State Enterprise Radioactive Waste

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Annex 1

to Market Consultation for Emptying and Decontamination of the 2 off Mogilnik radioactive storage facilities in Kozloduy Reactor Buildings 1 and 2

The Kozloduy Nuclear Power Plant, Units 1 to 4, have four reactors of soviet design type VVER-440/B-230. They were commissioned in 1974, 1976, 1980, and 1982 respectively. Units 1 and 2 were shut down permanently in 2002, while Units 3 and 4 were shut down permanently in 2006.

State Enterprise Radioactive Waste (SERAW) has the responsibility to dismantle and decommission the four reactor Units. The retrieval, treatment and conditioning of RAW are necessary conditions for KNPP Units 1-4 decommissioning.

The objective of the project is to empty the 2 off Mogilnik radioactive storage facilities of their waste and non-fuel bearing reactor component contents. This objective of removal and hand over packages of RAW (large tonnage containers (casks) and Reinforced Concrete Containers (RCCs)) to SERAW for safe disposal/storage of historical waste is necessary to achieve the ultimate goal of decommissioning Kozloduy Units 1-4. In general, it is expected that activated components will be consigned to the casks and contaminated items will be consigned to RCCs, however, high radiation level contaminated materials may be consigned to the casks depending on the nuclides involved and low-level activated materials may be consigned to RCCs depending upon extant radiation levels.

The two Mogilnik Storage Facilities in Kozloduy Units 1-4 were used for the storage of non-fuel bearing reactor components such as neutron flux measurement equipment, boron absorbers and intermediate masts as well as operational wastes such as used filters, textiles, plastics, etc. These items are RAW

category 2 according to the Bulgarian legislation and regulation (low to intermediate level waste). The Project requires that the contents of the storage tubes be removed, radiologically assayed, weighed, segregated and packaged in suitable containers (RCC or large tonnage container), as per assayed dose rate and activity, for the appropriate on-site waste routes and/or storage areas. Due to the presence of activated materials from the reactor, it is anticipated that remote working with shielded equipment will be required at least for these items. A visual camera survey of the inventory has been undertaken of the storage tubes in both Mogilniks, however, as is common with these types of historical storage, the wall to wall packing of the contents meant that the depth that the camera could penetrate was limited. The Tenderers in the forthcoming procurement will be supplied with the inventory compiled by the Employer comprising the recorded logs of deposits in the storage tubes during and after the Power Plant operational years amended and supplemented by the findings of the visual inspection.

On completion of the works, the Contractor will decontaminate and disassemble its technological equipment and working area and transport off the KNPP site.

The technical description and characteristics of the reactor components are presented below. Due to activation, the dominant nuclide of the components' specific activity is Co-60.

Absorbing Followers (Boron Absorbers)

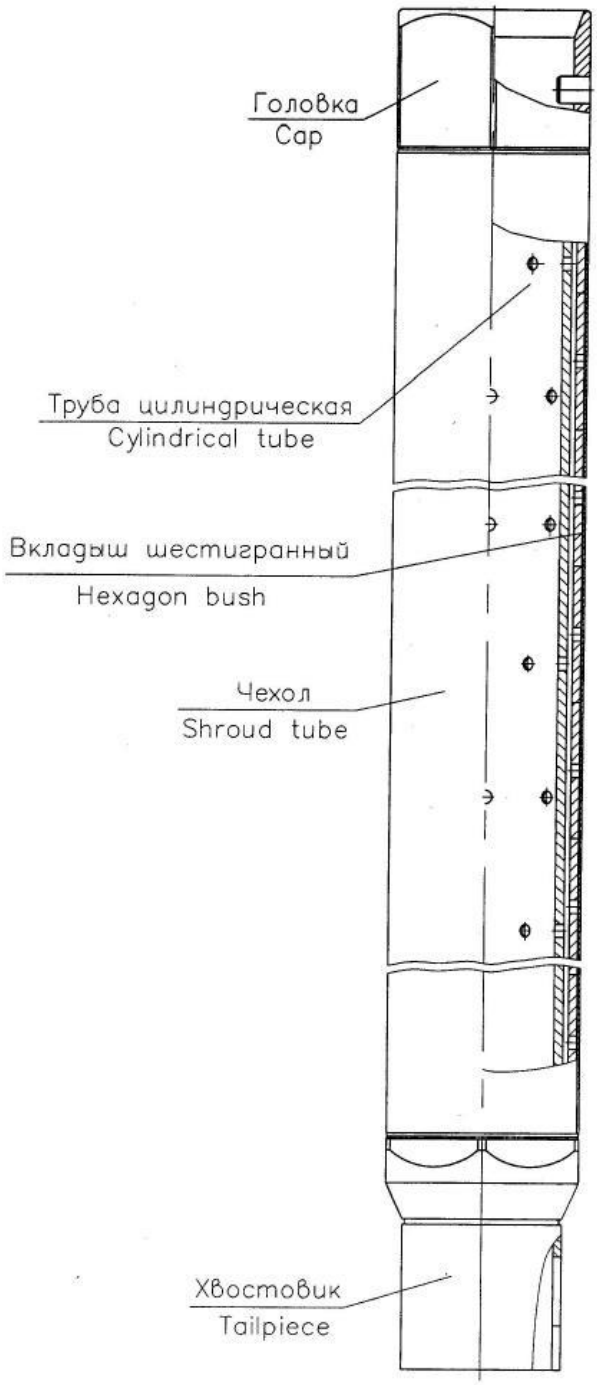
Total number of the absorbing followers (AF) stored in the Mogilnik facilities is 163 pieces. AF consists of a hexagonal pipe of stainless steel, in which the neutron absorber material is contained. In the table below are presented the technical characteristics of the absorbing follower.

Table 1 — Technical characteristics of Absorbing follower

Characteristic	Value	Unit
Width across flats „spanner dimension“	144	mm
Length	2 630	mm
Mass	115	kg
Specific Activity	2.99E+11	Bq/kg

Figure 1 – Absorbing follower

The drawing of the absorbing follower is presented on the figure below.



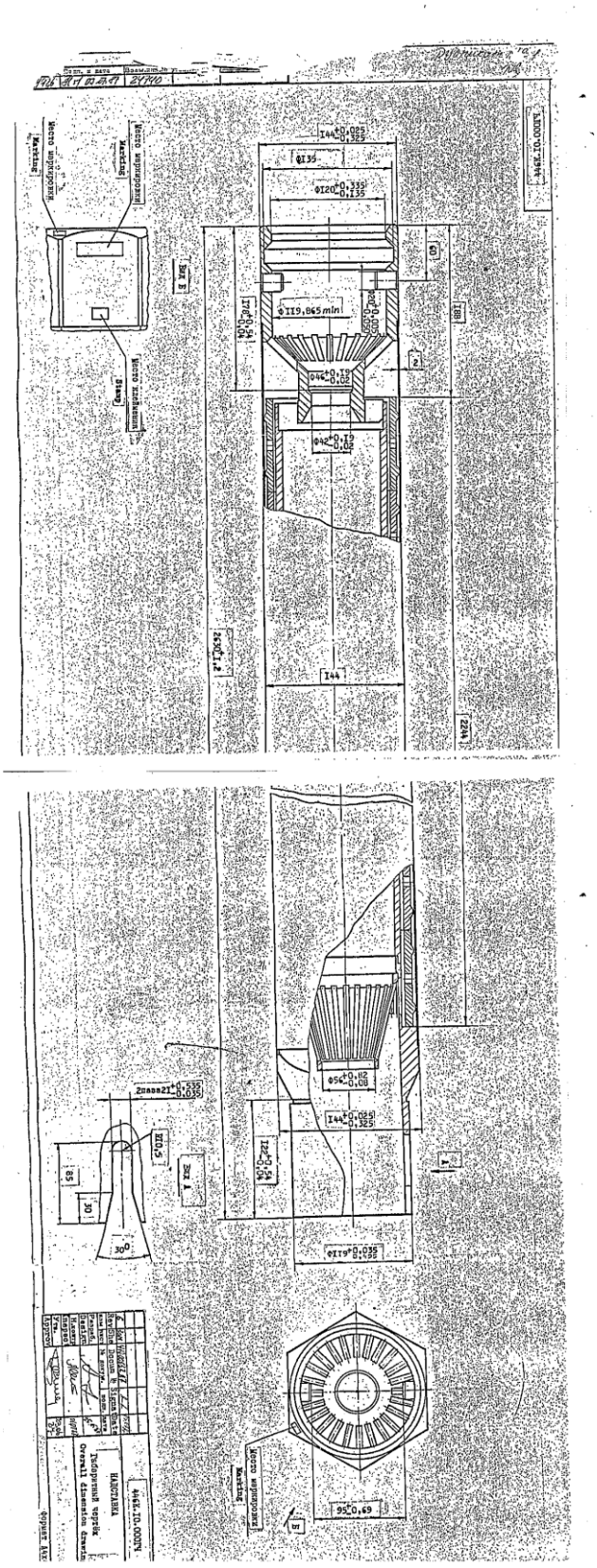


Figure 2 – Drawing of the Absorbing follower

Intermediate masts

Total number of the Intermediate Masts (IM) stored in the Mogilnik facilities is 300 pieces. All parts of Intermediate Mast are made from stainless steel. In the table below are presented the technical characteristics of the intermediate mast.

Table 2 — Technical characteristics of Intermediate mast

Characteristic	Value	Unit
Maximum diameter (head)	155	mm
Carrying tube diameter	40	mm
Head length	650	mm
Length	4 824	mm
Mass	62	kg
Specific Activity	7.14E+09	Bq/kg

Figure 3 – Intermediate mast

The drawing of the Intermediate mast is presented on the figure bellow.

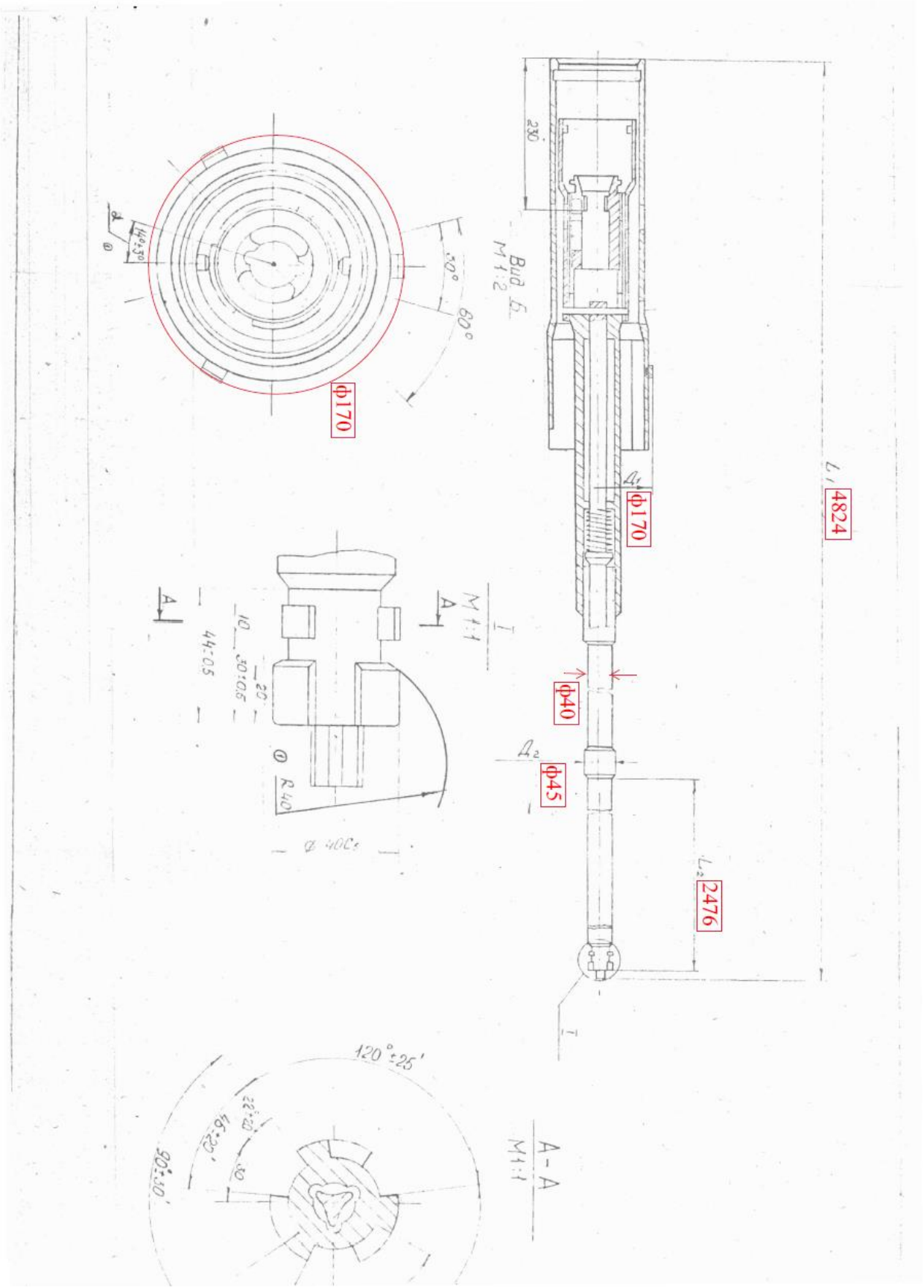


Figure 4 – Drawing of the intermediate mast

Neutron flux measurement channels

At the present moment the quantity of Neutron flux measurement channels (KNIs) stored in the Mogilnik facilities is unknown. The KNI body is made up of stainless steel tube of 7.5 mm diameter and 0.8 mm wall thickness. In the table below are presented the technical characteristics of the KNI.

Table 3 — Technical characteristics of Neutron flux measurement channel

Characteristic	Value	Unit
Diameter	7.5	mm
Wall thickness	0.8	mm
Mass	5.6	kg
Total length	10 250	mm
Specific Activity	1.58E+10	Bq/kg

The drawing of the Neutron flux measurement channel is presented on the figure bellow.

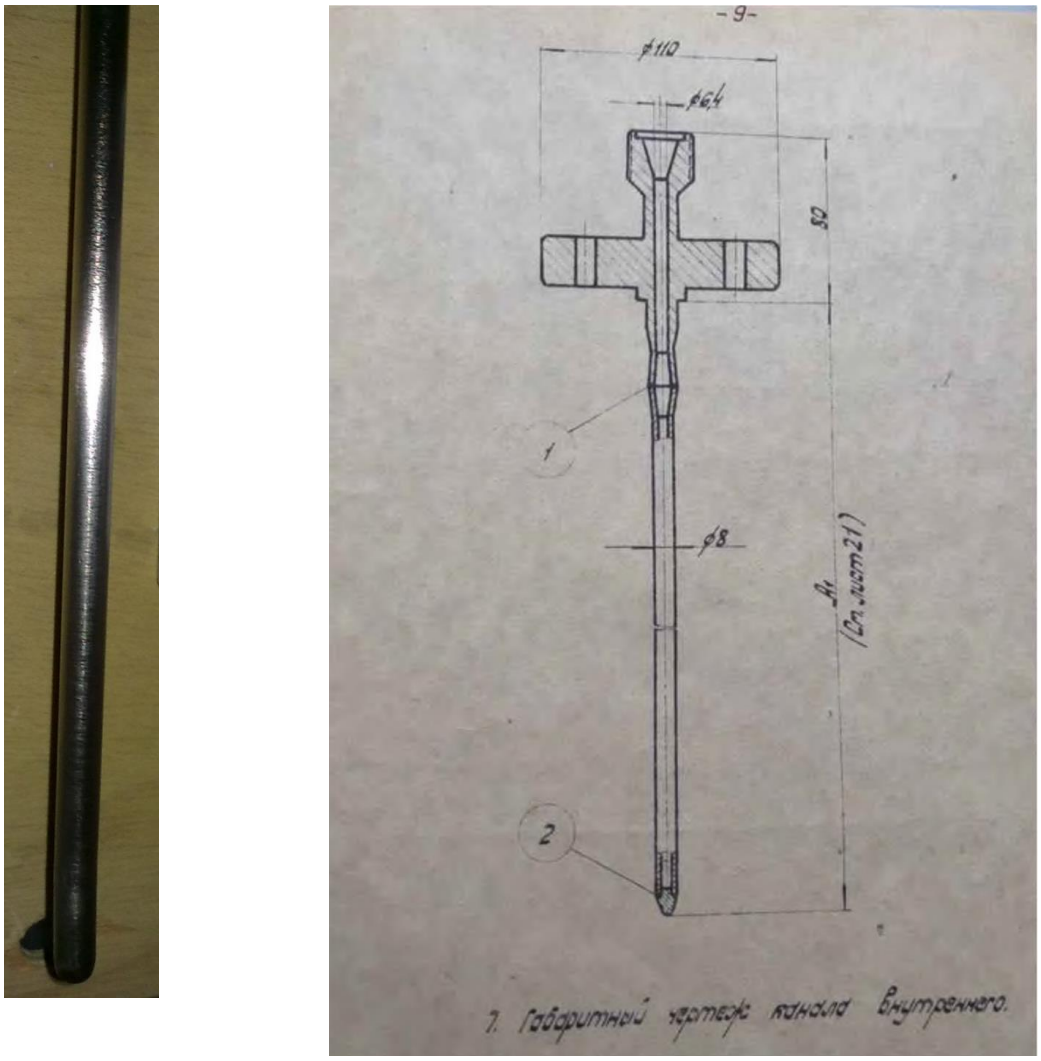


Figure 5 – Neutron flux measurement channel