

ID#17 New Security system for Irradiation Facility at the Vinča Institute, Belgrade - Serbia (second phase)



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1. Introduction

Gamma radiation is used for a variety of products: syringes, surgical gloves, gowns, masks, adhesive patches, dressings, 'tetrapacks', pacifiers for premature babies, artificial joints, food packaging, raw materials for pharmaceuticals and cosmetics, and even wine. The gamma plugs are sterilized.

Radiation Unit at Vinca Institute of Nuclear Sciences has operated since 1978. The facility core is cobalt-60 gamma irradiator with wet storage working in batch mode. Services are mainly provided for industry (sterilization of medical products, irradiation of food), and for scientific research in Institute. Current activity of source is around 90 kCi Facility is designed for the maximum value of 1MCI

Access to the control room and the source is enabled only by setting up the palm vein scanner at the entrance to the control room.



Palm vein scanner

The new security system provides video surveillance of the entire plant. Also, a new alarm station was created. All of these systems are connected and monitored 24 hours a day at the central alarm station located in a separate location within the Institute.



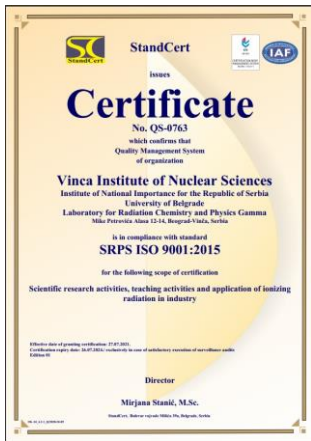
Photo of the Irradiation Facility



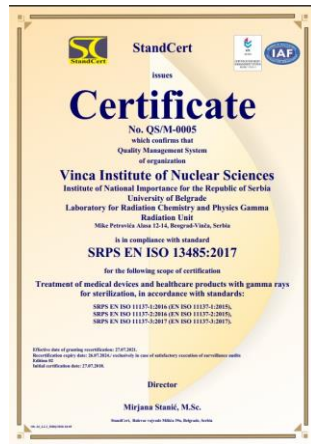
3D view of the source bunker



Video surveillance



ISO 9001:2015



ISO 13485:2017 in accordance with ISO 11137 - 1,2,3

3. II Phase

In the second phase of the project, which started last year, the main task was the introduction of a new central alarm station within the Institute, as well as connecting individual facilities with this station. Facilities containing radioactive or nuclear material will be connected to the new central alarm station.

During and outside working hours, the detection of unauthorized access is provided through constant surveillance by trained staff equipped with mobile phones and video surveillance at the Vinca Institute.

Outside working hours, sensor alarms are transmitted to the central alarm station of the Vinca Institute, which is under the jurisdiction of FTO and PPZ workers. An FTO and PPZ worker in the central alarm station (CAS 2) determines the presence of an unauthorized person by observation using a video surveillance system.

2. I Phase

The technical radiation safety system in the Irradiation facility for industrial sterilization and product conservation at the Vinča Institute has been implemented in accordance with the highest standards of radiation safety: IAEA Safety Standards No. 107 and ANSI-N43.10-1984.

It includes several interconnected switches, detectors, sensors, measuring converters and ionizing radiation monitors.

In 2016, the establishment of a new innovative safety system at the Radiation Unit began, in cooperation with the International Atomic Energy Agency (IAEA) and the Department of Energy USA (DOE).

In the first phase, two stationary radiation monitors used with ionizing chambers have been replaced by a network monitoring system with four modern reliable monitors, used to measure the level of radiation in the irradiation cell, near the technological passageway to the cabin, in the tank with demineralized water and in the warehouse room.



New central alarm station



Radiation monitors

Conclusions

Risks associated with the use of radioactive materials are numerous. Legislation in Serbia strictly prescribes the conditions of use of radioactive material in order to protect the exposed personnel, the population, and the environment. There is also a threat of nuclear terrorism in all plants with radioactive sources. Therefore, in 2016, in the Irradiation Facility of the Vinca Institute, a new security system was established, in cooperation with International Atomic Energy Agency (IAEA), Department of Energy USA, (DOE) and Vinca Institute.

In the second phase of the project, which began in 2021, a new central alarm station was introduced within the Institute, and individual facilities are connected to this station. In this paper, a detailed overview of the new innovative security system is presented.