Mobile Treatment System of Radioactive Cable Waste

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1. Introduction

Among the world's nuclear power plants, 166 nuclear power plants are subject to dismantling [1], of which a total of 50 pressurized water reactors (PWRs) are permanently shut down, and the amount of cable waste generated is as follows. Assuming that the standard nuclear power plant is 900 MWe of the French standard nuclear power plant, 5,000 tons of cable waste are generated [2]. Based on the assumption above, the amount of cable waste generated only by the PWR nuclear power plant is 250,000 tons. There is no report on the occurrence of cable waste in domestic nuclear power plants, but the amount of cable installed in old nuclear power plants (Gori 2-4, Wolseong 2-2, Uljin 1-4, Yeonggwang 1-4) in operation in Korea is reported to be more than 4,000 tons [1].

Radioactive cable waste generated during the operation or dismantling of nuclear facilities such as nuclear power plant is disposed of as radioactive waste, or waste is reduced through decontamination and taking off sheath. Copper, which is a useful metal, is recycled through a clearance procedure. In order to handle processes such as cleaning and striping, shredding and separation of radioactive cable waste, and ventilation, various facilities are essential. However, in the past, various facilities for treating radioactive cable waste were installed at sites where waste occurred or was stored. Therefore, there is a problem in that it is difficult to move the facilities and the installation cost is high.

The purpose of this study is to provide a mobile cable waste treatment equipment that includes various facilities capable of processing cable waste by being moved to a site with radioactive cable waste.

2. Mobile Cable Waste Treatment Equipment

The mobile cable waste treatment equipment includes a first container to perform cleaning and removing the cable waste, and a second container which shredding the cable waste transferred from the first container, filters the gas from the first container and discharges the same to the outside. Figure 1 is showing a mobile cable waste treatment container.

The first container includes a cable waste steam cleaning device to remove removable contamination of the cable waste. Figure 2 is showing a first container of a treatment equipment and a shape of the first container viewed from the top.

The cable waste steam cleaning equipment include a steam generator to generate steam by heating water, a steam filter for primarily filtering steam generated by the steam generator, a steam cleaning device for cleaning cable waste through the steam filter, and a condensate filter for secondary filtering steam condensed. Figure 3 is showing a cable waste steam cleaning equipment.

The first container includes a cable waste stripper to remove a sheath of the cable in order to remove fixed contamination of the cable. The cable waste stripper includes a roller part to be rotatable about a pair of axes, to be rotatable about a rotation axis parallel to a straight line perpendicular to the pair of axes, and to remove a sheath of the cable. Figure 4 is showing a cable waste stripper.

The second container include a cable waste shredder that shredding a primary treated cable waste, which is a cable on which at least one of cleaning and stripping the cable waste from the first container. This container includes a transfer and dust collector to input a shredded material formed by shredding through a cable waste shredder. The transfer and dust collector includes a cyclone. The second container includes a separator to separate the shredded material discharged from the cyclone and the dust collector into a copper and a shredded sheath. Figure 5 is showing a second container of a treatment equipment and a shape of the second container viewed from the top. Figure 6 is showing a transfer and dust collector.

The second container includes a ventilation facility, and the first container is connected to the ventilation facility.

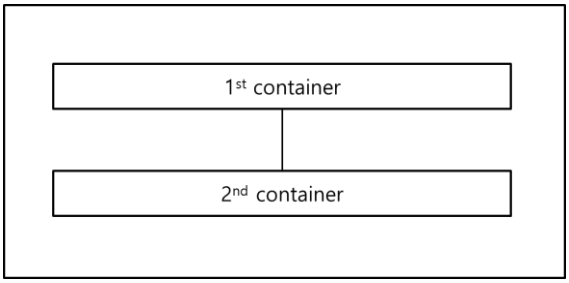

Figure 1. Mobile cable waste treatment container

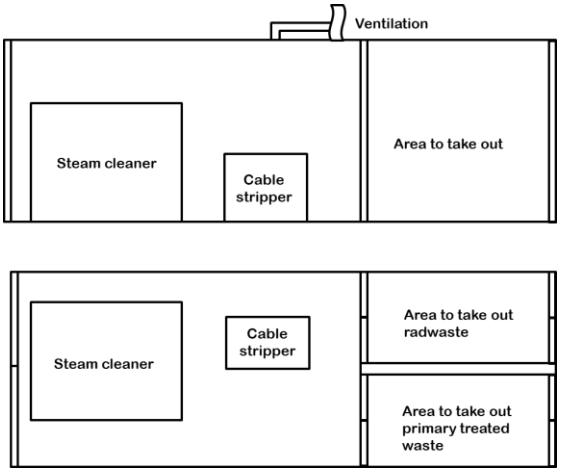

Figure 2. The first container

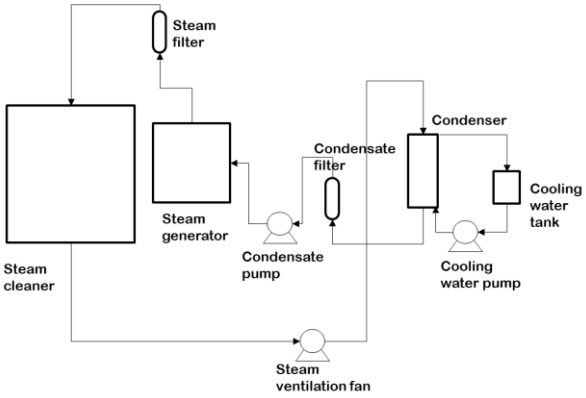

Figure 3. Cable waste steam cleaning equipment

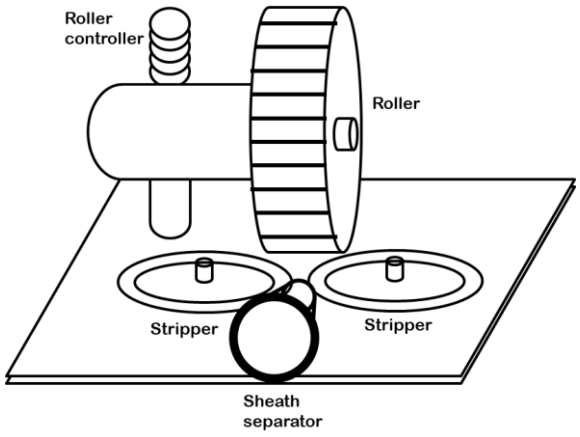

Figure 4. Cable waste stripper

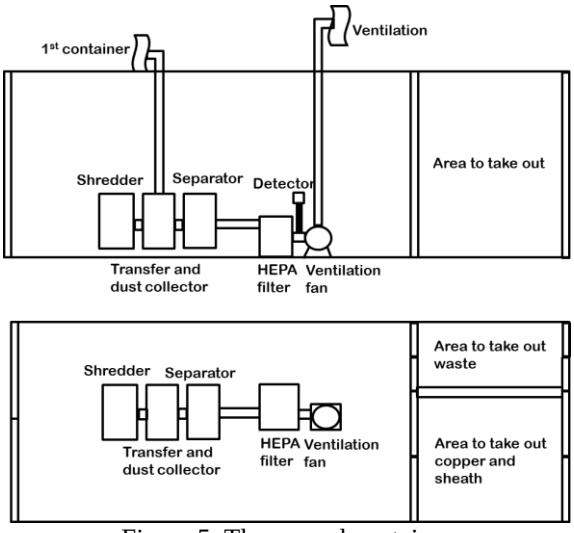

Figure 5. The second container

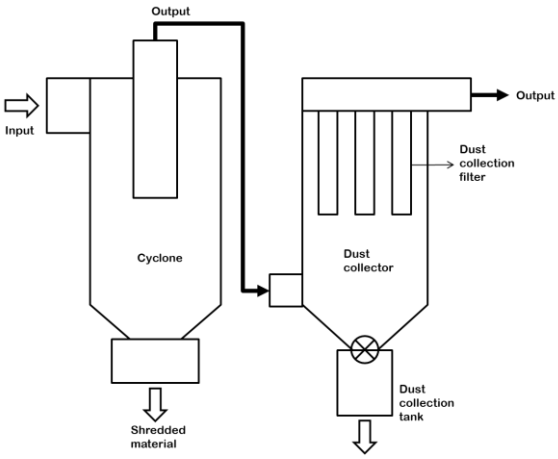

Figure 6. Transfer and dust collector

5. Conclusion

According to this study, after installing various facilities for cable waste treatment in the first container and the second container, the first container and the second container can be loaded and moved to a site with radioactive cable waste.

REFERENCES

[1] "2018 Current status and trend of global nuclear power generation", KAIF, 2018.

[2] "Evaluation of Radioactive Scrap Metal Recycling", pp A-58~59, ANL/EAD/TM-50, 1995.