

2009 Status of Uranium Conversion Plant Decommissioning

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KAERI (Korea Atomic Energy Research Institute) constructed a pilot plant for the uranium conversion process for the development of the technologies and the localization of nuclear fuels for HWR (heavy water reactor) in 1982. The final product of the plant was a UO₂ powder of ceramic grade for HWR and its capacity was 100 ton-U/year. After that, a part of the AUC (Ammonium Uranyl Carbonate) process was added and the process was improved for automatic operation. 320 tons of UO₂ powder was produced and supplied to the fabrication plant at KAERI for the fuel of the Wolsong-1 CANDU (Canadian deuterium uranium) reactor. The conversion plant has building area of 2916 m² and two main conversion processes. ADU (Ammonium Di-Uranate) and AUC 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 300 ton in Lagoon 1 and 2. Main compounds of sludge are ammonium nitrate, sodium nitrate, calcium nitrate, and calcium carbonate. In early 1992, it was determined that the plant operation would be stopped due to a much higher production cost than that of the international market. The conversion plant has been shutdown and minimally maintained for the prevention of contamination by deterioration of the equipment and the lagoon. In 2000, the decommissioning of the plant was finally decided upon and a decommissioning program was launched to complete the following tasks by 2010: planning and assessment of the environmental impact; dismantling of the facilities, decontamination of the dismantled metal waste to release; decontamination of the building for unrestricted reuse, removal of the contaminated soil, the treatment of the sludge and the decontamination of the lagoon structure, and final survey for the site release. In the middle of 2004, decommissioning program obtained the approval of regulatory body and decommissioning activities started.

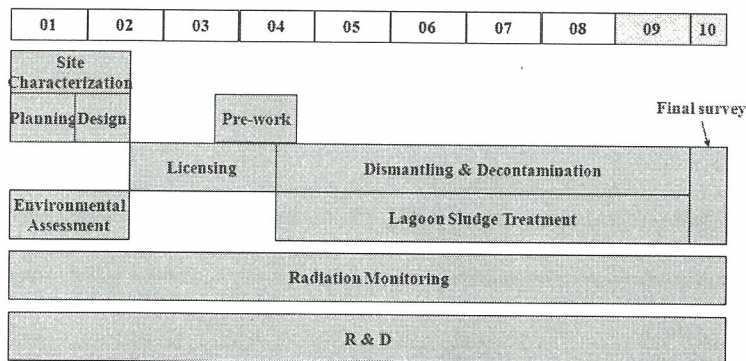


Figure 1. Project schedule

This paper introduced briefly decommissioning activities in the first half year of 2009. Dismantling started first from the reuse area such as temporary waste storage and the decontamination and lagoon sludge treatment. And then, we dismantle in the order of the most remote room from the waste treatment area. Order of dismantling work is as follows: disconnecting of pipe and electric wire, separation of the equipment, cutting into small pieces, grouping of the dismantled pieces for decontamination or packing, decontamination

of floor and wall, and measurement of remained contaminants.

Now, all of the process systems have been dismantled. Ventilation system was re-installed another room in the building, which will be used for an other facility hereafter. The sectional region (ADU process area) of the building was decontaminated and the final survey of this region was performed. ADU process area will be used with pyroprocess integrated demonstration facility. There were three sump pump pits in the UCP. Investigation of the soil under the pump revealed contamination to a depth of about 4 meters. This soil is been removing for storage. There is a strong emphasis on decontamination of materials for re-use. Stainless steel of 53 tons is decontaminated using a chemical/ultrasonic process while carbon steel of 48 tons was decontaminated through a melting process.

The sludge from the lagoons is treated using a heat drying process. The off gasses are processed and filtered. Lagoon sludge waste of 300 tons was treated completely. This process has reduced the sludge volume by 70%. Lagoon structure was coated by lubber but this was hardened. Some hardened rubber was off by torch and the rest was decontaminated by grinder.

To date, 400 tons of radioactive waste has been generated. 113 tons of material has been released.

Table 1. Amount of radioactive and releasable waste

Classification	Radioactive, ton	Releasable, ton
Metal	52.3	109.2
Concrete	150.5	3.7
Combustibles	7.9	-
Incombustibles	156.4	-
Lagoon sludge	32.8	-
Total Weight	399.9	112.9
No. of Drum	1,739	-