ANNEXURE-1

CONTINUOUS AMBIENT AIR QUALITY MONITORING SYSTEM (CAAQMS)

Part A - AAQMS Analyzers

1.0 SYSTEM REQUIREMENT

CAAQMS Stations – 03 Nos AAQMS Stations to be installed at site.

AAQMS shall be provided to check upon the ambient air quality inside and around the power plant and should be capable of generating required periodic reports for submission to relevant Central & State regulatory agencies by Owner.

Ambient air quality shall be monitored for concentration levels of selected pollutants at different locations at power station and adjoining areas as per the ambient air quality monitoring guidelines of Central & State regulatory agencies like, MOEF, Central & State Pollution Control Boards (PCBs) prevailing during contract execution phase.

AAQMS system including the analysers being supplied shall meet all applicable requirements/guidelines of relevant Central & State regulatory agencies like, MOEF, Central & State Pollution Control Boards (PCBs) etc. or of US EPA. In case USEPA approval is not applicable, approval from international reputed agencies like TUV, EN etc. is required. In the absence of the same, it is the sole responsibility of the Vendor to obtain the necessary approvals & Owner has no liability towards the same.

Broad break up of items to be supplied under CAAQMS – Part A is as below:

a. Analysers for Sulphur dioxide (SO_2) – 03 No.
b. Analysers for Oxides of nitrogen (NOx) – 03 No.
c. Analysers for Carbon monoxide (CO) – 03 No.
d. Analysers for Carbon dioxide (CO_2) – 03 No.
e. Particulate Monitors-PM2.5 Analyzer – 03 No.
f. Particulate Monitors-PM10 Analyzer – 03 No.
g. Analyser for Ozone (O_3) – 01 No.
h. Analysers for Ammonia (NH_3) – 03 No.
i. Analysers for Benzene – 03 No.

(Total number of Analyzers to be supplied – 25 Nos.)

AAQMS for each plant location will be a fixed type, self-contained 'Station'. Total three (3) nos. such Stations will be provided. Minimum, one (1) no 'Station' shall be located at the up-wind direction. Balance two (2) number 'Stations" shall be located at different plant locations considering factors like downwind direction, sensitive receptor, population etc. The exact location of the monitoring station(s) shall be decided in consultation with Owner and

regulatory agencies considering all units at Bhusawal project during project implementation phase.

Ambient air quality monitoring for each plant location shall be suitable for continuous on-line monitoring of different pollutant gases. AAQMS shall allow monitoring, logging of parameter values, archiving and report generation for environmental monitoring authorities and plant management personnel.
All the Analysers will be provided with dual range & auto ranging facility. The analysers must function properly in Indian conditions without any defect between 0 to 50°C ambient temperature, 0 to 100% relative humidity and in high ambient dust level.

2.0 ANALYSER SPECIFICATIONS

2.1 NO2 Analyser:

S.No	Features	:	Specification requirement
1	Principle	:	Chemiluminescence
2	Range	:	0 to 10 ppm
3	Minimum Detectable Limits	:	<1.0 ppb
4	Zero Drift (24 Hr. Basis)	:	< 0.4 ppb of Full Scale Per Day
5	Span Drift (24 Hr. Basis)	:	± 1% of Full Scale Per Day
6	Accuracy	:	± 0.4 ppb (For 500 ppb range)
7	Linearity	:	± 1% of Full Scale Reading
8	Operating Temperature	:	5-45 °C
9	Signal Output	:	4-20 mA DC/RS 232 or RS 485 Link
10	Power Supply	:	240 AC (UPS)
11	Mounting	:	Rack Mounted

2.2 SO2 Analyser:

S.No	Features	:	Specification requirement
1	Principle	:	Fluorescence In UV absorbance
2	Range	:	0 to 10 ppm
3	Minimum Detectable Limits	:	<0.5 ppb
4	Zero Drift (24 Hr. Basis)	:	<1 ppb
5	Span Drift (24 Hr. Basis)	:	±1% Per day
6	Accuracy	:	±1%
7	Linearity	:	± 1% of Full Scale Reading
8	Operating Temperature	:	5-45 °C
9	Signal Output	:	4-20 mA DC/RS 232 or RS 485 Link

10	Power Supply	:	240 AC (UPS)
11	Mounting	:	Rack Mounted

2.3 CO Analyser:

S.No	Features	:	Specification requirement
1	Principle	:	NDIR Type With Gas Filter Correlation
2	Range	:	0-100 ppm.
3	Minimum Detectable Limits	:	0.04 ppm.
4	Zero Drift (24 Hr. Basis)	:	< 0.1 ppm Per Day
5	Span Drift (24 Hr. Basis)	:	± 1% Per day
6	Accuracy	:	± 0.1 ppm
7	Linearity	:	± 1% of Full Scale Reading
8	Operating Temperature	:	20-30°C
9	Signal Output	:	4-20 mA DC/RS 232 or RS 485 Link
10	Power Supply	:	240 AC (UPS)
11	Mounting	:	Rack Mounted

2.4 CO2 Analyser:

S.No	Features	:	Specification requirement
1	Principle	:	IR Type With Gas Filter Correlation
2	Range	:	0-1000 ppm
3	Minimum Detectable Limits	:	0.5 ppm
4	Zero Drift (24 Hr. Basis)	:	< 0.1 ppm Per Day
5	Span Drift (24 Hr. Basis)	:	± 1% Per day
6	Accuracy	:	± 0.1 ppm
7	Linearity	:	± 1% of Full Scale Reading
8	Operating Temperature	:	5-45 °C
9	Signal Output	:	4-20 mA DC/RS 232 or RS 485 Link
10	Power Supply	:	240AC (UPS)
11	Mounting	:	Rack Mounted

2.5 Particulate Matter (PM2.5):

S.No	Features	:	Specification requirement
1	Type	:	Tapered Element oscillating microbalance (TEOM) or Beta Ray attenuation
2	Range	:	0 to 1000 µg / m^3
3	Resolution	:	0.1 Micro- Gram / m^3
4	Accuracy	:	± 1.5 µg / m^3 (1 Hr Average) / ± 0.5 µg / m^3 (24 Hr Average)
5	Minimum Detectable Limit for Mass Measurement	:	1 µg / m^3
6	Accuracy	:	For Mass Measurement ± 0.75 %
7	Operating Temperature	:	5-45°C
8	Signal Output	:	4-20 A DC/RS 232 or RS 485 Link
9	Power Supply	:	240 AC (UPS)
10	Mounting	:	Rack Mounted
11	Data Averaging	:	Every 2 seconds

2.6 Particulate Matter (PM10):

S.No	Features	:	Specification requirement
1	Type	:	Tapered Element oscillating microbalance (TEOM) or Beta Ray attenuation
2	Range	:	0 to 1000 µg / m^3
3	Resolution	:	0.1 Micro- Gram / m^3
4	Accuracy	:	± 1.5 µg / m^3 (1 Hr Average) / ± 0.5 µg / m^3 (24 Hr Average)
5	Minimum Detectable Limit for Mass Measurement	:	1 µg / m^3
6	Accuracy	:	For Mass Measurement +/- 0.75 %
7	Operating Temperature	:	5-45°C
8	Signal Output	:	4-20 mA DC/RS 232 or RS 485 Link
9	Power Supply	:	241 AC (UPS)
10	Mounting	:	Rack Mounted
11	Data Averaging	:	Every 2 seconds

2.7 Ozone Analyzer (O_3 Analyser)

Using UV Photometric technology, the Analyser will measure the amount of ozone in the air from ppb levels up to ppm. The Analyser will be based on Beer Lambert Law for measuring low ranges of Ozone in Ambient Air.

S.No.	Features	Specification requirement
1	Measuring principle	UV – Photometric/Chemiluminescence
2	Ranges	0-100 PPB to 0-10 PPM
3	Display	LCD/LED
4	Lower Detectable Limit	±0.006 ppm
5	Units	ppb, ppm, ug / m^3, mg / m^3
6	Zero drift at lowest Range	<1.0 ppb
7	Span drift at lowest Range	±1% of measured value/week
8	Response time at Lowest Range	20 sec
9	Linearity	1% of full-scale
10	Calibration	Built-in Calibration Facility
11	Mounting	Standard 19" with telescopic slide

2.8 Ammonia (NH_3) Analyser:

S.No.	Features	:	Specification requirement
1	Range	:	0 to 1000 µg / m^3
2	Minimum Detectable	:	400 µg / m^3
3	Response Time	:	60 Seconds
4	Operating Temperature	:	5-45 °C
5	Signal Output	:	4 - 20 mA DC/RS 232 Or RS 485 Link
6	Power Supply	:	240 V AC (UPS)
	Mounting	:	Rack Mounted

2.9 Benzene Analyser:

S.No.	Features	:	Specification requirement
1	Range	:	0 to 100 µg / m^3
2	Minimum Detectable Limit	:	5 µg / m^3
3	Response Time	:	60 Seconds
4	Operating Temperature	:	5-45 °C
5	Signal Output	:	4 - 20 mA DC/RS 232 Or RS 485 Link
6	Power Supply	:	240 V AC (UPS)
7	Mounting	:	Rack Mounted

ANNEXURE-2

CONTINUOUS AMBIENT AIR QUALITY MONITORING SYSTEM (CAAQMS)

Part B - Accessories of AAQMS analysers

CAAQMS Stations – 03 Nos AAQMS Stations to be installed at site.

1.0 Broad break up of items to be supplied under CAAQMS Part B is as below:

a. Multi Gas Calibrator - 03 Nos.
b. Calibration Gas Cylinders for SO_2, NOx, CO, CO_2, Benzene, NH_3 analysers – 03 Sets
c. Zero Air Generator – 03 Nos.
d. SS Gas Sampling Hood - 03 Nos.
e. Meteorological Monitoring System - 01 Set
f. Analyzer Shelter with 19" Rack Cabinet, Furniture (01 Cupboard, 01 Table & 02 Revolving Chairs), 1.5T Air Conditioners (2 No. for each AAQMS) - 03 Sets
g. UPS (5 KVA Minimum for Analysers & DAS, 1 Hour Battery Back-up) - 03 No.
h. Local DAS with Work Station(PC) & Laser Jet (B&W, A4) Printer - 03 Set
i. Central DAS with PC, Laser Jet (B&W, A4) Printer & UPS (6 Hour battery Backup for PC) - 01 Set
j. Electronic Display board along with Platform and Mounting structure - 01 No.
k. RF Communication is to be provided. License & its Renewal for use of wireless communication for 3 years would be in Bidders scope – 1 Set
l. Consumables/spares required for one year after commissioning of stations – 1 Set
m. O&M contract for one year after commissioning of stations – Contract covering all 3 AAQMS stations & its components furnished under this contract. (Minimum 1 visit per quarter during 1-year operation.)

AAQMS shall allow monitoring, logging of parameter values, archiving and report generation for environmental monitoring authorities and plant management personnel.

2.0 AAQMS system shall include the following:

a. AAQMS Stations- 3 Nos.
b. Centralized AAQMS Data Acquisition System with a facility to connect with MPCB server & also supply data to digital display board.
c. Supply of modems and installation.

2.1 Each AAQMS Station shall include the following including analysers mentioned in Annexure-1, accessories, calibration facility, mounting racks/cabinets and housing shelter, Data Acquisition System etc. but not limited to the same:

a. Individual Gas analysers for the parameters specified
b. Necessary sampling systems for the AAQMS analysers
c. Multi gas calibration system
d. Zero air generator
e. Calibration gas cylinders, regulators, tubing along with test certificate

f. Mounting cabinet/rack for analysers and accessories
g. Housing shelter for AAQMS equipment-environmentally conditioned, walk-in type shelter complete with lighting and convenience receptacles.

2.2 Only Single Point raw power supply would be provided near each AAQMS location by BHEL. The responsibility of supply of complete AAQMS system (including analyzers forming part of Annexure-1) and work related to Installation, commissioning and handing over of AAQMS to end user i.e. MAHAGENCO will be in vendor's scope.

2.3 Any other Statutory/Regulatory approval required for installation, Commissioning and Operation of AAQMS would be in Vendors scope.

2.4 Hydrogen gas if required, for analyzer application would be sourced from Hydrogen Generator. For this purpose, 03 no. Hydrogen Generator would be supplied. In case Hydrogen Generator is not required, manufacturer will certify that the same is not required for AAQMS application.

3.0 AAQMS Analyzer shelter

3.1 Shelter Specification

(i) General requirement

The analyser shelter will be a completely assembled unit suitable for installation on a concrete pad as a stand-alone unit. All internal piping and tubing will terminate in bulkhead connections. Internal wiring will terminate in external junction boxes. All equipment including tubing, conduit fittings, junction boxes etc. will be installed so as not to interface with the removal of analysers, sample handling systems and related equipment, accessibility for maintenance will be the prime consideration.

The minimum external size of shelter will be 3000 mm(L) x 3000 mm (W) x 2500 mm (H) to accommodate the panels, work stations, tables, revolving tilting chairs, cupboard, UPS, battery etc.

3.1.1 Cabin: It comprises base frame, self–draining roof, peripheral structure, windows (as per requirement) and entry doors. All the eight corners of cabin to be completely strengthened to assist in lifting, transportation and placing.

a. External dimensions (min.): 3000 mm (L) X 3000 mm (W) X 2500 mm (H).
b. Canopy: Metal canopy
c. External wall shall be made of stainless steel SS304 (minimum 2 mm thick). Internal wall shall be made of painted galvanized sheet steel (minimum 18 Gauge). Flooring material shall be Aluminum(Al) chequered plate. The insulation material for the wall and roof shall be of rock wool (minimum 100 mm thick). Shelter shall be provided

with welded base frame. There shall be main and emergency door with handle, lock and key, panic bar, SS hinges, half glazed window (in each door).

3.1.2 Accessories:

a. Air conditioners split module type - 2 Nos. 1.5-ton capacity of standard make. (Voltage Stabilizer and Change over unit will remain common for both AC's)
b. Furniture including 2 nos. cushioned wheel chairs, cupboard and desk for mounting PC, monitor and printer.
c. Carbon monoxide Detector hooked up to an External Hooter – 01 No.
d. Internal and External Lighting – 01 Lot
e. Fire Extinguisher – 02 No. (The automatic Fire detection and alarm System shall be provided to ensure availability at all times. Fire extinguisher in each AAQMS shelter is to be provided (CO_2 cylinder of 4.5 Kg capacity confirming to IS:2878).
f. External Steel / Aluminum Ladder
g. Lock and Key for Door.
h. Laying of cables, cable trays outside and inside of Analyzer room.
i. Trenching of cables outside and inside of Analyzer room.
j. One-point power supply would be provided by BHEL near the AAQMS location. Internal and external distribution for power supply for AAQMS shelter will be done by the Vendor.

3.1.3 Rack Cabinet: Standard 19" rack cabinet made of heavy grade aluminum profiles with facility of telescopic slides, overload protection, power distribution box to accommodate "Monitoring analyzers" should be provided.

3.1.4 Platform for AAQMS Shelter:

Cement Platform of suitable size and Height is required to be constructed by the Vendor. Shelters are required to be installed at platform at site of each AAQMS Station as part of scope of supply.

3.1.5 Earthing with Pit for AAQMS.

The Supplier shall provide earth pit for AAQMS alongwith suitable electrodes, connecting wiring etc.

3.1.6 Features of Construction

a. The analyser shelter will consist of a self-framing exterior skin assembled on a rigid primed and painted steel superstructure. All materials used in the construction will be non-combustible.
b. Wall panels design to be completely weather resistant. The design will allow for thermal expansion/contraction of the structure over the complete range of ambient temp. Applicable for the location without causing harmful buckling or opening of joints etc. materials of construction will be 2 mm thick SS304 sheets for

external walls and 18 gauge painted galvanized steel for internal walls with ribbed interlocking. The ribbed interlocking will provide a strong column for the sheets on the side valves, where the "u" profile created at the edges, when interlocked with the second sheet, increases the section modules of ribbing.

c. The wall panels of the shelter will be insulated and designed for the given ambient conditions by glass rock wool of approx. 100 mm insulation thickness.
d. Roof panels design and construction to be completely weather resistant. The design will allow for thermal expansion/contraction of the structure over the complete range of ambient temp. applicable for the location, without causing harmful buckling or opening of joints etc.
e. The base structure of the shelter will be constructed using ISMC (1501125) ISMB (100) welded properly and adequately sized to ensure structural rigidity to prevent deformation during dragging, lifting, loading and unloading of the shelter.
f. All insulation materials are to be fire retarding.
g. The analyser house will have two doors, one as the main entrance and the other as the emergency of the shelter.
h. The doors are to be mounted on special hinges to ensure gas tight construction of the shelter.
i. Doors will be sturdy, double walled, insulated with rock wool and open to the outside. Each door will have a window with transparent toughened safety glass.
j. The main entrance will carry a plate indicating the plane area number and the tag-list of all the analysers inside the shelter.
k. Analyser shelters shall meet the standards of the relevant building code with the following design loads:
   i) Roof 20 lb. / sq. ft. live load
   ii) Wind 35 lb. /sq. ft. at 0-30 ft. above grade elevation
   iii) Seismic zone as applicable.
l. All tubes and cable entries to the shelter will be through multi cable transit blocks to ensure gas tightness of the shelter.
m. The floor is to be fabricated with anti-slip sheet and sealed continuously to ensure no loss of pressure.

i. Painting

a. Preliminary cleaning involving removing of grease, oil, paint and dirt, which prevent pickling acid from coming in contact with the scale or mist.
b. Structural painting will include scraping, chemical cleaning, one coat of each primer, one coat of epoxy zinc chromate red oxide primer and two coats of epoxy finish paint. The surface coating will take sufficient care of removing all the containments thus ensuring against premature and complete coating failure. Precautions to be taken to avoid air bubbles and uneven coat thickness.
c. Internal sheet metal: the internal walls will be powder coated.

d. Painting for the shelter is completed in every respect before dispatch. No painting will be done at site except touch up of scratches made during site erection.

ii. Environmental conditioning

Analyser shelters will be environmentally conditioned to keep the inside atmosphere of the shelter at a constant temperature of 24°C + 3 °C to obtain repeatability and reliability of the analysers and also a comfortable working environment for workmen. For this purpose, either a skid mounted type air conditioning unit or 'split type' air conditioners (1 working & 1 standby) to be provided. A 300 mm single phase (240 V AC) exhaust fan with safety grills & flap type louver will be provided in the shelter. All Air conditioners will be 5 star rated or based on latest available inverter technology with minimum 3-star rating.

iii. Lighting

a. Illumination level in the shelters will be at a minimum of 300 lux at 750mm elevation inside the shelter. Maintenance factor will be 0.65.
b. External dome type lighting will be under the overhangs to provide sufficient illumination for maintenance work.
c. Power switches for internal and external lighting will be provided near the main entrance on the inside & outside of the shelter.

3.1.7 Fire detection and Protection: Necessary fire detection and protection measures for the analyzer shelter will be provided as per regulatory requirement. For this purpose, an automatic Fire detection and alarm System shall be provided to ensure availability at all times. Fire extinguisher in each AAQMS shelter is to be provided (CO2 cylinder of 4.5 Kg capacity confirming to IS:2878).

3.1.8 UPS of suitable capacity with all accessories like battery and battery charger will be provided. Battery will be maintenance free type.

3.1.9 Power Distribution Board

Power Distribution Board for distribution of UPS & 230 V AC power for all individual consumers such as individual analyzers, auxiliary equipment inside and around the shelter, lighting receptacles will be provided. Each of the main system will have an individual isolation circuit breaker mounted next to the individual power users.

3.1.10 Telephone connection will be provided for each AAQMS stations. Telephone bill for one year would be in bidder's scope.

3.1.11 Wireless connectivity will be provided for each AAQMS station for data communication. Analyzers Data from each individual DAS would be transferred to CDAS through wireless connectivity. CDAS will further transmit the data to pollution control boards server. Necessary hardware for Internet connectivity at CDAS would

be in bidder's scope. Recurring bills, if any, for Internet connectivity at CDAS for one year is covered under scope. CDAS would also be connected with existing Plant LAN.

4.0 Work Stations based data acquisition system (DAS) for AAQMS station

The work stations based DAS system for each AAQMS station will collect, store and analyze air quality data from all instruments of the station. For these purpose all instruments/analysers, will be interfaced with local DAS system.

4.1 PC based Data Acquisition System:

There will be one PC based Data Logger for each AAQMS and Meteorological Station. The entire data capture and mean value calculation as well as control of analyzers would be through user friendly software and operate on latest windows software system. Connection of analyzers with serial interface would be done through standard connectors. The DAS system for each AAQMS Station shall collect store and analyser air quality data from all instruments of the station. For these purpose all instruments shall be interfaced with local DAS system suitably either through a serial link or by hardware. Each local AAQMS DAS shall be connected to central station DAS through wireless connection.

4.2 Specification of Application Software:

a. Calculation of arithmetic mean values, average values at different fixed intervals and user defined time periods like hourly/weekly/monthly/yearly etc.
b. Calculation of pollution load and wind roses (by interfacing meteorological data wherever provided).
c. Generation of reports for at different fixed intervals like daily, weekly, annual etc. and for user defined periods.
d. Generation of reports in the form of line/ column charts / tables/curves/graphic etc.
e. Generation of reports for pollution load, wind rose etc.
f. Comparison of data of various parameters for the same monitoring station.
g. Generation of reports for real time data and based on archived data.
h. Display of real time (on-line momentary values) and archived values in tabular texts and graphic formats.
i. Facility for calibration windows for analyser calibration.
j. Real time monitoring of status of all analysers and sensors with diagnostics for maintenance personnel.
k. Alarm annunciation of analyser / sensor abnormal conditions.
l. Time synchronization with plant common GPS master clock.

4.3 Important features of the Software

a. Data Management, analysis and reporting
b. Latest Microsoft Windows operating system.
c. Inter – Comparison of data between monitoring stations.
d. Comparison of data of various parameters for the same monitoring station.
e. Integrates charts, tables and graphics.
f. Provision for data backups facilities.
g. Provision for calculation of Arithmetic mean values, average. 1/2hr, 1hr,2hrs,3hrs,4hrs, 8hrs, 24 hrs, weekly, monthly and yearly.
h. Calculation of Pollution load
i. Reports of daily, weekly, annual and user defined period.
j. Reports of Pollution load and calibration
k. Line & column chart.

4.4 Data Representation of AAQM Station:

Data logger with driver software should be provided with PC based data acquisition system suitable for storing, logging, reporting and printing data from the analysers.

PC should have Minimum configuration as mentioned below: -

a. Intel i7 or higher
b. RAM: 8 GB or higher
c. Hard Disk: 1 TB or higher
d. OS: Windows 10 or Latest
e. Monitor: 17" color monitor
f. Keyboard: Standard Windows Keyboard
g. Mouse: Mouse + Pad
h. Software: Windows based data logging/driver software with a provision to averaging out data at selectable interval and graphical representation of data.
i. A4 Laser Jet printer

4.5 Wireless Connectivity:

a. Data Acquisition System (DAS) would be equipped with wireless connectivity for RF Communication between Local and Central Station based on RF modems.
b. Required hardware and software will be provided for transmission of data from Central data acquisition system to pollution control boards server.
c. Central data acquisition system will be hooked on to end users existing LAN for transfer of data related to AAQMS system to plant network.
d. Vendor will obtain necessary approval for licenses authorizing the use of wireless communication equipment with specified frequencies.

5.0 Central AAQMS monitoring

Monitoring and report generation of AAQMS for the whole power station will be carried out through a centralized work station~~s~~ based data acquisition system with A4 sized LJP. For this purpose, all data from each AAQMS stations will be collected in centralized AAQMS.

Central AAQMS will also be connected to Plant DDCMIS & MIS server for monitoring through bidirectional dual redundant OPC link. Necessary Software for the purpose will be loaded into DDCMIS. CDAS would also be connected to servers of Department of Environment, for which necessary hardware & software are also covered under bidder's scope.

5.1 Central Station for AAQMS:

a. Monitoring and report generation of AAQMS for the whole power station shall be a centralized system and shall be carried out though a centralized PC based Data Acquisition system located at central control room. For this purpose, all individual analyser data from each AAQMS Stations shall be collected in a PC Based DAS by interfacing each AAQMS Stations by suitable wireless communication link (RF Modem) through centralized DAS System.

b. Data Communication System for the Central Station:

Data Communication system shall handle the data transmission of an ambient air quality network and receive incoming messages/ signals from remote Stations. The following additional features should be part of the system:

i. To collect all the data from the remote Stations at prescribed time or on request.
ii. Ability to manage multiple remote AAQMS Stations.
iii. Monitoring, analyse, report generation and archiving of data.
iv. To transmit the data to DCS OS.
v. CDAS shall be hooked on to plant DDCMIS network.

c. Central AAQMS DAS system software shall have following features:

i. Calculation of Arithmetic mean values, average values at different fixed intervals and user defined time periods like hourly / weekly/ monthly/early etc. for each remote Station.
ii. Calculation of pollution load and wind roses (by interfacing meteorological data).
iii. Generation of reports for at different fixed intervals like daily, weekly, annual etc. and for user defined periods.
iv. Generation of reports in the form of line / column charts/ tables/curves/ graphics etc.

v. Generation of reports for pollution load, wind rose, Station etc.
vi. Comparison of data of various parameters for the same monitoring station.
vii. Inter comparison of data between different monitoring Stations.
viii. Generation of reports for real time data and based on archived data.
ix. Display of real time (on-line momentary values) and archived values in tabular texts and graphic formats.
x. Facility for calibration windows for analyser calibration.
xi. Real time monitoring of status of all analysers and sensors with diagnostics for maintenance personnel.
xii. Alarm annunciation of analyser/sensor abnormal conditions.
xiii. Time synchronization with plant common GPS master clock.

5.2 Specification for Central Station Software

i. Data Communication system shall handle the data transmission of an ambient air quality network and receive incoming messages / signals from remote stations.
ii. The following features shall be part of the system.
iii. To collect all the data from the remote stations at prescribed time or on request.
iv. Manage at least 5 or more remote air quality – monitoring Stations.
v. It shall display multiple stations on –line data (momentary values) in tabular text and graphic format.

5.3 Important features of the Software

i. Data Management, analysis and reporting
ii. Latest Microsoft Windows operating system.
iii. 32 bit application.
iv. Inter – Comparison of data between monitoring stations.
v. Comparison of data of various parameters for the same monitoring station.
vi. Integrates charts, tables and graphics.
vii. Provision for data backups facilities.
viii. Provision for calculation of Arithmetic mean values, average. 1/2hr, 1hr, 2hrs, 3hrs, 4hrs, 8hrs, 24 hrs, weekly, monthly and yearly.
ix. Calculation of Pollution load
x. Reports of daily, weekly, annual and user defined period.
xi. Reports of Pollution load and calibration
xii. Line & column chart.

5.4 Data Representation of AAQM Station

Data logger with driver software should be provided with PC based data acquisition system suitable for storing, logging, reporting and printing data from the analysers.

PC should have Minimum configuration as mentioned below: -

a. Intel i7 or higher
b. RAM: 8 GB or higher
c. Hard Disk: 1 TB or higher
d. OS: Windows 10 or Latest
e. Monitor: 17" color monitor
f. Keyboard: Standard Windows Keyboard
g. Mouse: Mouse + Pad
h. Software: Windows based data logging/driver software with a provision to averaging out data at selectable interval and graphical representation of data.
i. A/4 Laser jet printer
j. UPS for CDAS PC (6 Hour battery backup)

6.0 Meteorological Monitoring System (MMS)

The following parameters will be Monitored:

i. Wind Speed
ii. Wind Direction
iii. Ambient Temperature
iv. Solar Radiation
v. Relative Humidity
vi. Rainfall

General requirement of MMS is as below:

i. MMS Will Be Continuous On-Line Type.
ii. MMS will allow monitoring, logging of parameter Values, Archiving and Report Generation for Environmental Monitoring Authorities and Plant Management Personnel.
iii. MMS Will Be Complete with All the Necessary Measuring Equipment.
iv. The System shall be providing in any one of the AAQMS station. Meteorological Mast of telescopic type and of 10-meter height to be placed alongside AAQMS station. The Mast is required for mounting the Meteorological Sensors. Necessary Hangers and Holders along with electrical Grounding Set shall be provided for installation of the Sensors. Material of Construction of the Mast shall be metallic and robust and shall be resistant to atmospheric corrosion. Data loggers for the metrological station will be provided with the necessary analogue and digital inputs and internal memory for all collected parameters. The data loggers will have the capacity for future extension with additional sensors.

a. Wind Speed Sensor

S.No	Features	Specification requirement
1	Principle	Frequency Proportional to Wind speed
2	Range	0-210 Km / hr
3	Accuracy	2%

b. Wind Direction Sensor

S.No	Features	Essential / Minimum Requirements
1	Type	Potentiometric
2	Range	0-360 Degree
3	Accuracy	2%

c. Ambient temperature Sensor

S.No	Features	Essential / Minimum Requirements
1	Type	RTD
2	Range	0- 50° c
3	Accuracy	0.2 Deg C

d. Relative Humidity (RH) Sensor

S.No	Features	Essential / Minimum Requirements
1	Type	Thin Film Capacitor type
2	Range	0-100 %
3	Accuracy	3% of Full Scale Reading

e. Solar Radiation Sensor (Solarimeter)

S.No	Features	Essential / Minimum Requirements
1	Type	Thermocouple based with appropriate wind shield
2	Measuring Range	0-1500 Watt/M^2
3	Accuracy	± 3.5%
4	Operating temperature	0- 50° C

f. Rain Gauge

S.No	Features	Essential / Minimum Requirements
1	Sensitivity	0. 5mm
2	Accuracy	1%
3	Operating Temperature	0- 50° C

7.0 Specification for Digital Display Board

S.N.	Features	Essential / Minimum Requirements
1	Size of the display	4 feet (H) X 8 feet (L)
2	Visibility Range	80-100 m
3	No of Display lines	4
4	Display of color elements	Color (RGY)
5	Minimum life span	5 years
6	Ambient Temperature	Maximum 50°C
7	Humidity Range	0-99%
8	Language	English only
9	Color gradient	Cluster LED based
10	Display casing	Weather proof casing
11	Type	Microcontroller/Microprocessor driven
12	LED	matrix 2X64X128
13	LED pitch	0.6”
14	Signal input to the display board	Data communication through RS 232/485/ Ethernet or suitable protocol from CAAQMS station for all parameters of AAQMS.

8.0 Multipoint calibrator

S.N.	Features		Essential / Minimum Requirements
1	Flow Measurement Accuracy	:	+/- 1 % Of Full Scale Reading (In 20-100%)
2	Repeatability of Flow Control	:	+/- 0.2 % Of Full Scale Reading
3	Linearity of Mass Flow Measurement	:	+/- 0.5 % Of Full Scale Reading
4	Calibration Gas Input ports	:	6 Nos
5	Temperature Range	:	5-45°C
6	Power Supply	:	240 V AC (UPS)

8.1 Gas Sampling System

i. Analyser gas sampling system will be complete with sampling hood arrangement with SS hood, SS 316 manifold, peltier based moisture removal

facility, manifold & tubings to the analyzers, moisture trap, air compressor of requisite capacity (minimum 10 LPM) and heat less type air dryer.

ii. Zero Air Generator

8.2 Calibration System

a. The calibration system should form a complete system alongwith Analysers being supplied under Annexure-1 of this specification. The calibration system must have facility of zero-point calibration.
b. Calibration gas cylinders as required for calibration of analysers referred in Annexure-1 of appropriate capacity suitable for minimum 6-month calibration are covered in scope.
c. Calibration Gas cylinders for NOx, SO_2, CO, CO2, Benzene & NH_3 of 10-liter Capacity, N_2 of 47-liter capacity with SS316 regulator – 3 Set (1 set for each AAQMS).
d. All the calibration gases provided along with the system must be NIST traceable.
e. The calibration procedure will be integrated into the software system for automatic calibration.

9.0 General Terms & Conditions

9.1 Installation & Commissioning: The supplier will supply, erect & commission all the items covered under scope of Annexure 1 & 2 at site to integrate the system, demonstrate the performance of the Equipment and all its accessories to ensure compliance with complete specifications & parameters of the specification to the satisfaction of BHEL/MAHAGENCO. Only one-point power supply near to each AAQMS station location would be provided by BHEL. All the items required for the erection, commissioning and handing over of the AAQMS system to end user will be in bidder's scope.

9.2 Training of Owner's Personnel:

To enable Owner's Personnel to become familiar with the equipment being supplied by the bidder, the bidder will arrange to train the Owner's engineering Personnel at site. The period (Minimum 03 man days) and nature of training for the individual personnel will be decided during contract execution stage.

9.3 O & M Manual: 05(Five) hard copies and 07(Seven) soft copies in USB Pen Drive/CD ROM of O&M manual in English language giving complete technical information for operation, maintenance, trouble shooting, preventive maintenance etc. will be provided.

9.4 Packing & Dispatch: All the items in the enquiry will be packed separately in packing capable of bearing air, water and road transit hazards. Packing boxes will be properly identified and marked with BHEL's Purchase Order Number.
"PCRI HWR" should be written in bold letters on all four sides of the boxes. Packing boxes will be properly identified and marked with BHEL's (India) Purchase Order Number.

9.5 Guarantee: The equipment will be guaranteed for a period of 36 months from the date of dispatch or 24 months from the date of Installation & Commissioning, whichever is earlier.

Annexure - 3

Pre- Qualifying Requirement (PQR):

1. The firm of Bidder should have in existence since past 3 years as on date of bid opening. Supporting documents, "e.g. Certificate of Incorporation/ Profit & Loss account/Balance Sheet/ GST returns/Any other acceptable document certified by CA" proving the firm is active in past 3 years to be provided.
2. Bidder Average Annual Turnover (Last 3 Years): 100 Lakhs
3. The bidder should have supplied at least 01 No. CAAQMS station in last 05 years from the bid opening date.
4. The bidder shall offer analyzers (i.e. PM10, PM2.5, SO_2, NOx, NH_3, CO, CO_2, O_3 and Benzene) whose guaranteed and trouble free performance has been proven at-least for two years in not less than two (2) different "**reheat type pulverized coal fired units (Thermal power stations of unit size not less than 500 MW)**" or "**process & manufacturing industries**" for continuous ambient air monitoring from the bid opening date. The bidder shall submit supporting documents, e.g. copy of PO placed/ Dispatch documents/Commissioning Report/Experience Certificate, and details of end user concerned official for supply, satisfactory operation of the commissioned analyzer. It may please be noted that bidders should offer maximum number of analyzers having proven-ness related to power stations.
5. In case the bidder is sourcing analyzers from an OEM, Tender specific authorization letter is required from the manufacturer, clearly indicating contact details like Name, Email and address of manufacturer.

Buyer Specific ATC document for Ambient Air Quality Monitoring System (AAQMS) of Bhusawal project

1.	**MDCC (Material dispatch clearance certificate) Clause:** Please note that material shall be dispatched only after issue of Material dispatch clearance certificate (MDCC) by BHEL. For issue of MDCC, you are required to submit the set of documents (i.e. Packing list, Guarantee certificate, Complete test / inspection reports & Calibration certificates). BHEL will release MDCC within 07 days from the date of receipt of complete documents as detailed above. The delivery period of 180 days is inclusive of 07 days taken by BHEL to issue MDCC.
2.	**Quality Requirement:** (i) BHEL / BHEL's Customer / Nominated third part inspection agency may do inspection at works of bidder before dispatch of material. (ii) Bidders are requested to submit quality plan in line with technical specification in prescribed format in the event of ordering for approval of customer / BHEL within 30 days of Purchase Order. BHEL will provide approval of quality plan within 30 days from the date of submission. Any delay in submission / approval will be in respective account. The delivery period of 180 days is inclusive of time for quality plan submission and approval.
3.	**Customer Approval:** At present, you are not a customer approved supplier. The final acceptance of the offers shall be subject to vendor approval by End Customer. **BHEL will open the Price Bids of only those vendors who are finally approved by the end customer.**
4.	**Pre-Qualification Requirement (PQR):** The Pre-Qualification Requirements have been made part of bid as **Annexure-3**. All the bidders should ensure submission of complete details and documents as called for in the same. The offers submitted by the bidders would be scrutinized with respect to Pre-Qualification Requirements first. **Techno-Commercial offer of only those bidders shall be evaluated who meet the Pre-Qualification Requirements.**
5.	**Technical Specification Requirement:** 1. Please quote your valuable offer as per BHEL Specification enclosed with bid documents as follows: **Annexure-1:** Specification for AAQMS Analysers **Annexure-2:** Specification for Accessories of AAQMS Analysers 2. Bidders are requested to upload point-wise compliance of BHEL Specifications along with the offer as token of acceptance.

6.	**Validity:** Offer will be valid for 180 days from bid end date and extensions thereof. **BHEL will reserve the right to reject any or all quotations, quoting validity less than 180 days.**
7.	**Payment Terms:** • 85% payment after receipt of material at site against submission of PBG @ 10% of Order value valid till entire Guarantee / Warranty period. The PBG will be in BHEL format and from one of the BHEL consortium banks. For name of BHEL consortium bank, please visit our website hwr.bhel.com. • Balance 15% payment after installation and commissioning at site. • Payment will be released by BHEL within: - 45 days for Micro and Small enterprises - 60 days for Medium enterprises - 90 days for Non MSME enterprises
8.	**Delivery Period:** The material should be supplied within 180 days of purchase order. This period includes following: • 30 days from the date of PO for supplier to submit the documents (drawings / datasheet & Quality Plan) for approval. • 30 days for documents approval by BHEL/ End User • 07 days for arranging inspection by BHEL/BHEL Nominated agency/ End User • 07 days for issuing dispatch clearance from the date of receipt of documents mentioned in Clause No. 1 of this document. • 07 days for arranging dispatch of material from the date of providing MDCC by BHEL. Any delay in document submission / approval / Inspection will be in respective account.
9.	**Post Order Document approval:** Drawings/Data sheets/Quality Plan (QP) will be submitted to BHEL for BHEL/customer approval within 30 days of purchase order. The documents shall be complete in all respects. To ensure completeness of documents (as per specifications) BHEL would have in person meeting/ video-conference within first 15 days of PO (if requested by supplier well in advance). However, delay in documents approval due to vague / in-complete submission of documents shall be on supplier's account. BHEL will arrange the approval of the drawings/data sheets/QP within 30 days of their receipt. In case of delay on account of BHEL, delivery shall be re-scheduled accordingly.
10.	**Evaluation criteria:** Evaluation will be done on the basis of Total Landed cost up to Bhusawal project site considering all items together for supply of complete scope of bid **(Total value wise evaluation).**

11.	**Document:** 05 (Five) hard copies and 07 (Seven) soft copies in USB Pen Drive/CD ROM of O&M manual in English language giving complete technical information for operation, maintenance, trouble shooting, preventive maintenance etc. will be provided.
12.	**Price Basis:** Please confirm that prices have been quoted on F.O.R. Bhusawal site basis.
13.	**Packing & Dispatch:** All the items will be packed separately in packing capable of bearing air, water and road transit hazards. Packing boxes will be properly identified and marked with BHEL's Purchase Order Number. "**PCRI HWR**" should be written in bold letters on all four sides of the boxes. Packing boxes will be properly identified and marked with BHEL's (India) Purchase Order Number.
14.	**Guarantee:** The equipment will be guaranteed for a period of 36 months from the date of dispatch or 24 months from the date of Installation & Commissioning, whichever is earlier. **Failing to comply to the Guarantee / Warranty clause, the offer will be rejected straightaway.**
15.	**Installation, Commissioning & Training:** The supplier will supply, erect & commission all the items covered under scope of **Annexure - 1** & **Annexure - 2** at site to integrate the system, demonstrate the performance of the Equipment and all its accessories to ensure compliance with complete specifications & parameters of the specification to the satisfaction of BHEL/MAHAGENCO. Only one-point power supply near to each AAQMS station location would be provided by BHEL. All the items required for the erection, commissioning and handing over of the AAQMS system to end user will be in bidder's scope. To enable Owner's Personnel to become familiar with the equipment being supplied by the bidder, the bidder will arrange to train the Owner's engineering Personnel at site as asked in specifications. ***Cost of Installation, Commissioning and Training should be inclusive in the quoted prices.*** Installation, Commissioning and Training will be done at following address: CHIEF ENGINEER/DY.CHIEF ENGINEER(PROJECT), 1X660MW BHUSAWAL THERMAL POWER STATION UNIT-6, MSPGCL, BHUSAWAL, DIST JALGAON (MAHARASHTRA), PIN-425307 STATE : Maharashtra-27 ***Failing to comply to the Installation, Commissioning and Training clause, the offer will be rejected straightaway.***
16.	**General Clause:** All other commercial terms and conditions will be governed by General Terms and Conditions (GTC) GeM_GTC_4.0 v1.10_02May23.

17. **EARNEST MONEY DEPOSITE (EMD)**

13.1 Interested vendors must submit their offer along with the following Earnest Money Deposit (EMD) in a separate sealed envelope:

Details	Amount In INR	Amount in Foreign Currency	Type
EMD	**INR 2,00,000/-** (INR Two Lacs Only)	Equivalent Foreign currency	Refundable

13.2 EMD shall not carry any interest.

13.3 Modes of deposits will be as per General Terms and Conditions (GTC) GeM_GTC_4.0 v1.10_02May23.

The demand draft shall be in favor of "BHEL Haridwar". E-Payment is also acceptable. For e-payment, RTGS details are as mentioned below:

Bank Details	SWIFT Details of bank	Contact Details of Banker
STATE BANK OF INDIA RANIPUR BRANCH, OPP: BHEL MAIN GATE, SECTOR-5, RANIPUR, HARIDWAR, UTTRAKHAND, INDIA PIN CODE : 249403	SWIFT NO : SBININBB225 CC ACCOUNT NO : 10667995458 IFSC CODE : SBIN0000586	Chief Manager (IBD) Contact No. +91 1334 224201 +91 1334 226125 Fax: +91 1334 226512

13.4 MSE Suppliers, who are the manufacturer of offered items as per specification are exempted from submission of the EMD.

13.5 EMD exemption will be allowed as per criteria laid down in General Terms and Conditions (GTC) GeM_GTC_4.0 v1.10_02May23.

13.6 Bids not accompanied with requisite EMD or bids accompanied with EMD of inadequate value shall be liable for rejection, wherever exemption is not allowed.

13.7 The bidder whose bid is technically not accepted will be informed & EMD wherever submitted shall be refunded after the finalization of the contract. EMD shall be forfeited in the event of bidder opting out after tender opening (PART-I).

13.8 Earnest money of successful bidder shall be returned only after receipt of Performance Bank Guarantee (PBG).

18. **Penalty Charges:**

Kindly confirm that penalty charges for late delivery w.r.t. contractual delivery shall be applicable at the rate of 0.5% of total order value per week of delay or part thereof subject to maximum of 10% of the total order value.

Date of GR/LR shall be treated as delivery date for all purposes.

19.	**Conflict of Interest among Bidders/ Agents:** "A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. **The bidder,: found to have a conflict of interest shall be disqualified**. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if: a) they have controlling partner (s) in common; **or** b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; **or** c) they have the same legal representative/agent for purposes of this bid; **or** d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder,· **or** e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/Assemblies from. one bidding manufacturer in more than one bid; **or** f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/dealer. There can be only one bid from the following: 1. The principal manufacturer directly or through one Indian agent on his behalf; and 2. Indian/foreign agent on behalf of only one principal, **or** g) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid,· **or** h) In case of a holding company having more **than** one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business. "
20.	**E-invoicing:** E-invoicing under GST has been implemented w.e.f. 01.10.2022 for all the taxable persons having turnover more than Rs. 10 cr. it has been specified by the govt that it is mandatory to mention a valid unique invoice reference no. (IRN) and QR code as generated from govt. portal on a tax invoice. Based on such information, GST ITC as claimed by BHEL in GST returns shall be matched with the corresponding details uploaded by supplier in E-invoicing system. In case the vendor / contractor delays or fails to provide all the documents as per the purchase order / work order at the time of submitting tax invoice to BHEL, any subsequent financial loss to BHEL on account of vendor/contractor shall be to vendor's / contractor's account. BHEL has further right to take necessary steps to protect its interest at the time of release of payment. this further requires inclusion of IRN and QR code on tax invoice as announced by govt. of india w.e.f. 01.10.2022.

21. **Integrity Pact:**

(a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors OEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl.	IEM	Email
1.	Shri Otem Dai, IAS (Retd.)	iem1@bhel.in
2.	Shri Bishwamitra Pandey, IRAS (Retd.)	iem2@bhel.in
3.	Shri Mukesh Mittal, IRS (Retd.)	iem3@bhel.in

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

(c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s)-

Mr. Shashi Pal Designation: A. E. (PCRI-BOI) Pollution Control Research Institute HEEP, BHEL, Haridwar- 249403 Uttarakhand, India Email ID: palsh@bhel.in Tel: +91 1334 28 1941	Mr. Deshraj Yadav Designation: Dy. Manager (PCRI-BOI) Pollution Control Research Institute HEEP, BHEL, Haridwar- 249403 Uttarakhand, India Email ID: deshraj@bhel.in Tel: +91 1334 28 1187

22. **Arbitration Clause:**

In case of any dispute arising out of as in connection with this contract, the same shall be referred to arbitration under Arbitration & Conciliation Act 1996 of a sole arbitrator who shall be appointed by mutual consent of the parties. The seat & venue of arbitration shall be Haridwar.

The proceedings shall be conducted in English. The Governing law of contract shall be the substantive law of India.

23.	**Risk Purchase:** In case of abnormal delays (beyond the maximum late delivery period as per LD clause) in supplies / defective supplies or non-fulfillment of any other terms and conditions given in Purchase Order, BHEL may cancel the Purchase Order in full or part thereof, and may also make the purchase of such material from elsewhere / alternative source at the risk and cost of the supplier. BHEL will take all reasonable steps to get the material from alternate source at optimum cost. If bidder does not agree to the above Risk Purchase Clause, BHEL reserves the right to reject the offer. In case for compelling reasons BHEL accepts the offer without acceptance of this clause by the bidder and in the eventuality of Risk Purchase, appropriate action will be taken as per BHEL extant rules. This will be without prejudice to any other right of BHEL under the contract or under General Law. **Action against Bidders / vendor / supplier / contractor in case of default:** In order to protect the commercial interests of BHEL, BHEL shall take action against supplies / contractors by way of suspension of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business/ money/ reputation, indulge in malpractices, cheating, bribery, fraud or any other misconduct or formation of cartels so as to influence the bidding process or influence the price etc. Suspension of Business Dealings could be in the form of "Hold" or "Banning" a supplier/ contractor or a bidder and shall be as per "Guidelines for Suspension of Business Dealings with Suppliers/ Contractors" available at BHEL's website "https://www.bhel.com/guidelines-suspension-business-dealings-supplierscontractors".
24.	**Acceptance of offers from country Sharing Land Border with India:** I. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turkey projects) only if the bidder is registered with the Competent Authority. Further, any bidder (including bidder from India) having specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India, shall also require to be registered with the same competent authority. II. "Bidder" means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process. III. "Bidder (or entity) from a country which shares a land border with India" for the purpose of this Order means: - a. An entity incorporated, established or registered in such a country; or b. A subsidiary of an entity incorporated, established or registered in such a country; or c. An entity substantially controlled through entities incorporated, established or registered in such a country; or d. An entity whose beneficial owner is situated in such a country; or e. An Indian (or other) agent of such an entity; or f. A natural person who is a citizen of such a country; or g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation:

a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;
b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owners) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

VII. The registration shall be valid at the time of submission of bid and at the time of acceptance of bid.

VIII. If the bidder was validly registered at the time of acceptance / placement of order, registration shall not be a relevant consideration during contract execution.

Note: Following declarations would be required from bidders (if applicable):

(A) "I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached.]"

(B) "I have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. I certify that this bidder does not have any ToT arrangement requiring registration with the competent authority.

OR

* have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. I certify that this bidder has valid registration to participate in this procurement."

Annexure-1

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____
_____ (hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles: -

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process , terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - **Compensation for Damages**

4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above , the Bidder(s)/ Cotractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be-entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee , whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 6 - Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.

6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 -Independent External Monitor(s)

8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.

8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.

8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.

8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.

8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.

8.9 IEMs should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the Prinicpal should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place _____
Date _____

Witness:_____
(Name & Address) _____
_____

Witness:_____
(Name & Address) _____
_____

CONTINUOUS AMBIENT AIR QUALITY MONITORING SYSTEM (CAAQMS) OF BHUSAWAL PROJECT			
Name of Bidder……			
S. No.	**Description**	**Documents Provided YES/NO**	**Annexure No. in offer**
1	Document suppoting that the firm is active in past three (03) years		
2	Document for Annual Turnover (Last 03 Years)		
3	Document for supply of CAAQMS by bidder in last 05 years		
4	Documents for proven-ness of offered analyzers: (i.e. PM10, PM2.5, SO2, NOx, NH3, CO, CO2, O3 and Benzene) whose guaranteed and trouble free performance has been proven at-least for two years		
5	Tender specific authorization letter (In case bidder is sourcing analyzers from an OEM)		
6	Technical Data Sheets of offered analyzers		
7	Catalogoues of offered analyzers		
8	Compliance Sheet of Technical Specification		
9	Un-priced Bid indicating Make / Model		
10	No deviation Certificate		
11	Signed Copy of Integrity Pact (IP)		
12	Signed Copy of Buyer Specific ATC Document		

Certificate

In line with Government Public Procurement Order No. P-45021/2/2017-BE-II dt. 15.06.2017 & P-45021/2/2017-PP (BE-II) dated 28.05.2018, we hereby certify that we M/s _____(supplier name) are local supplier meeting the requirement of minimum local content (50%) as defined in above orders for the material against Enquiry No. _____

Details of location at which local value addition will be made is as follows:

_____
_____

We also understand, false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Seal and Signature of Supplier