



Annex “Specifications”

	Nordisk Sikkerhet AS
	Tender title: Supply of radiation monitoring instruments
	Project title: “Control and measurement instruments for State Regulatory Authority of Tajikistan (stage 2)”

Specifications

Supply of radiation monitoring instruments:
[Lots 1-5]

Contracting Authority: Nordisk Sikkerhet AS

Recipient: CBRN SSA of Tajikistan

Tenderer’s name: _____

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NOTE

The Tenderer shall fill in the Annex “Specifications” in the format given below. The Tenderer’s proposed supplies should be manufactured and certified in accordance with the technical regulations and standards of the country of origin. The complete table should be submitted to the Contracting Authority along with the required tender documents. On the front page of the Annex “Specifications”, the Tenderer shall indicate its name. After the completion of this document, it should be signed and dated by the Tenderer-authorized person.

1. LOT 1: HAND-HELD DOSIMETERS

	Contracting Authority’s Requirements	Tenderer’s Offer
Manufacturer	—	
Model	—	
Scope of supply	2 pcs	
TECHNICAL SPECIFICATIONS		
Type	Handheld device	
Detected radiation	Gamma, X-ray, beta	
Detector type of gamma radiation	Plastic scintillation detector will be an advantage.	
Energy range of detected gamma radiation	From 20 keV to 3 MeV or better	
Measurement range of ambient dose equivalent rate H*(10)	From 0.1 µSv/h to 2 Sv/h or better	
Measurement range of ambient dose equivalent H*(10)	From 0.1 µSv to 10 Sv or better	
Uncertainty of measuring ambient dose equivalent rate H*(10) when calibrated for ¹³⁷ Cs (662 keV), no more than	± 30%	
Energy range of detected beta radiation	From 500 keV or better	
Search of beta radioactive sources	Yes. Uncertainty of measurements is not specified.	
Setup time of operating mode, no more than	2 min	
Minimum measurement time, no more than	2 sec	
Alarm indication	Visual and audible alarms when thresholds are exceeded. Haptic alarm is an advantage.	

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	Contracting Authority's Requirements	Tenderer's Offer
Functions	Search, localization and evaluation of RN materials: <ul style="list-style-type: none"> - Measurement of ambient dose equivalent and ambient dose equivalent rate $H^*(10)$; - Search of beta radioactive sources (e.g., as an indicator of presence of beta radioactivity, alternatively as measuring instrument); - Indication of measured values on the built-in display; - Audible signalling of each registered particle in the search mode; - Adjustable thresholds for alarm; - Recording the measurements in the non-volatile memory. 	
Power supply	From integrated rechargeable batteries	
Battery and battery life	Battery life should be greater than 12 hours under no alarm conditions	
Weight, no more than	1 kg	
Physical dimensions	Compact, suitable for handheld use. Comfortable carrying handle is recommended.	
Shockproof	N/A	
Waterproof, no less than	IP54	
Mean time between failures, no less than	4000 hours	
Service life, no less than	6 years	
ENVIRONMENTAL REQUIREMENTS		
Ambient temperatures	From -30 to +45 °C	
Relative humidity	Up to 95% at ambient temperature of 35°C and lower, without condensation of moisture	
PRESERVATION AND PACKAGING		
Packaging	Protection for transportation, handling and reliable storage without re-preservation within 1 year upon delivery.	
OTHER REQUIREMENTS		

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	Contracting Authority's Requirements	Tenderer's Offer
Certification	Yes, the measuring instrument shall be certified in the country of origin	
Visibility of Norwegian financing	Any equipment delivered under the contract should be clearly identified and should have metallic plates or indelible labels containing the flag of Norway and the phrase “Provided with support from the Government of Norway” in Tajik/Russian and in English.	

2. LOT 2: BACKPACK FOR RADIONUCLIDE IDENTIFICATION AND SOURCE LOCATION

	Contracting Authority's Requirements	Tenderer's Offer
Manufacturer	—	
Model	—	
Scope of supply	1 set	
TECHNICAL SPECIFICATIONS		
Type	Portable monitor of RN materials in backpack	
Detection channels	Gamma, neutron independent channels	
Gamma channel	Spectrometric scintillation detector NaI(Tl)	
Neutron channel	³ He counters in polyethylene moderator or equivalent	

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Functions	Contracting Authority's Requirements	Tenderer's Offer
Functions	<p>Search, localization and evaluation of RN materials:</p> <ul style="list-style-type: none"> - Measurement of ambient dose equivalent rate $H^*(10)$; - Automatic identification of gamma-emitting radionuclides and radionuclide analysis; - Indication of measured values on the built-in display or a handheld computer; - GPS positioning; - Marking the map with measurements; - Radiation safety alarm; - Recording the measurements in conjunction to the time and place in the non-volatile memory; - Automatic energy stabilization. <p>Indication of the direction to the found RN materials (radiation sources) on the map as well as the assistance to localization of multiple RN materials (radiation sources) via user interface (incl. the calculation of estimated location for radiation sources) are an advantage.</p>	
Energy range of detected gamma radiation	From 50 keV to 3 MeV or better	
Energy range of detected neutron radiation	From 0.025 eV to 14 MeV or better	
Measurement range of ambient dose equivalent rate $H^*(10)$	From 0.01 $\mu\text{Sv/h}$ to 100 $\mu\text{Sv/h}$ or better	
Uncertainty of measuring ambient dose equivalent rate $H^*(10)$ when calibrated for ^{137}Cs , no more than	$\pm 30\%$	
Channels of amplitude gamma spectrum, no less than	1024	
Dimensions of detector crystal, no less than	$\varnothing 60 \times 60 \text{ mm}$	
Relative energy resolution for line of 662 keV (^{137}Cs)	7.5 % or better	

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	Contracting Authority's Requirements	Tenderer's Offer
Automatic identification of radionuclides	<ul style="list-style-type: none"> - Nuclear materials: ²³³U, ²³⁵U, ²³⁹Pu; - Medical radionuclides: ¹⁸F, ⁶⁷Ga, ^{99m}Tc, ¹¹¹In, ¹²³I, ¹²⁵I, ¹³¹I, ¹³³Xe, ¹⁹²Ir, ²⁰¹Tl; - Naturally occurring radioactive materials: ⁴⁰K, ²²⁶Ra, ²³²Th, ²³⁸U; - Industrial radionuclides: ⁵⁷Co, ⁶⁰Co, ¹³³Ba, ¹³⁷Cs, ¹⁹²Ir, ²²⁶Ra, ²⁴¹Am. 	
Reference source for automatic energy calibration (for routine operation)	Yes. In case if there are no built-in source/LED for spectrometric route stabilization, a separate calibration/reference source(s) for automatic energy calibration shall be supplied	
Duration of routine energy calibration, no more than	20 min	
Alarm indication	Visual and audible alarms when thresholds are exceeded. Haptic alarm is an advantage.	
Power supply	From integrated accumulators	
Battery and battery life	Battery life should be greater than 6 hours under no alarm conditions for instruments	
Weight, no more than	10 kg	
Physical dimensions	Compact, suitable for use as a backpack.	
Shockproof	N/A	
Waterproof, no less than	IP54	
Mean time between failures, no less than	4000 hours	
Service life, no less than	6 years	
ENVIRONMENTAL REQUIREMENTS		
Ambient temperatures	From -20 to +45 °C	
Relative humidity	Up to 95% at ambient temperature of 35°C and lower, without condensation of moisture	
OTHER REQUIREMENTS		
Certification	Yes, the measuring instrument shall be certified in the country of origin	
Visibility of Norwegian financing	Any equipment delivered under the contract should be clearly identified and should	

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	Contracting Authority's Requirements	Tenderer's Offer
	have metallic plates or indelible labels containing the flag of Norway and the phrase “Provided with support from the Government of Norway” in Tajik/Russian and in English.	

3. LOT 3: GAMMA-BETA SPECTROMETER

	Contracting Authority's Requirements	Tenderer's Offer
Manufacturer	—	
Model	—	
Scope of supply	1 set	
TECHNICAL SPECIFICATIONS		
Type	Laboratory gamma - beta spectrometer	
Purpose	Gamma-beta spectroscopy and radiometry analysis of samples (food, water, soil, radioactive waste, dispersed materials, bulk samples originated from Uranium Ore Tailings, etc.)	
Type of measurements	Simultaneous measurements of gamma and beta radiation	
Equipment	The spectrometer shall be equipped with the following: <ul style="list-style-type: none"> - Spectrometric detection units of gamma and beta radiation, - Analog-digital converters (i.e., integrated in detection units), - Marinelli vessel (of 1 l) and set of measuring cuvettes, - Lead shielding, - Reference source(s) for energy calibration, - Specialized software for data treatment and spectroscopy analysis. 	
GAMMA MEASUREMENTS		
Detector type of gamma radiation	Spectrometric scintillation detector NaI(Tl)	

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	Contracting Authority's Requirements	Tenderer's Offer
Energy range of detected gamma radiation	From 50 keV to 3 MeV or better	
Dimensions of NaI(Tl) detector crystal NaI(Tl), no less than	Ø60 x 60 mm	
Relative energy resolution for line of 662 keV (¹³⁷ Cs)	7.5 % or better	
BETA MEASUREMENTS		
Detector type of beta radiation	Spectrometric plastic scintillation detector	
Energy range of detected beta radiation	From 150 keV to 3.5 MeV or better	
Dimensions of plastic scintillation detector, no less than	Ø120 x 9 mm or equivalent volume	
PERFORMANCE		
Channels of amplitude spectrum, no less than	1024	
Automatic energy stabilization of spectrometric route	Yes. Built-in source/LED and/or temperature stabilization system for spectrometric route stabilization	
Reference source(s) for energy calibration	Yes, reference/calibration source(s)	
Automated identification of radionuclides and calculation of specific (volumetric) activity values in samples	Yes	
Uncertainty of measuring activities, no more than	± 20%	
Minimum detectable activity for ¹³⁷ Cs, no more than (without sample concentration, in Marinelli vessel geometry)	2 Bq/l	
Minimum detectable activity for ⁹⁰ Sr, no more than (without sample concentration, in Marinelli vessel geometry)	20 Bq/l	
Recording spectra in a non-volatile memory	Yes	
Functions	- Automatic/automated identification of gamma and beta emitting radionuclides and radionuclide analysis; - Measurement of specific/volumetric activity of radionuclides in samples, - Natural and intrinsic background suppression; - Storing spectra in a non-volatile memory and	

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	Contracting Authority's Requirements	Tenderer's Offer
	transferring to the PC for processing; - Self-diagnosis of the detection units; - Automatic energy stabilization; - Assistance to energy calibration of the spectrometric detectors.	
Measurement techniques	Yes, techniques for measuring the specific/volumetric activity of radionuclides in samples shall be included in the scope of supply	
Power supply	From mains of AC current, 220 ±10% V, 50±5 Hz	
Total weight of all the components, no more than	200 kg	
Physical dimensions	Compact, suitable for tabletop use	
Waterproof, no less than	IP 2X or better	
Shockproof	N/A	
Mean time between failures, no more than	4000 hours	
Service life, no less than	6 years	
ENVIRONMENTAL REQUIREMENTS		
Ambient temperatures	From 10 to +35 °C	
Relative humidity	Up to 75% at ambient temperature of 30°C and lower, without condensation of moisture	
OTHER REQUIREMENTS		
Certification	Yes, the measuring instrument shall be certified in the country of origin	
Visibility of Norwegian financing	Any equipment delivered under the contract should be clearly identified and should have metallic plates or indelible labels containing the flag of Norway and the phrase “Provided with support from the Government of Norway” in Tajik/Russian and in English.	

4. LOT 4: PERSONAL ELECTRONIC DOSIMETERS

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	Contracting Authority's Requirements	Tenderer's Offer
Manufacturer	—	
Model	—	
Scope of supply	1. Personal electronic dosimeters – 5 pcs., 2. Spare parts for 3 years of operation (accumulator batteries) – 1 set (to be defined by the tenderer)	
TECHNICAL SPECIFICATIONS		
Ionizing radiation	Gamma	
Detector type	Energy compensated Geiger-Muller counter	
Energy range of registered gamma radiation	From 50 keV to 1.5 MeV or better	
Measurement range of individual dose equivalent rate $H_p(10)$	From 0.1 μ Sv/h to 0.1 Sv/h or better	
Measurement range of individual dose equivalent $H_p(10)$	From 1 μ Sv to 9.9 Sv or better	
Weight, no more than	0.15 kg	
Dimensions	Compact, suitable to be worn on a belt or to be carried in a pocket for hands free operations	
Alarm indication	Visual and audible alarms when thresholds are exceeded. Haptic alarm is an advantage.	
Functions	- Indication of measured values on the built-in display; - Intrinsic background suppression; - Adjustable thresholds for alarm; - Recording the measurements in the non-volatile memory.	
Power supply	From accumulator battery	
Battery and battery life	Accumulator batteries shall provide more than 2000 hours of continuous operation	
Shockproof	Yes	
Waterproof, no less than	IP54	
Mean time between failures, no less than	4000 hours	
Service life, no less than	6 years	
ENVIRONMENTAL REQUIREMENTS		

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	Contracting Authority's Requirements	Tenderer's Offer
Ambient temperatures	From -10 to+40 °C	
Relative humidity	Up to 90% at ambient temperature of 35°C and lower, without condensation of moisture	
OTHER REQUIREMENTS		
Certification	Yes, the measuring instrument shall be certified in the country of origin	
Visibility of Norwegian financing	Any equipment delivered under the contract should be clearly identified and should have metallic plates or indelible labels containing the flag of Norway and the phrase “Provided with support from the Government of Norway” in Tajik/Russian and in English.	

5. LOT 5: RADON MONITOR

	Contracting Authority's Requirements	Tenderer's Offer
Manufacturer	—	
Model	—	
Scope of supply	1. Radon monitor – 1 set, 2. Consumables for 3 years of operation (e.g. air filters, etc.) – 1 set (to be defined by the tenderer)	
TECHNICAL SPECIFICATIONS		
Type	Monitor of Radon, Thoron and their airborne progenies	
Detection channels	Two alpha radiation detection channels	
Detector type	Silicon detector	
Functions	- Monitoring of Radon, Thoron and their airborne progenies in air: (a) Measurement of concentration (volumetric activity) in air, (b) equilibrium equivalent concentration (volumetric activity) in air; - Measurement of Radon concentration in water samples,	

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	<ul style="list-style-type: none"> - Measurement of Radon concentration in soil air; - Measurement of Radon flux density from the soil surface; - Automatic energy stabilization; - Indication of measured values on the LCD display; - Recording the measurements in the non-volatile memory. 	
Equipment	<p>The Rodon monitor shall be equipped with the following:</p> <ul style="list-style-type: none"> - concentration (volumetric activity) measuring device, - EEC measuring device, - data display and control unit, - self-contained air blower equipped with various sampling device, - air filter system, - barbator, - water sampling device, - air sampling device, - accumulation chamber, - soil air sampling device, - specialized software for measurement data treatment and calculation of concentrations/EEC of Radon, Thoron. 	
MEASUREMENTS OF equilibrium equivalent concentration		
Measurement range of Radon (^{222}Rn) equilibrium equivalent concentration (EEC)	From 1 to $1 \cdot 10^6$ Bq/m ³ or better	
Measurement range of Thoron (^{220}Rn) equilibrium equivalent concentration (EEC)	From 0.5 to $1 \cdot 10^4$ Bq/m ³ or better	
Relative measurement error of equilibrium equivalent concentration (EEC), no more than	±30%	
MEASUREMENTS of concentration		

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Measurement range of Radon (²²² Rn) concentration in air	From 1 to 2·10 ⁶ Bq/m ³ or better	
Relative measurement error of Radon (²²² Rn) concentration in air, no more than	±20%	
Measurement range of Radon (²²² Rn) flux density from the soil surface	From 20 to 1·10 ³ mBq/(m ² sec) or better	
Relative measurement error of Radon (²²² Rn) flux density, no more than	±30%	
PERFORMANCE		
Power supply	From mains of AC current, 220 ±10% V, 50±5 Hz	
Time of autonomous continuous operation (from accumulator batteries), no less than	6 hours	
Weight, no more than	10 kg	
Automatic energy stabilization of spectrometric route	Yes. By means of system generating test impulses	
Physical dimensions	Compact, suitable for tabletop use	
Shockproof	N/A	
Waterproof	IP 2X or better	
Mean time between failures, no less than	2000 hours	
Service life, no less than	6 years	
ENVIRONMENTAL REQUIREMENTS		
Ambient temperatures	From 1 to +35 °C	
Relative humidity	Up to 80% at ambient temperature of 25°C and lower, without condensation of moisture	
OTHER REQUIREMENTS		
Certification	Yes, the measuring instrument shall be certified in the country of origin	
Visibility of Norwegian financing	Any equipment delivered under the contract should be clearly identified and should have metallic plates or indelible labels containing the flag of Norway and the phrase “Provided with support from the Government of Norway” in Tajik/Russian and in English.	

6. DOCUMENTATION

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	Contracting Authority's Requirements	Tenderer's Offer
DOCUMENTATION		
Technical specifications/ conditions	Russian or English	
Passports/logbooks	Russian or English	
User's manuals, including guidelines on the application of specialized software	Russian or English	
Measurement techniques	Russian or English	
Documents attesting certification of equipment in the country of origin and, if available, in Tajikistan	Russian or English	
Certificates of primary metrological verification from the country of origin	Russian or English	
Training documentation	Russian or English	
Transportation documentation	Russian or English	

7. DELIVERY TERMS AND CONDITIONS

	Contracting Authority's Requirements	Tenderer's Offer
DELIVERY TERMS AND CONDITIONS		
Terms of Delivery	DAP, Incoterms 2010	
Place of Delivery	CBRN SSA of Tajikistan: 33 Rudaki Avenue, 734025, Dushanbe, Tajikistan	
Delivery Time	≤ 120 calendar days after the date of contract signature	
Place of Installation (only for gamma-beta spectrometer, Lot 3)	Branch of CBRN SSA: 1A B.Gafurov street, Buston, Sogd Region 735730, Tajikistan	
Installation Time	≤ 180 calendar days after the date of contract signature	

8. TRAINING COURSE: OPERATION, MAINTENANCE AND REPAIR

	Contracting Authority's Requirements	Tenderer's Offer
TRAINING		
TRAINING COURSE		
Place of training (training room to be provided by the Recipient)	Branch of CBRN SSA: 1A B.Gafurov street, Buston, Sogd Region 735730, Tajikistan	

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Duration of training course	2 days	
Language of training course	Tajik/Russian	
Number of trainees, up to	6 persons	
Themes to be covered	<ul style="list-style-type: none"> - Operating principles of measuring instruments, - Detailed analysis of algorithms and features of operation, - Use of measuring instrument, - Setting-up procedures, - Procedures of calibration and measurements, - Applied measurement techniques, - Maintenance, - Minor repairs, -Specialized software: installation and operation. 	
Theoretical part duration, no less than	1/2 day	
Practical part duration, no less than	1 and 1/2 day practical training at Recipient’s training room	
Instructional video	Optional	
Verification	Test, written form	
TRAINING COURSE DOCUMENTATION		
One certificate per trainee	In Tajik and English	
List of materials to provide per trainee	<ul style="list-style-type: none"> - Set of training materials; - User’s documentation; - Training materials on one CD/DVD. 	
Results of test after training should be delivered to the Contracting Authority and Recipient	Yes	

9. WARRANTY AND POST-WARRANTY SERVICES

	Contracting Authority’s Requirements	Tenderer’s Offer
WARRANTY AND POST-WARRANTY SERVICES		
Duration of warranty period	≥ 24 months	
Place of warranty repairs and maintenance	Tajikistan	
Presence of official representative of the manufacturer or authorised service centre in the FSU region	Would be an advantage	
Technical support during warranty and post-warranty period	- Technical support by email or telephone in Tajik /Russian/English to solve any technical problems (software failure, anomalous behavior,	

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	<p>minor improvements concerning process, functional capabilities of data processing, etc.) and rectify any system-disabled state.</p> <ul style="list-style-type: none"> - Consultancy support in relation to the annual metrological verification by email or telephone in Tajik /Russian/English. 	
After-sales service	<p>Compulsory after-sales service to be provided under a separate agreement with the Recipient shall include the following:</p> <ul style="list-style-type: none"> - Maintenance and post warranty repair of the equipment on the territory of Tajikistan; - Rapid provision of spare parts and consumables. 	

10. TIME SCHEDULE

No.	Action	Period of completion	Tenderer's Offer
1.	Submission of documents: - Technical specifications/conditions.	Within 45 calendar days after the signing of Contract	
2.	Submission of documents: - Passports/logbooks, - User's manuals, including guidelines on the application of specialized software, - Measurement techniques, - Documents attesting certification of equipment in the country of origin and, if available, in Tajikistan, - Certificates of primary metrological verification, - Transportation documentation.	2 weeks before the scheduled shipment and supplied with equipment	
3.	Submission of documents: - Training course documentation.	2 weeks before the scheduled training	
4.	Equipment delivery	Within 120 calendar days after the signing of Contract	
5.	Installation (assembling, starting-up and adjustment) of gamma-beta spectrometer	Within 180 calendar days after the signing of Contract	
6.	Training of personnel	Within 180* calendar days after the signing of Contract	

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Note: *) The personnel training must be carried out not later than 60* calendar days after the delivery of equipment. The actual dates of training shall be confirmed by the Recipient and Contracting Authority no later than 10 days before the training course.

Authorized person on behalf of the Tenderer:

Name: _____

Title: _____

Signature: _____

Date: _____