2010 Status of Uranium Conversion Plant Decommissioning Project

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1. Introduction

The Uranium Conversion Plant (UCP) was used to manufacture 100 tons of UO_2 powder for the Wolsong-1 CANDU reactor. The conversion plant has been shut down and minimally maintained for the prevention of a contamination by a deterioration of the equipment. The conversion plant has building area of 2916 m2 and two main conversion processes. ADU (Ammonium Di-Uranate) and AUC (Ammonium Uranyl Carbonate) process are installed in the backside and the front side of the building, respectively. Conversion plant has two lagoons, which is to store all wastes generated from the plant operation. Sludge wastes stored 150m3 and 100m3 in Lagoon 1 and 2, respectively. Main compounds of sludge are ammonium nitrate, sodium nitrate, calcium nitrate, and calcium carbonate. In 2000, the decommissioning of the plant was finally decided upon and a decommissioning program was launched to complete by 2010. In the middle of 2004, decommissioning program obtained the approval of regulatory body and decommissioning activities started. The scope of the project includes the removal of all equipment and the release of the building for re-use. The project is scheduled to be completed at the end of 2010 with a total budget of ₩10.9 billion.

This paper introduced briefly decommissioning activities in the first half year of 2010.

2. Status of Decommissioning Project

The final goal of the project includes the removal of all equipment and the release of the building for re-use. The project scopes are to dismantle all the equipment, decontaminate of the dismantled metal waste, decontaminate the building inside, to treat the lagoon sludge waste, decontaminate the lagoon structure, and perform the final survey of the building and the site. General methodologies for the dismantling work include; disconnecting pipes, cables, etc, dismantling equipment, cutting components into small pieces, classifying pieces for decontamination or packaging, decontaminating floors and walls, completion of the final survey.

The decommissioning work that has been performed until now is as follows. All of the process systems and steel structure in the plant had been dismantled. The steel structure and the waste treatment facilities such as lagoon sludge waste treatment facility and melting decontamination equipment in the AUC process region has been dismantled.

Fig.1. Before and after dismantling of lagoon sludge waste treatment facility

Fig.2. Before and after dismantling of the steel structure in the AUC process region

There is a strong emphasis on decontamination of materials for re-use. The metal waste was decontaminated by a chemical decontamination with ultrasonic for the stainless steel and melting for the carbon steel. The stainless steel waste was decontaminated by chemical decontaminator with ultrasonic and steam cleaner for washing. The releasable waste was 53 tons. The carbon steel waste was decontaminated by melting with induction melting. The releasable waste was 76 tons.

Concrete inside the building was decontaminated by using a grinder, breaker, scabbler, and mini-excavator. The concrete in the building has been decontaminated. And the final survey of the building and the site perform has been surveyed now.

Fig.3. Concrete decontamination of the plant

The major compounds of lagoon sludge waste were ammonium nitrate, sodium nitrate, calcium nitrate, and calcium carbonate, and natural uranium of 1 wt%. The sludge waste from the lagoon was treated using a thermal denitration process. The process consisted of sludge transportation, filtration, thermal denitration, off-gas treatment, and final solid waste package. The lagoon sludge waste of 300 tons was treated completely. This process reduced the sludge volume by 70%. The lagoon structure was coated with rubber but this had hardened. Some hardened rubber was taken off by torch and the rest was decontaminated by grinder. The lagoon was remodeled for use as an interim waste storage facility. This will be demolished after disposing of the radioactive waste.

Fig.4. View of lagoon before and after sludge waste treatment

Fig.5. View of lagoon remodeled for use as an interim waste storage facility

3. Summary

All the facilities in the plant have been dismantled. Dismantled stainless steel waste was decontaminated by a chemical decontamination with ultrasonic and 53 ton was released. Carbon steel was decontaminated by a melting and 76 ton was released. And the final survey of the building and the site perform has been surveyed now. Lagoon sludge waste had been treated and the final solid waste after treatment is a stable compound for storage. Volume of the lagoon sludge waste could be decreased by over 70 %. The lagoon was remodeled for use as an interim waste storage facility. This will be demolished after disposing of the radioactive waste.