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The Experience of Cooperation with IAEA new approach for Spent Fuel Transfer Campaign at CANDU Reactors

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1. Introduction

It was agreed that both of the Republic Of Korea (ROK) and the International Atomic Energy Agency (IAEA) cooperate with the new approach using the Unattended Monitoring Systems (UMS), the mailbox declaration and the short notice inspections, which can decrease the agency inspection efforts and operator's burden. As a result of the positive cooperation of ROK for applying new approach, the IAEA could accomplish a successful implementation of new safeguards approach during last transfer campaigns at Wolsung site.

As of the end of Feb. 2007, the IAEA installed the UMS at Wolsung units 2, 3 and 4. The transfer campaigns at Wolsung units 2 and 4 are performing from April, 2007. The IAEA will install the UMS at Wolsung unit 1 by the end of 2007. Then agency will inspect all of transfer campaign at Wolsung units by using new approach with UMS, mailbox declaration and SNI. It is based on the SSAC full cooperation with IAEA to meet agency safeguards goals.

2. IAEA New Safeguards Approach for Transfer Campaign

When the new approach is applied, the agency safeguards measures to be performed during transfer campaign at Wolsung site are as followed.

2.1 Containment and Surveillance Equipments

New system substituted for the inspector's presence during the transfer campaign periods by unattended system of camera surveillance, radiation monitoring and remote monitoring. The verification of operation of underwater cameras and neutron & gamma detectors, and installation of All In one Surveillance unit (ALIS) camera and All In one surveillance Potable battery unit (ALIP) camera must be carry out by IAEA inspector before transfer campaign. Two underwater cameras, neutron & gamma detectors and one ALIS camera were installed in the spent fuel pond area. The Mobile Unit Neutron Detector (MUND) was installed on the transport flask, and an ALIP camera was installed on the transport truck, respectively. At the extension building, there are one ALIS camera and one Digital Multi-camera Optical Surveillance (DMOS) camera.
The Silo Entry Gamma Monitor detectors (SEGM) were installed at four empty canisters, and two ALIS cameras were installed at the dry storage canister area. Figure 1 shows location of the IAEA new system installed at spent fuel transfer.

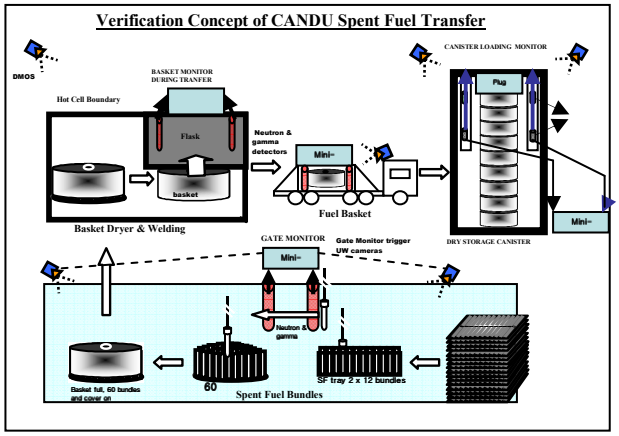

Figure 1. Diagram of IAEA new system

2.2 Mailbox Declaration

The mailbox arrangement between the ROK and the IAEA include providing detailed information on the spent fuel bundles to be transferred, the storage location where they are taken from, the dry storage container into which they are loaded and the time sequence of the operational steps involved. The mailbox declaration data is updated on daily base by the national inspector. The mailbox declaration data is sent to IAEA headquarters by secure e-mail at Korea Institute of Nuclear non-proliferation And Control (KINAC) office in Wolsung plants 1 and 2, respectively.

Table 1. Mailbox Contents for Transfer Campaign

Doc. #	Content	Frequency / Timing
1	- Start plan of new canister - Plan of Canister welding - Basket transfer of next week	- Every week / 7 days advance - At least 48 hours advance - Every week / Thursday
2	Activity of basket loading	Every day / within 24 hours after finish
3	Activity of canister welding	Within 24 hours after finish

From the IAEA headquarters, the IAEA inspector will access the declaration through secure VPN wherever the location where the inspector is, in particular at the IAEA office, in Gyeongju. The content

and timing of mailbox declared by the national inspector are defined in Table 1.

Among the above table, the national inspector who conducts the inspection for the transfer campaign, prepares document 2 for the daily activity and reviews documents 1 and 3 which were prepared by the operator. Then all of these documents are sent to the IAEA headquarters through the mailbox system by the national inspector.

2.3 Short Notice Inspection

During the transfer campaign with the UMS, an IAEA inspector is assigned for transfer campaign verification on one or two units.

In Gyeongju area, the IAEA inspector reviews remote monitoring data from the facilities and the mailbox declaration provided by the national inspector. The inspector performs Short Notice Inspections (SNI) to confirm that transfers being conducted as declared and confirm the mailbox declaration on selected periods during the transfer campaign at selected strategic points of the transfer process. For SNI, the IAEA inspector should be able to access to strategic point within 2 hours after the advanced notice is submitted to the operator.

Baskets subject to verification is chosen with 20% selection probability from the entire number of baskets planned to transfer during the campaign period.

During 11 weeks transfer campaign period of last year, IAEA inspectors performed 17 SNIs for Wolsung unit 2 and 16 SNIs for unit 4, respectively.

3. Conclusion

The last transfer campaign with UMS at Wolsung units 2 and 4 was successfully finished without any other special problems. The implementation of enhanced cooperation based on the UMS, mailbox declaration and SNI considerably reduced the IAEA's inspection effort for transfer campaign of units 2 and 4. The IAEA saved about 60 Person Day of Inspections (PDI) during the last transfer campaign period (From 1 Sep. to 1 Dec. 2006) at Wolsung units 2 and 4.

The new scheme should also ensure that IAEA can complete all verification activities required between the spent fuel pond and dry storage canister area without delays in the operator's schedule. But, the operator has another burden ie, support for movement of SEGM, document work for the entrance and radiation work permission of the IAEA inspector and the preparation of Mailbox declaration. In case of State System of Accounting for and Control of nuclear material (SSAC), there is no benefit and the national inspector additionally has another responsibility to declare the transfer information to the IAEA.

In difference with the IAEA, the national inspection system for the transfer campaign was not changed. Therefore, it is advisable to note that the consideration and development of enhanced system for the national inspection under Integrated Safeguards should be discussed and established in the near future.

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