|  |  |
| --- | --- |
|  |  |
| **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: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Contents**

[1. LOT 1: HAND-HELD DOSIMETERS 3](#_Toc87199378)

[2. LOT 2: BACKPACK FOR RADIONUCLIDE IDENTIFICATION AND SOURCE LOCATION 5](#_Toc87199410)

[3. LOT 3: GAMMA-BETA SPECTROMETER 8](#_Toc87199445)

[4. LOT 4: PERSONAL ELECTRONIC DOSIMETERS 10](#_Toc87199489)

[5. LOT 5: RADON MONITOR 12](#_Toc87199514)

[6. DOCUMENTATION 14](#_Toc87199542)

[7. DELIVERY TERMS AND CONDITIONS 15](#_Toc87199544)

[8. TRAINING COURSE: OPERATION, MAINTENANCE AND REPAIR 15](#_Toc87199547)

[9. WARRANTY AND POST-WARRANTY SERVICES 16](#_Toc87199549)

[10. TIME SCHEDULE 17](#_Toc87199550)

**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 MeVor 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 137Cs (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. |  |
| Functions  | Search, localization and evaluation of RN materials:- 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 0C |  |
| Relative humidity | Up to 95% at ambient temperature of 350C 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** |
| 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. |  |

1. **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 | 3He counters in polyethylene moderator or equivalent |  |
| Functions  | Search, localization and evaluation of RN materials:- Measurement of ambient dose equivalent rate H\*(10); - Automatic identification ofgamma-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. 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.  |  |
| Energy range of detected gamma radiation | From 50 keV to 3 MeVor better |  |
| Energy range of detected neutron radiation | From 0.025 eV to 14 MeVor better  |  |
| Measurement range of ambient dose equivalent rate H\*(10)  | From 0.01 μSv/h to 100 μSv/h or better |   |
| Uncertainty of measuring ambient dose equivalent rate H\*(10) when calibrated for 137Cs, no more than  | ± 30% |  |
| Channels of amplitude gamma spectrum, no less than | 1024 |  |
| Dimensions of detector crystal, no less than | ∅60 x 60 mm  |  |
| Relative energy resolution for line of 662 keV (137Cs) | 7.5 % or better |  |
| Automatic identification of radionuclides | - Nuclear materials: 233U, 235U, 239Pu;  - Medical radionuclides: 18F, 67Ga, 99mTc, 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 0C |  |
| Relative humidity | Up to 95% at ambient temperature of 350C 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. |  |

1. **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: * 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) |  |
| Energy range of detected gamma radiation | From 50 keV to 3 MeVor better  |  |
| Dimensions of NaI(Tl) detector crystal NaI(Tl), no less than | ∅60 x 60 mm  |  |
| Relative energy resolution for line of 662 keV (137Cs) | 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 MeVor better  |  |
| Dimensions of plastic scintillation detector, no less than | ∅120 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 137Cs, no more than(without sample concentration, in Marinelli vessel geometry) | 2 Bq/l |  |
| Minimum detectable activity for 90Sr, 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 ofgamma 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 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 0C |  |
| Relative humidity | Up to 75% at ambient temperature of 300C 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. |  |

1. **LOT 4:** **PERSONAL ELECTRONIC DOSIMETERS**

|  | **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 Hp(10) | From 0.1 µSv/h to 0.1 Sv/hor better |  |
| Measurement range of individual dose equivalent Hp(10)  | From 1 µSv to 9.9 Svor 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** |
| Ambient temperatures | From -10 to+40 0C |  |
| Relative humidity | Up to 90% at ambient temperature of 350C 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. |  |

1. **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,- 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 | The Rodon monitor shall be equipped with the following: * 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 (222Rn) equilibrium equivalent concentration (EEC) | From 1 to 1⋅106 Bq/m3or better |  |
| Measurement range of Thoron (220Rn) equilibrium equivalent concentration (EEC) | From 0.5 to 1⋅104 Bq/m3or better |  |
| Relative measurement error of equilibrium equivalent concentration (EEC), no more than | ±30% |  |
| MEASUREMENTS of concentration |
| Measurement range of Radon (222Rn) concentration in air | From 1 to 2⋅106 Bq/m3or better |  |
| Relative measurement error of Radon (222Rn) concentration in air, no more than | ±20% |  |
| Measurement range of Radon (222Rn) flux density from the soil surface | From 20 to 1⋅103 mBq/(m2 sec) or better |  |
| Relative measurement error of Radon (222Rn) 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 0C |  |
| Relative humidity | Up to 80% at ambient temperature of 250C 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. |  |

1. **DOCUMENTATION**

|  |  |  |
| --- | --- | --- |
|  | **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 |  |

1. **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 ofCBRN SSA:1A B.Gafurov  street, Buston, Sogd Region735730, Tajikistan  |  |
| Installation Time | ≤ 180 calendar days after the date of contract signature |  |

1. **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 ofCBRN SSA:1A B.Gafurov  street, Buston, Sogd Region735730, Tajikistan |  |
| Duration of training course | 2 days |  |
| Language of training course | Tajik/Russian |   |
| Number of trainees, up to | 6 persons |  |
| Themes to be covered | - 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 | - 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 |  |

1. **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, minor improvements concerning process, functional capabilities of data processing, etc.) and rectify any system-disabled state.- Consultancy support in relation to the annual metrological verification by email or telephone in Tajik /Russian/English. |  |
| After-sales service | Compulsory after-sales service to be provided under a separate agreement with the Recipient shall include the following:- Maintenance and post warranty repair of the еquipment on the territory of Tajikistan;- Rapid provision of spare parts and consumables. |  |

1. **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, staring-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 |  |

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: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_