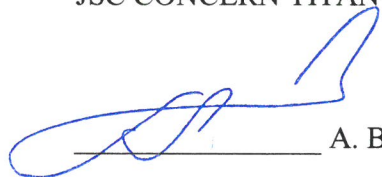


APPROVED BY

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06 02 2023

TERMS OF REFERENCE
for Equipment Procurement

Cairo
2023

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SECTION 1. GENERAL INFORMATION

Subsection 1.1. Name
1.1.1. Portable air medium gas analyser (for measuring O ₂ , CO, CO ₂ , H ₂ S); 1.1.2. Medium heat load index meter (portable device for checking temperature and humidity levels); 1.1.3. Portable electronic anemometer (portable wind speed measuring device); 1.1.4. PH meter (portable device for measuring acidity); 1.1.5. Sound level meter (portable device measuring volume level in decibels); 1.1.6. Dust meter (portable device for measuring concentration of dust in air medium); 1.1.7. Radar vehicle speed meter (radar); 1.1.8. Medium heat load index meter; 1.1.9. Dosimeter (portable individual device for measuring X-ray and gamma radiation); 1.1.10. Meteorological station.
Subsection 1.2. Information on Novelty
1.2.1. The devices supplied shall be new, released not earlier than 2021, not used or restored and shall not be an exhibition sample, free from the rights of the third parties. 1.2.2. The date of manufacture of the devices confirming their novelty shall be indicated in the factory documentation.
Subsection 1.3. Development/Manufacture Stages
1.3.1. As per GOST 2.103-2013

SECTION 2. SCOPE OF APPLICATION

2.1. Delivery of environmental monitoring devices for monitoring main environmental characteristics of quality of air, water, noise level and wind strength at the site of construction of the El Dabaa NPP.
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SECTION 3. OPERATION CONDITIONS

3.1. Climatic conditions: - subtropical, Mediterranean climate; - average highest temperature (over the last 30 years) of + 46.5°C; - average lowest temperature (over the last 30 years) of + 1°C; - base wind speed (with the averaging interval of 3 seconds with the exceedance probability of 0.02) V=42.0 m/s; - no snow load.

SECTION 4. TECHNICAL REQUIREMENTS

Subsection 4.1. Technical, Functional and Qualitative Characteristics (Consumer Properties) of Equipment
4.1.1. Technical characteristics of portable air medium gas analyser (for measuring O ₂ , CO, CO ₂ , H ₂ S): Operating temperature: from -20°C to +50°C; Humidity: from 0 to 95% of RH without condensation; Data registration rate: 24 hours of time logs with the rate of 1 log per minute; Session: at least 180 logs;

Calibration: at least 8 calibration logs;
 Impact logs: at least 180 logs;
 Battery: lithium-ion storage battery;
 Operating time: up to 14 hours (diffusion);
 Recharge period: up to 4 hours;
 Housing: impact-resistant rubberised housing;
 Falling test: 3 m;
 IP rating: dustproof and watertight up to 1 m;
 Response time:
 O₂ = 12 seconds;
 CO <20 seconds;
 CO₂ without requirements;
 H₂S <20 seconds.

4.1.2. Technical characteristics of portable device for checking temperature and humidity levels:

Operating temperature: from -20°C to +50°C;
 Relative humidity range: from 5% to 95% of relative humidity;
 Response time (humidity): for 90% of the total range, it is 60 s with the air movement speed of 1 m/s;
 Operating temperature: from -20 °C to +50°C;
 Storage temperature: from -20°C to +50°C with < 80% of RH (with battery removed);
 Autonomous operation time: 200 hours.

4.1.3. Technical characteristics of portable electronic anemometer (portable wind speed measuring device):

Wind speed: 1.4~108 km/h (0.4~30 m/s);
 Operating temperature: from -10 to +50°C;
 Wind scale: 0~12;
 Storage battery;
 Falling test: 1 m.

4.1.4. Technical characteristics of PH meter (portable device for measuring acidity):

Operating temperature: from 0°C to +50°C;
 pH measurement range: from 0.00 to 14.00 pH;
 Response time (humidity): for 90% of the total range, it is 60 s with the air movement speed of 1 m/s;
 Accuracy: pH ±0.1;
 Storage battery.

4.1.5. Technical characteristics of sound level meter (portable device measuring volume level in decibels):

Operating temperature: from 0°C to +50°C;
 Measurement range: from 30 to 130 dB;
 Humidity: from 10% to 99% of relative humidity;
 Accuracy: ±1.5 dB;
 Frequency characteristics: 31.5 Hz~8.5 kHz;
 Dynamic range: 50 dB/100 dB;
 Sampling frequency: 20 times per second;
 Microphone type: ECM;
 Storage battery.

4.1.6. Technical characteristics of dust meter (portable device for measuring concentration of dust in air medium):

Detection: PM2.5 and PM10 0-1000 $\mu\text{g}/\text{m}^3 \pm 12\%$;
 Operating temperature: from 0°C to +50°C;
 Measurement range: from 30 to 130 dB;
 Humidity: from 0.1% to 99.9% of relative humidity ± 3 ;
 Sampling frequency: 50 seconds;
 Storage battery.

4.1.7. Technical characteristics of radar (portable radar vehicle speed meter):

Operating frequency: 24.15 ± 0.1 GHz (K range);
 Measurement distance, at least: 300, 500, 800 m (three levels);
 Measured speed range: 10-300 km/h;
 Speed measurement error, not more than: ± 1.0 km/h in a steady state; ± 2.0 km/h in motion;
 Speed measurement time: not more than 0.3 s;
 Sampling rate of threshold speed value: 1.0 km/h;
 Difference between the speed of the target and the group when choosing the fastest target: 3.0 km/h (ratio of reflected signals is 1:100);
 Number of memory cells: 2;
 Time of data storage in memory: 10 minutes;
 Radiation flux density in the opposite direction (at the distance of 0.5 m): not more than $10 \mu\text{W}/\text{cm}^2$;
 Average consumed power: not more than 2.5 W;
 Autonomous power supply: 7.4 V, built-in lithium-ion storage battery;
 Duration of operation using storage battery (with the measurement frequency of once per minute): at least 16 hours.

4.1.8 Technical characteristics of dosimeter (portable individual device for measuring X-ray and gamma radiation):

Detector. Measurement range of power of individual dose equivalent of continuous and pulsed (with a pulse duration of at least 1.0 ms) photon radiation (MED): $0.1 \mu\text{Sv}/\text{h}$ – $10.0 \text{ Sv}/\text{h}$;
 Limit of allowable relative MED error:
 DKG-RM1610 (ДКГ-PM1610): $\pm(15+0.0015/\text{H}) \%$;
 DKG-RM1610A (ДКГ-PM1610A): $\pm(10+0.0015/\text{H}+0.0015/\text{H}) \%$, where H is MED value in mSv/h);
 Measurement range of individual equivalent dose (ED):
 continuous photon radiation;
 DKG-RM1610 (ДКГ-PM1610): $0.05 \mu\text{Sv}$ – 10 Sv ;
 DKG-RM1621A (ДКГ-PM1621A): $0.05 \mu\text{Sv}$ – 20 Sv ;
 pulse photon radiation (with a pulse duration of at least 1.0 ms);
 DKG-RM1610 (ДКГ-PM1610): $10.0 \mu\text{Sv}$ – 10 Sv ;
 DKG-RM1610A (ДКГ-PM1610A): $10.0 \mu\text{Sv}$ – 10 Sv ;
 Limit of allowable main relative ED measurement error: $\pm 20 \%$;
 Range of registered energy values: 0.02–10.0 MeV;
 Energy dependence of sensitivity relative to the energy value of 0.662 MeV (Cs-137) in the entire range:
 from 20 keV to 33 keV: -60% ;
 from 33 keV to 48 keV: -40% ;
 from 48 keV to 3 MeV: $\pm 30 \%$;
 from 3 MeV to 10 MeV: $\pm 50 \%$;
 Alarm type: visual, sound, vibration.

<p>Operation conditions:</p> <p>Temperature: from - 20°C to + 50°C;</p> <p>relative humidity: up to 98% with + 35°C;</p> <p>Device housing ingress protection: IP65;</p> <p>Power supply: from built-in storage battery; from external power supply source (PC USB connector);</p> <p>Time of continuous operation of a device from a fully charged battery: at least 1 month;</p> <p>Connection with PC: USB.</p> <p>4.1.9. Technical characteristics of meteorological station:</p> <p>Air temperature: from - 40 to 60°C (optionally: from - 50 to 80°C), resolution of 0.1°C; error of $\pm 0.2^\circ\text{C}$;</p> <p>Air humidity: 0 ~ 100% of Rh; resolution of 0.1% of Rh; error of 2%;</p> <p>Wind speed: 0 ~ 60 m/s; resolution of 0.1 m/s; accuracy of ± 0.3 m/s or 3%; measurement method is use of ultrasound sensor;</p> <p>Wind direction: 0° ~ 360°; resolution of 1°; error of $\pm 3^\circ$;</p> <p>Atmospheric pressure: 10 ~ 1100 hPa, resolution of 0.1 hPa, error of 0.3 hPa (25°C);</p> <p>Precipitation: 0 ~ 5 mm/min., resolution of 0.2 mm, error of $\pm 3\%$;</p> <p>Solar radiation: 0 ~ 2000 W/m², resolution of 1 W/m² $\leq 5\%$; UV index of 0 ~ 15;</p> <p>Dust monitoring by RM2,5 (PM2,5) and RM10 (PM10): 0 ~ 1000 $\mu\text{g}/\text{m}^3$, resolution of 0.3 $\mu\text{g}/\text{m}^3$, error of $\pm 15\%$ or ± 10 $\mu\text{g}/\text{m}^3$, laser dissipation method;</p> <p>Noise: 30 ~ 130 dB (A) (human ear simulation), resolution of 15 dB, condenser microphone;</p> <p>CO₂: detection principle: electrochemical principle; detection method: diffusion; measurement range: 0-2000 ppm, stability: $\pm 1\%$;</p> <p>Main parameters: RS485 interface, transmission rate (2400, 4800, 9600, 19200, 38400, etc.), supply voltage of 9~30 V, average current (ICB 3000) is less than 25 mA, maximum current is 30 mA (12 V DC), operating humidity range is from 0 to 100%, relative humidity, operating temperature range is from - 40 to 60°C, (optionally from - 50 to 80°C), ingress protection is IP66.</p>
Subsection 4.2. Requirements for Components, Original and Operating Materials
<p>4.2.1. Supply set:</p> <p>Package;</p> <p>Device;</p> <p>Scaling nozzle, strap;</p> <p>Charger;</p> <p>Dock station;</p> <p>Verification methods;</p> <p>Operation manual;</p> <p>Compliance certificate;</p> <p>Data sheet;</p> <p>Calibration certificate.</p>
Subsection 4.3. Requirements for Marking
<p>4.3.1. Marking of the devices, factory and technical data, serial numbers applied to the housings shall correspond to those specified in the attached documentation.</p>
Subsection 4.4. Requirements for Package
<p>4.4.1. General requirements for device packages shall not be lower than the requirements of GOST 9181-74.</p> <p>4.4.2. A package shall ensure safety of the devices during transportation taking into account several handling operations in transit and storage in the form and supply set in</p>

which they were released by the manufacturer.

SECTION 5. REQUIREMENTS FOR DELIVERY AND ACCEPTANCE RULES

Subsection 5.1. Delivery and Acceptance Procedure

5.1.1. The final stage of delivery for the Supplier is testing (test run, demonstration of operability, etc.), before the devices are delivered for operation to the Buyer.

Subsection 5.2. Requirements for Submission of Technical and Other Documents to the Customer When Delivering Standard Industrial or Non-Industrial Equipment

5.2.1. The supplier shall supply a complete set of operating documentation for the devices in Russian and English:

- data sheet/technical specification for the devices, (1 copy for each unit);
- technical description and operation manuals for the devices;
- certificates of compliance with state (international) standards; documented certificate of verification of a measuring tool with indication of verification interval;

The requirements for the documentation are also specified in Clause 4.2.1 of ToR.

SECTION 6. REQUIREMENTS FOR TRANSPORTATION

6.1. The delivery location is the site of construction of the El Dabaa NPP.

6.2. The equipment is transported and vehicle types are selected in accordance with the rules adopted for a specific type of transport in the country in which transportation is carried out, in compliance with all applicable safety regulations and standards.

SECTION 7. STORAGE REQUIREMENTS

7.1. Requirements for equipment storage shall be specified in supporting documents.

SECTION 8. REQUIREMENTS FOR SCOPE AND/OR TERMS OF GUARANTEE PROVISION

8.1. The warranty period of operation is at least 24 months from the date of acceptance of the equipment by the Buyer.

SECTION 9. REQUIREMENTS FOR MAINTENANCE

9.1. The maintenance instructions for the devices shall establish the following:

- arrangement of maintenance and repair;
- procedure for performing scheduled calibration and maintenance works;
- checking operability and compliance of the devices after calibration;
- equipment verification procedure.

SECTION 10. SAFETY REQUIREMENTS

10.1. The devices shall comply with the following:

- Labour Law of the ARE No. 12 dd. 2003;
- Decree of the Ministry of Labour Resources and Immigration of the ARE No. 211 dd. 2003 "On Safety Levels, Precautions and Conditions for Preventing Harmful

Physical, Chemical, Biological and Mechanical Hazards and Ensuring Safe Working Conditions” in the ARE

SECTION 11. QUALITY REQUIREMENTS

11.1. The equipment supplied shall comply with Cl. 4.1 of these Terms of Reference.

SECTION 12. ADDITIONAL (OTHER) REQUIREMENTS

12.1. Replacement of the supplied equipment with similar (equivalent) one is possible provided that compliance with the technical requirements specified in Cl. 4.1 of the Terms of Reference is ensured. It shall be taken into account that the references in the documentation to a specific type of equipment, manufacturer are only recommended, not mandatory.

It is possible to present other types of equipment (equivalents) provided that the replacements made are compatible with each other, substantially equivalent or superior in quality relative to the products.

SECTION 13. LIST OF APPENDICES

13.1. Appendix 1 – List of Equipment

List of Equipment

Item No.	List of goods	Unit of measurement	Quantity
1	Portable air medium gas analyser (for measuring O ₂ , CO, CO ₂ , H ₂ S)	Piece	1
2	Portable device for checking temperature and humidity levels	Piece	1
3	Portable electronic anemometer (portable wind speed measuring device)	Piece	1
4	PH meter (portable device for measuring acidity)	Piece	1
5	Sound level meter (portable device measuring volume level in decibels)	Piece	1
6	Dust meter (portable device for measuring concentration of dust in air medium)	Piece	1
7	Radar (portable radar vehicle speed meter)	Piece	1
8	Dosimeter (portable individual device for measuring X-ray and gamma radiation)	Piece	6
9	Meteorological station	Piece	1

Environmental Safety Group Chief Specialist



A. Dementyeva

Agreed by:

Acting Head of Safe Work Production Department



S.Smal