NUKLEARNA ELEKTRARNA KRŠKO (NEK)

TO.KM

TECHNICAL SPECIFICATION FOR LOW RADIOACTIVE WASTE INCINERATION in 2025, 2026 and 2027

Revision: 0

Classification: AQ

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1. Description and content activities

Bidder shall propose all steps required for conducting and completing the activities of incineration of low-level radioactive waste (LLRW) packed in standard 208-liter carbon steel drums, including transportation.
The technical specification covers three incineration campaigns (in years 2025, 2026 and 2027). NPP Krsko (NEK) will prepare 7 or 8 20-feet containers (504 or 576 drums in total) of LLRW for all three campaigns.
LLRW includes:

- compressible/compacted waste (CW) which includes dry contaminated protective clothing, footwear and other protective gear, contaminated plastic, paper and textile waste,
- solid noncompressible / other waste (O) which includes wood.

2. Scope of the service

2.1 Main steps of incineration campaign are:

2.1.1. Transport of drums with LLRW to incineration site and drums with final product of incineration back to NPP Krško (two-way transportation). For three campaigns.

2.1.2. Incineration of waste (CW and O).

2.1.3. Embedment of incineration products with concrete.

2.1.4. Gamma spectrometry analysis of drums with incineration products.

2.1.5. Alpha spectrometry of final incineration product.

3. Classification of the service

AQ (augmented quality).

4. Type of service

N/A

5. Applicable regulations, standards and procedures

5.1. Transport of the waste shall comply with European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) and

International Atomic Energy Agency (IAEA) regulation. The permits are defined in 2006/117/EURATOM, and its application for authorization is defined in section A-1 and A-5.

5.2. The waste processing shall follow appropriate national waste processing regulation of bidder and/or European regulation. Transport should comply with European regulation.

5.3. Embedment of the ashes and dust shall comply with appropriate procedures, national bidder regulations and IAEA safety standards and should be identical to already existing products stored at NEK. The applicable procedure shall be submitted for review and for the record.

5.4. Embedded waste shall be properly characterized to enable defining all the characteristics of the waste form necessary for temporary and final storage.

- Radionuclide specific data
- Total activity (alpha and beta/gamma)
- Dose rate of packages (contact)
- Total net weight
- Total gross weight
- Packaging description

5.5. Radiochemical laboratory shall follow well-established quality assurance program. All calibration standards shall be traceable to primary standards and all analytical methods shall be under consistent quality control program.

5.6. In case if bidder will sign subcontract for conducting any activity from contract sub-supplier/subcontractor shall satisfy all QA criteria given in this specification.

6. Identification equipment and devices

N/A

7. Technical requirements

7.1. Initial data

The LLRW to be incinerated is segregated in accordance with waste stream and it is compacted to average density of approximately 0.4 kg/dm^3 in case of CW type. In case of O type there is only noncompacted wood intended for incineration. Activity concentrations of principal gamma emitters in waste in every drum are measured by gamma spectrometry and data of activity concentrations of all detected isotopes will be provided to contractor. Most abounded principle gamma emitters are Co-60 and Cs-137, and less abounded, but often measurable in waste, are Cr-51,

Mn-54, Nb-95, Zr-95, Cs-134, Ag-110m, Sb-125, Co-57, Co-58 Sb-124, Sn-113, Ce-144. Beside activity concentrations of principal gamma emitters, activity concentrations of isotopes of transuranic elements (TRU) will be provided (Pu-239+Pu-240, Pu-238, Am-241, Cm-243+Cm-244 and Cm-242). Activity concentrations of TRU are derived using previous scaling factors.

The activity concentration of each measured gamma emitter and activity concentrations of all derived TRU specified per drum will be provided to contractor. Total activity of shipment will be given as sum of activity concentrations of gamma emitters and alpha emitters separately. Average ratio of α to β-gamma emitters is 0,3 %.

7.2. It is expected that the overall volume reduction factor after incineration of LLRW waste will be not less than 14.

7.3. It is required from contractor to send a copy of certificate for embedment material (concrete) that will be used.

7.4. The bidder shall provide references about technology of packaging of incineration products. Such references shall be nationally approved procedure or/and procedure that is already approved as waste packaging criteria of bidder national radioactive waste repository.

7.5. Incineration products shall be packed into 100 liters drums, and after embedment procedure inserted in 208 l standard drums. All drums need to satisfy internationally recognized criteria for radioactive material disposal.

7.6. NPP Krško 208 l standard carbon steel drums may be used as mold for solidification. Final packaging dimensions shall be precisely specified.

7.7. Bidder (or subcontractor) shall have developed methods for determination of gamma emitters in final packages and method(s) for TRU isotopes speciation.

8. Qualification requirements

8.1. Bidder shall be licenced by his national authority for the incineration services.

9. The dynamics of work implementation

9.1. Bidder shall be prepared to accept and process complete LLRW waste in three campaigns. First in year 2025, second in year 2026 and third in year 2027. The return date of solidified waste shall be indicated in the proposal. Exact schedule of all main activities defined in 2nd paragraph of this specification shall be proposed.

10. Bidder's obligations

10.1. Final activity concentrations of each principal gamma emitter for every package shall be reported.

10.2. Activity concentrations of transuranic nuclides, listed in section 7 of this specification, shall be obtained from analysis of two representative samples.

10.3. Any out sorted waste shall be packed in NPP Krško drums and returned together with incinerated waste.

10.4. Bidder shall arrange return shipment of the empty and unused NPP Krško drums.

10.5. Bidder shall ensure all necessary permits from his national authorities for waste return shipment.

10.6. Bidder shall provide controlled copy of approved QA Manual together with the proposal.

11. NPP KRŠKO obligations

11.1. NPP Krško will provide all available data about LLRW requested by bidder.

11.2. NPP Krško will accept incinerated and out sorted waste processed in accordance with this specification.

11.3. NPP Krško will ensure approval from the Slovenian Nuclear Safety Administration for LLRW transportation (section A-1, form 2006/117/EURATOM) and description of LLRW consignment description with appropriate packages list (section A-5, form 2006/117/EURATOM).

12. Special requirements

12.1. The bidder shall provide relevant test results for the products – embedded radioactive waste (transport regulation requirements and compliance to appropriate national repository requirements for waste acceptance for storage – taking into account the existing form of similar waste at Krško).

12.2 Only referent regulation (EURATOM and ADR) has to be followed in these international transport services or authorities' approvals. No other international agreements other than international nuclear law will apply.

12.3 The waste intended for incineration campaign 2026 and 2027 is not measured and prepared yet. Therefore, NEK guarantees that the waste intended for incineration in second and third campaigns will be described in

more detail in Attachment 14.3.

13. QA requirements

All services requested in this technical specification are classified as AQ (Augmented Quality) and shall be provided and performed in accordance with a Supplier's Quality Assurance Program (certified per ISO 9001:2015 or other relevant recognized standards). The certificate for quality management system shall be provided within a quotation.
If it has not been previously sent to NEK, the Bidder shall provide a copy of approved QA Manual with the proposal.

All activities shall be performed in accordance with suppliers QA program and NEK QA specification *QS-610 Generic Quality Assurance Program Requirements* (attached to this TS). Relevant sections which apply to this Bid are: 1.1, 1.2, 1.6, 1.7, 3.0, 4.1, 4.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.6, 4.4.7, 4.4.9, 4.5, 4.6, 4.7.1, 4.7.2.1 and 4.7.2.2, 4.7.3, 4.7.4, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13.1, 4.13.2, 4.13.4, 4.13.6, 4.14, 4.15, 4.16, 4.17 and 4.18.

All work performed by Subcontractor(s) shall be subject to the technical and quality requirements of this Specification as well. The Contractor shall be responsible for all subcontracted activities.

Any deviations or design changes which are not fully in accordance with the technical or quality assurance requirements of the procurement documents and which the Contractor desires to accept, must be accepted by the Purchaser. Any such deviation request must be made in writing by means of a Deviation/Change Request Form submitted to the Purchaser for acceptance prior to continuing work.

NEK shall have the right of access to enter the premises of the Contractor to witness work or for demonstration/test activities or to conduct surveillance or quality assurance audits. This right shall extend to the Subcontractors and will be coordinated through the Contractor.

14. Attachments

14.1. QS 610 – Generic Quality Assurance Program Requirements, rev.2
14.2 Radioactive waste data: Activity refers to measurement date (only for first campaign)
14.3 Description of LLRW intended for incineration in second and third campaign (year 2026 and 2027).