

**NUKLEARNA ELEKTRARNA KRŠKO (NEK)****TO.KM****TECHNICAL SPECIFICATION
MELTING OF LOW RADIOACTIVE METAL WASTE IN 2027****Revision: 0****Classification: AQ**

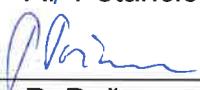
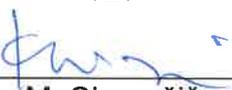
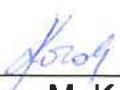
Prepared:	 _____	Date: <u>20 / 05 / 2025</u>
	A. Petančič	
Reviewed:	 _____	Date: <u>20 / 5 / 2025</u>
	P. Požun	
Reviewed:	 _____	Date: <u>21 / 5 / 2025</u>
	M. Simončič	
Reviewed:	 _____	Date: <u>22 / 5 / 2025</u>
	D. Novak	
Reviewed:	 _____	Date: <u>23 / 5 / 2025</u>
	M. Kozole	
Approved:	 _____	Date: <u>27 / 05 / 2025</u>
	M. Gluhak	

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1. Description and content activities

Bidder shall propose all steps required for conducting and completing the activities for melting of low-level radioactive waste (LLRW) packed in HDPE boxes (V=610 L), 208 liter drums and on HDPE pallets, including transportation. The technical specification covers one melting campaign in 2027. NPP Krško (NEK) will prepare six (6) full 20-foot IP-2 containers of metal LLRW for the campaign.

LLRW includes:

- Copper metallic waste.
- Stainless steel and carbon steel waste
- Painted carbon steel
- Aluminum
- Galvanized steel

All types of metal are carefully separated from each other and cut in pieces. Dimensions of each piece of metal are smaller than 120 x 60 x 60 cm. Net mass of the metallic waste is approximately 65 tonnes.

2. Scope of the service

2.1 Main steps of melting campaign are:

- 2.1.1. Transport of metal LLRW to melting site. Transport of ingots and drums with final product of melting and embedment back to NPP Krško (two-way transportation). NEK will supply ISO IP-2 containers which shall be returned to NEK (loaded with secondary waste, drums, empty boxes and empty pallets) after the service.
- 2.1.2. Melting of metal waste.
- 2.1.3. Embedment of secondary waste with concrete.
- 2.1.4. Gamma spectrometry analysis of ingots and secondary waste products.
- 2.1.5. Alpha spectrometry of final secondary waste products.
- 2.1.6. Free release of ingots that can be free released.

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 secondary waste 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. Ingots 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, side 1m)
 - Total net weight
- 5.5. 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, side 1m)
 - Total net weight
 - Total gross weight
 - Packaging description
- 5.6. 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.

- 5.7. 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 metal LLRW to be melted is segregated and cut to pieces of 120 x 60 x 60 cm or less. Activity concentrations of principal gamma emitters in waste in every HDPE box, pallet or 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-94, Zr-95, Cs-134, Ag-110m, Sb-125, Co-57, Co-58 Sb-124, Sn-113, Sn-125 and Ce-144. Activity concentrations of transuranic elements (TRU) nuclides can be derived using previous scaling factors. Surface contamination values for alpha and beta/gamma in each package are also given.

The activity concentration of each measured gamma emitter and activity concentrations of all packages 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 required from contractor to send a copy of certificate for embedment material (concrete) that will be used.
- 7.3. The bidder shall provide references about technology of packaging of secondary waste. Such references shall be nationally approved procedure or/and procedure that is already approved as waste packaging criteria of bidder national radioactive waste repository.
- 7.4. Secondary waste 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.
- 7.5. Ingots shall have a given volume.
- 7.6. Ingots shall be protected with appropriate coating (except of Aluminum ingots) and properly marked.
- 7.7. NPP Krško 208 l standard carbon steel drums may be used as mold for solidification. Final packaging dimensions shall be precisely specified.

7.8. 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 metallic LLRW waste in one campaign. Containers should be picked up by the end of January 2026 at the latest. The return date of ingots and embedded secondary 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 waste 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 or boxes and returned together with ingots that cannot be free released and together with embedded secondary waste.

10.4. Bidder shall free release ingots that can be free released.

10.5. Bidder shall arrange return shipment of secondary waste, ingots and empty and unused NPP Krško drums.

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

10.7. 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 metal LLRW requested by bidder.
- 11.2. NPP Krško will accept ingots (that cannot be free released by bidder), secondary waste 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).
- 11.4. NPP Krško will prepare LLRW in accordance with ADR regulations in NEK's ISO IP-2 containers.

12. Special requirements

- 12.1. The bidder shall provide relevant test results for the products – ingots and 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.

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