

Complex (KPC) from the ore of Jeroy-Sardaria deposit according to "dry" enrichment technology.

The lower limit of the specific alpha-activity of solid radioactive wastes (7400Bq/kg) specified in the Article 16.4. of "Sanitary Codes and Regulations of radiation safety № 029-94" (SanCR№029-94) was taken as a criterion of radioactivity of materials.

Besides, the similar evaluation was made for the phosphorus fertilizers manufactured of these products.

It was estimated that the average values of a total alpha-activity of radionuclides in phosphorite flour and roasted phosphorite concentrate by 15% less than the lower limit specified in SanCR№029-94. The average values of a total alpha-activity of radionuclides in fertilizers such as superphosphate, uniform phosphorus-nitrogen fertilizer (UPNF), ammophos and dibasic ammonium phosphate are respectively by 3.3, 2.1, 8.7 and 9.2 times lower than accepted threshold.

Thus the results of the investigations showed that phosphorite flour and roasted phosphorite concentrate currently produced at KPC as well as phosphorus fertilizers made of them were favorable in radiation-ecological aspects.

The further investigations are expected to evaluate and forecast activity of the natural radionuclides in higher grade washed phosphorite concentrate that will be manufactured at KPC in 2001-2002 when washing installation is put into operation.



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## **SOFTWARE-PROGRAMMABLE COMPLEX FOR A TRUCK BY TRUCK X-RAY-RADIOMETRIC SORTING GOLD SULFIDE ORE OF KOKPATAS DEPOSIT**

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In the second quarter of 2001 at the Ore Control Automobile Station (OCAS), Kokpatas Deposit, Northern Mining Administration, the Software Programmable Complex for a Truck by Truck X-Ray-Radiometric Sorting of Gold Sulfide Ore was put into operation. The Complex was developed by the specialists of INTEGRA Group Company together with the specialists of Navoi Mining & Metallurgy Enterprise.

In term of technicality the Complex represents a system including the following basic components: X-Ray-Measuring System; Detectors System to control a truck arrival in or departure from measuring area; Annunciation Panel permitting truck departure; Panel displaying the grade of the analyzed ore; Controllers for measuring and executive systems; Operator Workstation.

Taking into account the experience of the previous model operation the following advantages were introduced: remote-controlled power supply unit for X-ray Generator allowing the BKh-10 X-ray Tube working in a pulsed standby mode. Owing to introducing two additional detectors (detectors to control arrival in or departure from a measuring area) in an automatic control system the time of high voltage supply to the tube was reduced to a minimum. Actually the X-ray generator turns on only at the moment when the truck goes through OCAS and at the time of the system setting up.

To increase sampling sensitivity and representativeness the new spectrometric units were developed based on SRPO-309 X-ray proportional detector and used in the Complex. It

allows the Complex sensitivity increasing up to 5000-6000 impulse/sec per 1% As and decreasing a lower detection limit to 0.01%As without X-ray generator switching on a high voltage mode of operation. At that, the width of the uniform sampling band was by 1.4 -1.7 as large as the band width of the similar units.

Operational reliability of the system was raised five-fold owing to use of X-ray generator together with a detection block based on SRPO -309 as well as application of «gamma-screen» new algorithm which makes it possible by 10 times decrease quantity of trucks could not be measured due to irregularly distributed ore load in there.

From the software point of view the Complex represents a "Client-Server" two-level distribution system where Server is a computer (Operator Workstation) and Client is a set of controllers of X-ray - measuring system. Such distribution makes it possible to significantly increase the quantity of measuring systems served by a single operator and simplify the process of their setting and operation. As a whole, the software includes the following components: OIU (5720.exe, program for controller; tgen.exe, program for controller for X-ray generator block; RKS\_\_integra.exe, program for Workstation Operator.

Interacting between measuring equipment and themselves the programs provide the following functions: information gathering from the detection blocks and detectors recording a truck arrival in/departure from the measuring area as well as determination of the sampled ore grade; X-ray generator conditions control and monitoring for the purposes of automated turning on/off of X-ray generators ensuring the most efficient mode of their operation. Operator Workstation software is responsible for initial setting; checking the proper work of the equipment according to the results of recurring calibrations; manual/automatic mode switching; database support based on results of sorting, calibration and setting.

Usage of new electronic and computer aided technologies as a complex made it possible to raise the level of automation of routine measuring processes. The system reliability is increased significantly owing to its protection from improper staff actions. The protection is based on the users recording system and user authorities distribution according to their status (operator, shift engineer, administrator). Now the user having a lower status is not able to enter any command critically affecting the sorting process or the system efficiency.

The listed features allow efficient operation of the Complex and ensure reliable sorting the transported ore according to the gold ore grade.



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## PREPARATION OF CARRIER-FREE $^{111m}\text{Cd}$

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Study of  $^{111}\text{In}$  complexes with organic ligands by perturbed angular  $\gamma\gamma$ -correlation (PAC) technique [1] and peculiarities of  $^{111}\text{In}$  decay [2] lead to a necessity of investigating analogous complexes with the daughter isotope,  $^{111}\text{Cd}$ . There is a PAC isotope  $^{111m}\text{Cd}$  with half-life 48.3 min, which emits two successive  $\gamma$ -rays, 150 and 245 keV. This  $\gamma\gamma$ -cascade, used for PAC measurements, proceeds via the same intermediate level as the 172-245 keV cascade