition or Agreement with CONTRACTOR in respect of the performance of his obligations under the said Agreement, with or without notice to us, shall in any manner discharge or otherwise affect this Guarantee and our liabilities and commitments there under.

2 This is an independent and direct obligation guarantee and shall be binding on us and our successors interest and shall be Irrevocable.

3 This guarantee shall not be affected by any change in the constitution of the Guarantor Bank or the constitution of the Contractor.

4 The Guarantor Bank Warrants and represents that it is fully authorized, empowered and competent to issue this guarantee.

(BANKERS)

**TENDER NO. PROC-FC/CB/PROD/NASHPA-3200/2018
SCADA SYSTEM FOR NASHPA WELLS**

Attachment # 4

DELIVERY PERIOD

SUPPLY PART

The timely delivery of SCADA System shall be the essence of the Contract/PO, as OGDCL has to meet its obligations for completion of the Project. Accordingly, the Supplier is required to complete the Supply of SCADA System within five (05) months on CFR Karachi basis (applicable for foreign bidders) or at NASHPA site basis (applicable for local bidder) from the date of establishment of letter of credit by OGDCL.

SERVICES PART

The supplier is required to complete the services i.e. Installation, commissioning, start-up & Performance testing, Site Acceptance Test including mobilization/de-mobilization and Training of OGDCL operational and Maintenance staff at Site as per TOR within three (03) Months from the date of establishment of Services LC by OGDCL.

Note: *In case of OGDCL finds prolong delay by supplier for completion of services at site OGDCL reserves the right to complete the services at the risk and cost of supplier.*

TAXES

i. The Contract price includes all taxes, duties, fees, levies and any other relevant charges payable inside and outside Pakistan.

ii. Any taxes, duties, fees, levies and other relevant charges, present or future, assessed or payable outside Pakistan by the Contractor and/or by the expatriate personnel deputed by the Contractor in connection with the services supplied under the Contract shall be the exclusive responsibility of the Contractor.

iii. Any taxes, duties, fees, levies and other relevant charges, present or future, assessed or payable in Pakistan by the Contractor and/or by the expatriate personnel deputed by the Contractor in connection with its performance under the Contract shall be the exclusive responsibility of the Contractor.

iv. The Contractor shall be responsible and pay all taxes on its income outside and in particular on its income in Pakistan under the Contract and under the laws of Pakistan.

v. The Company shall have the right, as provided under the laws of Pakistan to meet its obligations and in particular to deduct from the payments due to the Contractor (against entire contract value including supplies and/or services components, as applicable), income tax/sales tax at source at the rates prevailing from time to time, from the invoiced amounts, or such reduced rates fixed by the taxation authorities for the Contractor on production of documentary evidence by the Contractor and pay such amount to appropriate authorities.

vi. The Contractor shall also be responsible for any income taxes levied on the Contractor's expatriate personnel, under the laws of Pakistan and for all social security issuances and other contributions for the Contractor's expatriate personnel regardless of whether such contributions are levied on employer or employee or both in Pakistan.

vii. The Contractor shall keep the Company duly informed about the steps taken by the Contractor in order to meet its obligations under the Contract and provide the necessary documents to the Company in this connection.

viii. The Contractor shall indemnify the Company against any claim which might occur due to non compliance by Contractor of any legal obligation regarding the taxes, duties, fees, levies, or other charges, including taxes on income in Pakistan and any other payments to the Government or Governmental agencies.

Understanding reflected under the above tax clauses would prevail in case of any understanding to the contrary that may be reflected with respect to tax matters, in any other clause of the contract.