FINAL REPORT on TASK 003 (item 3.4)
of SUBCONTRACT 625UU0005-35
with the USA Los Alamos National Laboratory

"Test and Evaluation of Item Control Technology"

For the period at the IPPE's BFS facility (Obninsk, Russia) the followings work was carried out on the Task 003 of the subcontract 625UU005-35 with the USA Los Alamos National Laboratory:

1. Methods and concepts of Item Control Technology having in LANL and SNL were examined, review report on the problem was prepared.

2. The BFS plutonium and highly enriched uranium disks in the form of metal and dioxide are nuclear materials accounting items. Total number of such items at the BFS facility is approximately equal to 70.000.

2.1. The BFS item control identification is carried out taking into account following indications:

- mark made on a disk stainless steel cladding;
- individual manufacturer's number made on disk cladding (and disk core);
- reaction of IDEM device identifying nuclear materials type;
- passport weight characteristics (in the KMP's in nuclear materials vault and BFS-1 and BFS-2 facilities electronic balance of PM-600 type are installed, delivered from LANL and user for disks weighing in the case of PIT);
- isotopic composition measurements by U-Pu Inspector (delivered from LANL) and nuclear material NDA mass measurements by Coincidence Counter (delivered from LANL).

2.2. After studying and testing of different methods and technologies of putting marks on nuclear material item dummies (satisfying the requirements of their using in the BFS cores), it was decided, together with USA Oak Ridge national Laboratory specialist, that such marks will be placed on item cladding axial surface. As marks with information on nuclear material type and manufacturer number, bar codes used after preliminary putting thin layer of aluminum oxide on a mark place. The job of placing bar codes on test batch of 50 items according to the chosen

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

technology is planned to be done by the end of 1995. Further, under condition of getting of positive results it is assumed to build, together with ORNL specialists, automatic line for bar codes placing on all material items.

2.3. To provide nuclear items control and safeguards:

-paper and vinyl seals are used to seal doors, hatches providing access to "stone sack", i.e. to zones of nuclear material storage, transportation and workmanship with, and also to seal transport containers and temporary storage of canisters with nuclear material items in the BFS-1 and BFS-2 facilities rooms;

-by contract with SNL the design of plug-seals was elaborated to seal BFS core tubes and canister with nuclear material disks; tests of small batch were carried out, design was elaborated and test batch of special tools was manufactured for seals of paper (or A-foil) installation on plug-seal, and plungers were manufactured to load plug-seals into core tubes and canisters of chosen depth allowing to carry out operations on their relocation without seals damage; batch of 230 plug-seal was manufactured with which plutonium BFS-1 core (200 tubes) and canisters with plutonium and "thin" uranium dioxide disks in the nuclear materials vault (30 canisters) were sealed;

-4 TV cameras were installed in one room of the nuclear material vault and 2 more cameras were installed in the BFS-1 facility hall; cabling was made (including fiber optic) from TV cameras to the digital data storage and processing computer; TV system test was carried out on the subject of one canister removal from a row of canister in the nuclear material vault and one BFS-1 core fuel tube removal, which showed the ability of the TV system to detect such events. Task for future is to put under TV system control of 2 more nuclear material vault rooms and the BFS-2 facility hall. Besides, the task is put into agenda to investigate the possibility of using such TV system for recording plug-seals tampering with which are used for core tubes sealing.

2.4. At the BFS facility computerized access control system was put into test run to control personnel access into zones of nuclear material storage, transportation and workmanship with, and also computerized system of TV control of entrance doors into the BFS-1 and BFS-2 facility halls, nuclear material storage and into two cabin traps giving access to the "stone sack".

2.5. For weighing process automation using electronic balance PM-600 and upgrading of weight measurements accuracy, the regime of the balance connection to computers-clients in the three KMP's was introduced.

2.6. Preliminary agreement with SNL exits on carrying out of the BFS facility of fiber optics "blanket" test run with the aim of detection of any attempts of canisters or core tubes removal after putting the "blanket" into permanent regime of nuclear material safeguards.

2.7. Number of manufactured by contract AP-9474 with SNL plug-seals (230 seals) is evidently too small to seal all core fuel tubes of the BFS-1 and BFS-2 cores and canisters with nuclear material disks in the storage. We need to have about 3000 such plug-seals, and it calls for an additional contract for their manufacturing.

V.Dvukhsherstnov.

M98005295

Report Number (14) LA-SUB--96-58

Publ. Date (11) 1998 03

Sponsor Code (18) DOE/DP, XF

JC Category (19) UC-700, DOE/ER

19980706 029

DOE