

# Neutron separator

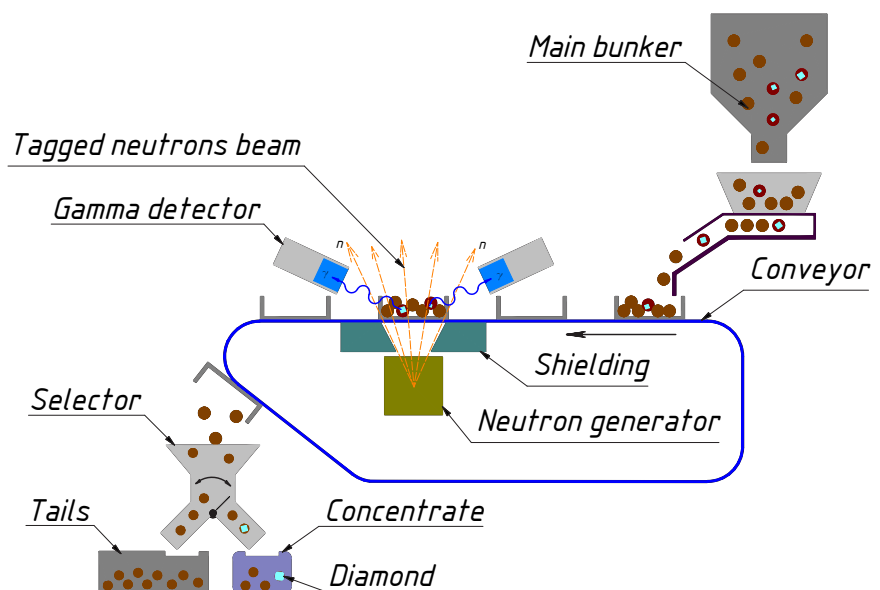
for dry enrichment  
of kimberlite ore

On the basis  
of Tagged Neutron Method

## Operating principle

- Tagged Neutron Method allows detecting a diamond in kimberlite ore without ore destruction. Rock is irradiated with fast 14 MeV neutrons from reaction.
- Carbon distribution in the rock is analyzed by 4.44 MeV gamma-line.
- Sign of the diamond is detection of local carbon excess.

## Workflow





## Application features

- Allows diamond detection inside kimberlite ore with 10:1 ore-to-diamond ratio.
- Detects coated and low-luminescent diamonds.

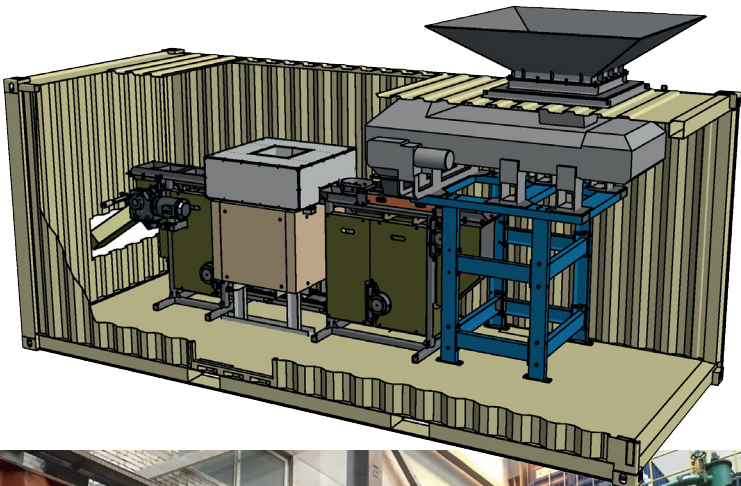


## Approbation

- Diamonds have been detected in kimberlite ore samples of 200-300 mm size (V.Alexakhin et al., Detection of Diamonds in Kimberlite by the Tagged Neutron Method, Nuclear Instruments and Methods A785 (2015) 9).
- The separator was tested at enrichment factory of Lomonosov Mine of PJSC Severalmaz (Archangelsk).

## Specifications

Neutron source	Neutron generator with built-in alpha-detector
Neutron energy	14 MeV
Neutron beam intensity	$1 \times 10^8$ n/s
Number of tagged neutron beams	256
Gamma-ray detection system	44 BGO gamma-detectors
Power source	AC 220 V
Power consumption	Less than 3 kW



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