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# U.S. Assistance in Physical Protection at The Kharkov Institute of Physics and Technology and The Sevastopol Institute of Nuclear Energy and Industry, Ukraine

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**Abstract**

The U.S. DOE is providing nuclear material safeguards assistance in both material control & accountability and physical protection to several nuclear facilities in Ukraine. This paper describes the types of physical protection upgrades that are presently being implemented at the Kharkov Institute of Physics and Technology and at the Sevastopol Institute of Nuclear Energy and Industry. These upgrades include: hardening of storage areas, improvements in access control, intrusion detection, CCTV assessment, alarm monitoring and voice communication systems. Methods used to implement these upgrades and problems encountered are discussed.

## Introduction

The work described in this paper is part of the U.S. Department of Energy's (DOE's) cooperative effort with the Ukrainian Government in the area of Nuclear Materials Protection, Control and Accounting (MPC&A). Funds for this program have been provided by the U. S. Department of Defense through the Cooperative Threat Reduction (CTR) initiative and by DOE to enhance the security of weapons-useable nuclear material at civilian facilities in Ukraine.

The U.S. DOE is providing nuclear material safeguards assistance in both material control & accountability (MC&A) and physical protection (PP) to the national regulatory authority and to four facilities in Ukraine. This paper discusses the assistance in physical protection being provided to the Kharkov Institute of Physics and Technology (KIPT) and the Sevastopol Institute of Nuclear Energy and Industry (SINEI). A general description of the program was published in the Proceedings of the 36th Annual Meeting[3] and the Proceedings of the 37th Annual Meeting.[4]

KIPT consists of two separate sites. One site, designated the "old site," is within the city of Kharkov. The second site, designated the "new site," is approximately 10 kilometers northwest of the city. There are no nuclear reactors or critical assemblies at KIPT. However, for many years a great deal of research and development work was done in the area of nuclear technology. Although this work has ceased, much of the bulk nuclear material remains in storage, primarily at the new site, in various physical and chemical states and isotopic enrichments.

A 200-kW research reactor, designated the IR-200, is located in the northern part of the city of Sevastopol. This reactor was part of the Sevastopol Naval Institute. It was used for basic research in material science and for training navy submariners. Operation ceased in 1994. In the fall of 1996, the Naval Institute was divided into two parts. One part, which contains the reactor facility, was named the Sevastopol Institute for Nuclear Energy and Industry. This Institute is administered by the Ukrainian State Committee on Nuclear Power Utilization (Derzhcomatom) and will be used as a training facility for nuclear power plant personnel.

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## Methodology

Providing technical assistance to each facility in the area of physical protection is being accomplished by a three-step process: site survey, system design, and implementation.

The first step in determining the type of technical assistance needed in the area of physical protection is a site survey of relevant areas of the facility. This PP survey is performed by a team composed of two physical protection experts from the National Laboratories, the DOE Program Manager and a translator. It is usually performed in conjunction with a MC&A survey. The team meets with the facility's administration and division managers, listens to their needs and requests, and then performs a survey of the existing physical protection capabilities. A report is prepared containing the survey team's observations and recommendations to upgrade the capabilities to IAEA and local regulatory guidelines. This report is then translated and copies are sent to the facility and to the Ministry of Environmental and Nuclear Safety (MEPNS). When accepted by both the facility and regulatory authority, the report's recommendations form the basis of the assistance to be provided.

The site survey for KIPT was performed in June, 1995. The report was submitted to DOE in August, was translated and then delivered to Ukraine. It was accepted and approved by MEPNS and KIPT in October, 1995. The site survey for SINEI was performed in May, 1996. The report was submitted to DOE in July. It was accepted and approved by MEPNS, Derzhcomatom and SINEI in October, 1996.

The second step, system design, was performed jointly by Ukrainian and U.S. personnel. In the case of KIPT, Argonne engineers worked directly with facility personnel. KIPT staff prepared the design and drawings necessary to perform the needed structural upgrades, HVAC system modifications and routing of utilities. U.S. personnel specified the type of equipment to be provided and prepared drawings showing the recommended location of the equipment. Both sides reviewed and commented on the designs.

The approach used at SINEI is slightly different. SINEI does not currently have the appropriate staff to participate in the PP design. Therefore, U.S. personnel work directly with the staff of the Physical Protection Department of Derzhcomatom, located in Kiev, to develop the system design for the IR-200 reactor facility.

The system designs are based on international physical protection guidelines. The IAEA's information circular, INFCIRC/225/Revision 3, *The Physical Protection of Nuclear Material*, is being used as the basis for determining the adequacy of the existing physical protection systems and the design of the upgraded systems.

Implementation of the upgrades is being accomplished through contracts with U.S. companies, Ukrainian companies and directly with the Institutes. All of the major equipment used in the upgrades is purchased from U.S. companies. Upgrades involving direct modifications to the facility are accomplished through direct contracts with the Institute or with local companies recommended by the Institutes. Much of the equipment installation is being performed by Institute personnel under the supervision of appropriate U.S. company personnel.

## Physical Protection Upgrades

The designs prepared for each facility include upgrades in the areas of physical barriers, voice communication, intrusion detection and assessment, access control and alarm monitoring. One of the first upgrades being implemented at the two sites is to physically harden the storage areas. Walls are hardened (rebuilt if necessary), windows removed, and doors replaced. In addition, a modular vault, designed and fabricated by Sandia National Laboratories, has been provided for each facility. Figure 1 shows the vault that was installed by Sandia engineers at KIPT last year. A modular vault has also been shipped to SINEI, and will be installed after it is released from Customs and site preparations are complete. Individual laboratories in which work with nuclear material is performed are also being upgraded. Wooden doors are being replaced with metal doors that not only offer more security, but also are fire-rated. Windows are being barred to eliminate the possibility of unauthorized entry and to reduce the potential for insiders to remove material.

Figure 1. Photograph of KIPT Modular Vault.

During the site surveys, it was noted that the primary means of voice communication provided for the guard force was the public telephone system. One of the sites also had an intercom system for limited on-site communication. Neither site was equipped with a radio system. A Motorola radio system composed of hand-held portable radios, vehicle radios, and base stations have been procured for each site. The equipment for KIPT was purchased in the U.S. and shipped to Ukraine. It arrived at the Kharkov Customs office in early March and will be installed shortly. The equipment for SINEI was purchased from an Ukrainian Motorola dealer and is scheduled to be delivered in August. Appropriate training in the operation and maintenance of the equipment will be provided for the guard force at each facility.

As observed at many similar FSU facilities, existing intrusion detection systems at KIPT and SINEI are based on 1960's technology. For example, many of the electronic components, such as CCTV cameras, still used vacuum tubes. Spare parts for these systems are either no longer available or the facilities do not have the funds to purchase them if they are available. Both the interior and exterior intrusion

detection systems at both facilities are being upgraded. Interior volumetric and surface penetration sensors are being provided for the storage areas and those laboratories where nuclear material is being used or processed. Interior CCTV cameras are also being provided for assessment and surveillance purposes. The exterior systems are also being upgraded with new sensors and cameras. Japan and Sweden are coordinating the effort to upgrade the KIPT perimeter system. Upgrade of the SINEI perimeter system is being performed by Sandia National Laboratories.

The access control system at both facilities is also being upgraded. Both portable and walk-thru metal detectors and radiation monitors are being provided. An electronic access control system using magnetic stripe and/or proximity card is being implemented at each facility. New badge imaging systems are also being provided. The two-person rule has been implemented for access to Category I storage areas.

The Central Alarm Station at each facility is being upgraded with an integrated alarm monitoring, access control, and automated CCTV assessment system. These systems are being provided by Advantor Corporation. A simplified block diagram of a typical system is shown in Figure 2.

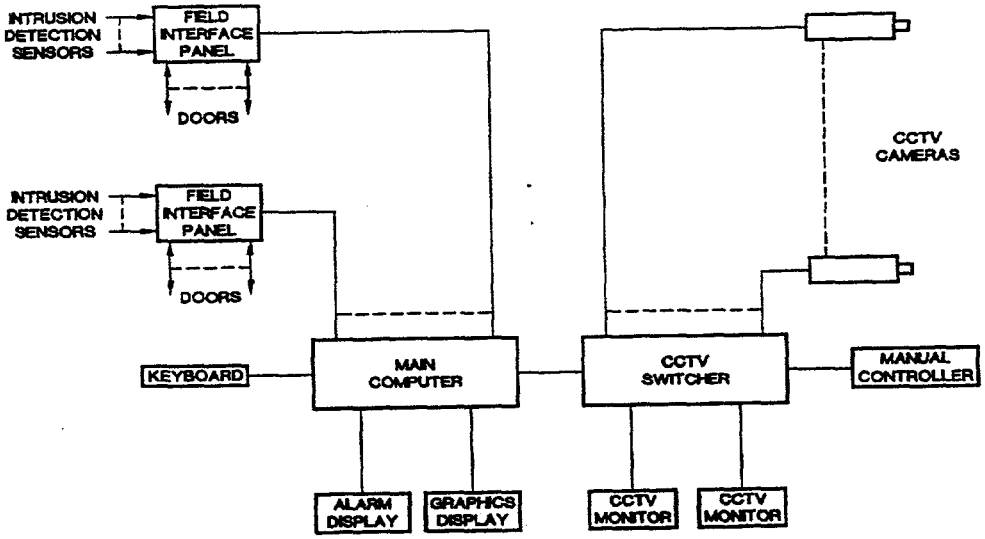


Figure 2. Simplified Block Diagram of Alarm Monitoring, Access Control and CCTV Assessment System

**Summary**

Major upgrades in physical protection for both the KIPT and SINEI facilities are well underway. Site surveys and much of the design work have been completed. Procurement, shipment, and installation of equipment are progressing. Ukrainian staff at each facility have been very cooperative during all of our visits and seem genuinely grateful for the assistance being provided.

The major problems to-date have been due to difficulties in adhering to the bureaucratic strictures present in intergovernmental activities. These difficulties are augmented by the changing regulatory environment under which the program must operate. Delays in shipment and Customs clearance of equipment can result in stalled projects and in inefficient use of resources that would be better applied to improving the safeguards systems at the facilities.

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**References**

[1]Argonne National Laboratory

[2]U.S. DOE/NN-40

[3]Kuzmycz, G., et.al., "The U.S. Program of Technical Assistance in Nuclear Safeguards to Ukraine," Proceedings from the 36th Annual Meeting of INMM at Palm Desert, California, July 9-12, 1995.

[4]Zelensky, V.F. and Mikhailov, V.A., "Cooperative Efforts to Improve Nuclear Materials Accounting, Control and Physical Protection at the National Science Center Kharkov Institute of Physics and Technology," Proceedings from the 37th Annual Meeting of INMM at Naples, Florida, July 28 - August 1, 1996.

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