

## 1. Introduction

- ❖ The permanent shutdown and decommissioning of nuclear power plants (NPPs) has been growing steadily in the world. The number of permanent shutdown NPPs is totally 189 and decommissioned NPPs are 21 in the world.
- ❖ Especially, among various issues during decommissioning, most important thing is decommissioning waste. According to literature of decommissioned NPPs, period and cost for decommissioning of NPPs are impacted by decommissioning waste. But technologies of recycling for cable are inadequate during decommissioning NPPs.
- ❖ In this study, it was investigated that classification of cable using NPPs and applied technologies for decommissioning of NPPs.

## 2. Technology of Recycling for NPP Cable

### 2.1 Design of cable

- ❖ NPP cable is an assembly of one or more conductors running side by side or bundled. The cable typically consists of copper conductor to carry power or control signals and insulating cover to isolate the conductor.

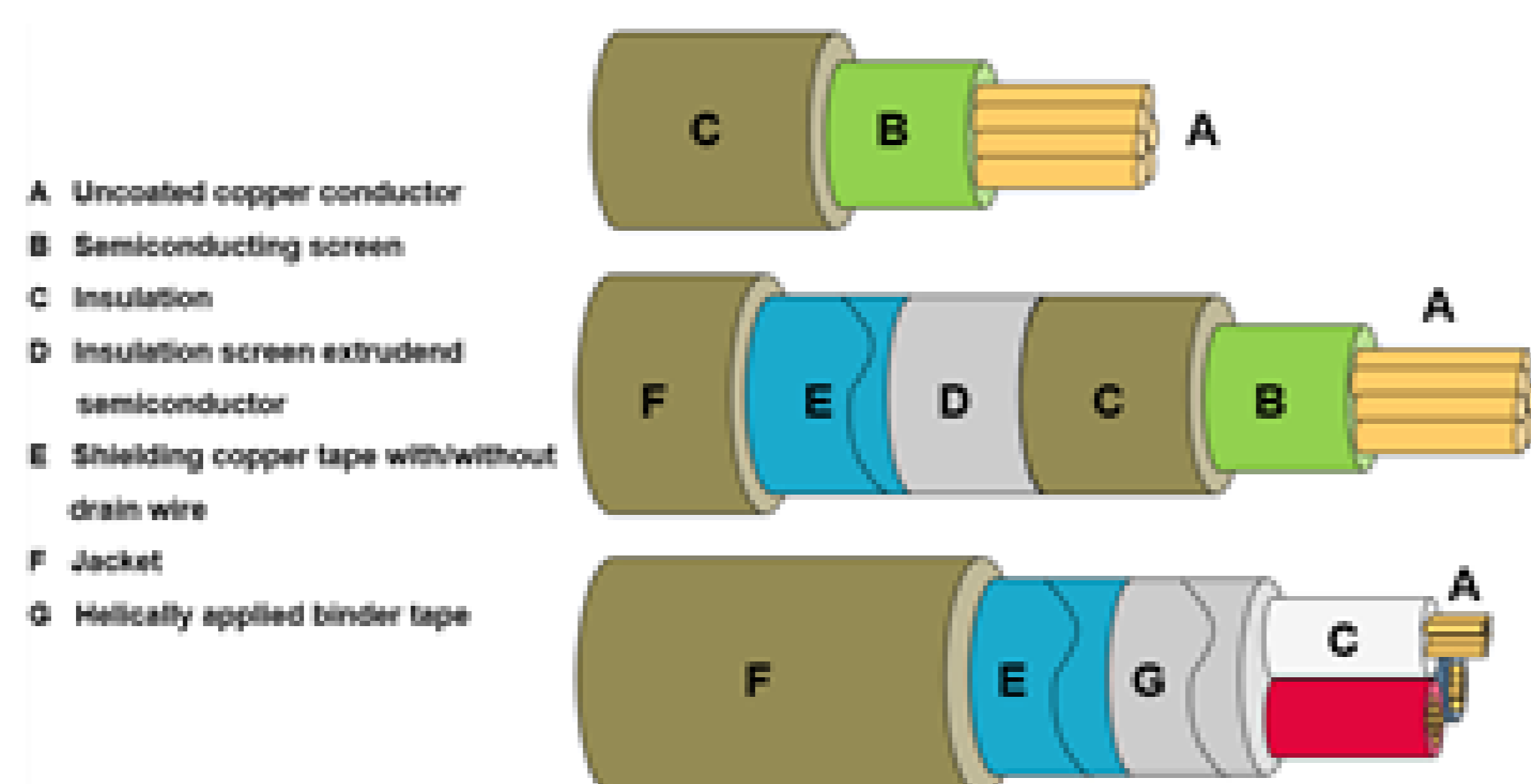


Fig. 1. Configurations of cable designs used in NPPs

### 2.2 Layout and volume of cable

- ❖ Layout of cable for NPP is not designed to inspection of cable lengths. Cable trays and conduits are designed to protect cable from environmental effect and impacts from workers and equipment that may move inside building at NPPs.

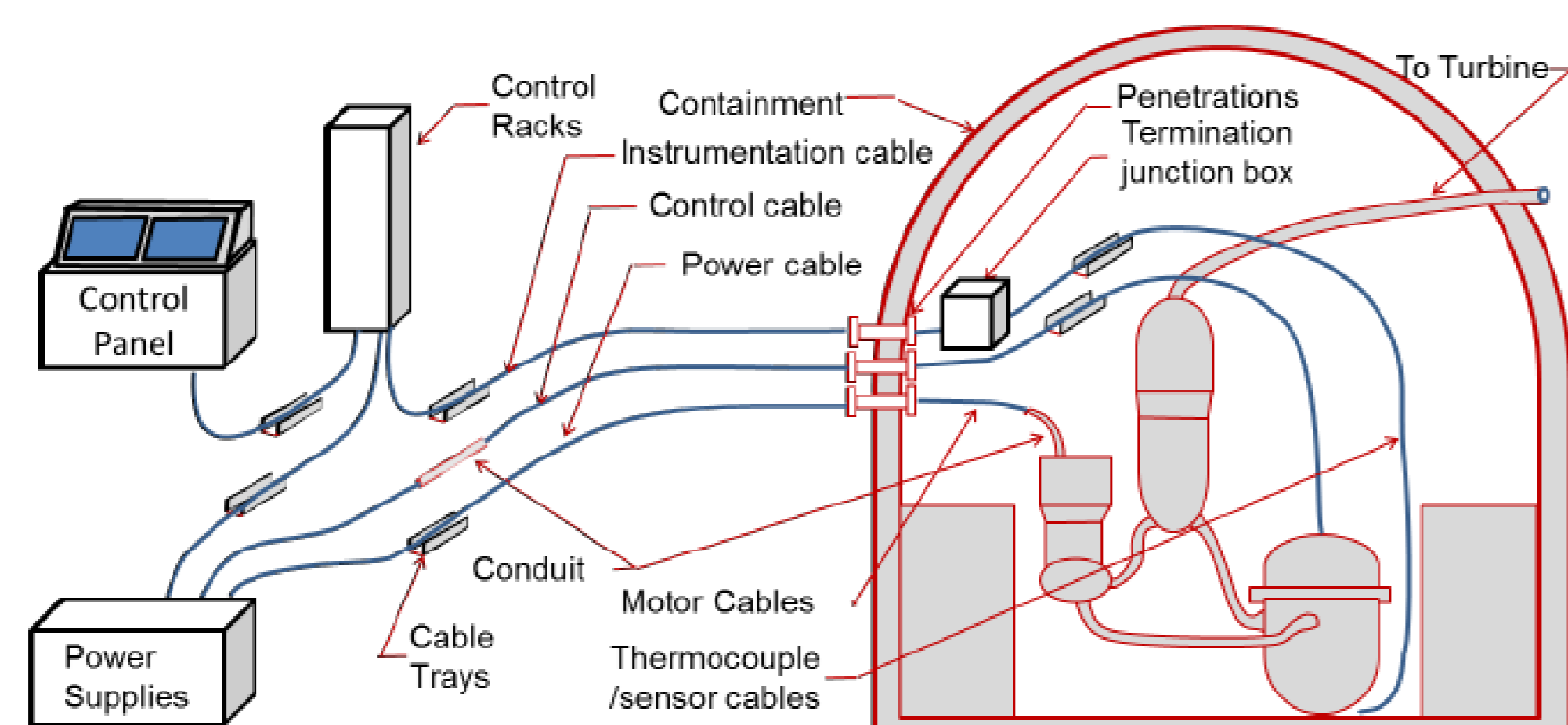


Fig. 2. Typical layout of cable system

Table 1. Expected waste of cable generated during decommissioning of Kori-1

Waste classification	Waste types	Expected volume (ft <sup>3</sup> )	Expected volume using reduction (ft <sup>3</sup> )
CW	Cable, concrete, metal, etc.	139,526	147,687
ILW	Cable	763	1
LLW	Cable	2,931	4

- ❖ Cable generated decommissioning are mostly CW (Clean Waste), but some of the waste is radioactive waste. Cables classified as radioactive waste are mostly contaminated with only surface of jacket. It is mainly classified as LLW (Low Level Waste) due to the radiation of dust attached to the surface of jacket as the main cause of contamination.
- ❖ Cable generated during decommissioning of NPPs are composed of compactible waste (insulation) and non-compactible waste (copper), it is possible to minimize the amount of radioactive waste through decontamination.

### 2.3 Experience of recycling for cable

- ❖ Most of the cable recycling system have been separate cable insulation from internal copper wires using mechanical process in shredding facilities.

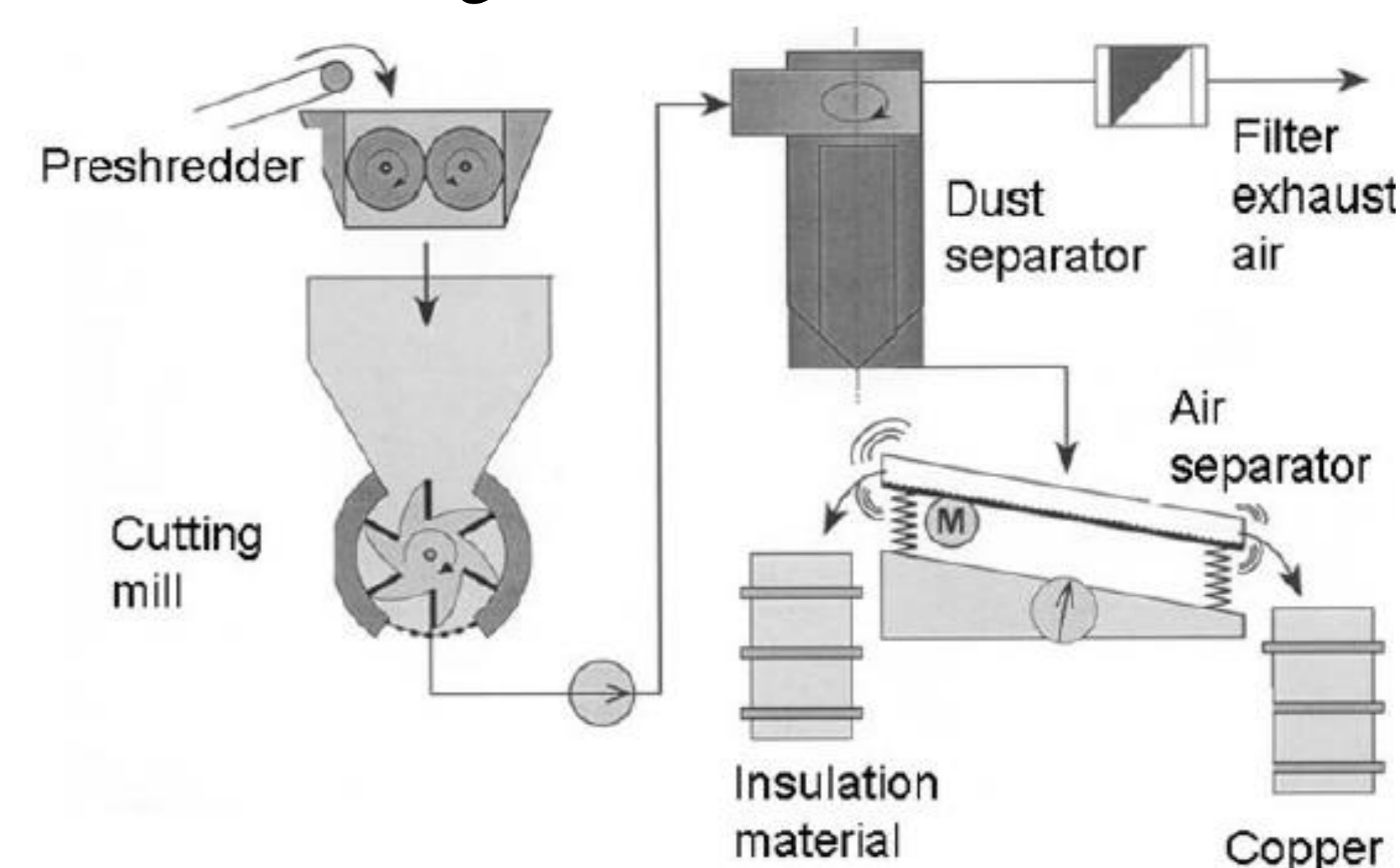


Fig. 3. Process of cable insulation separation system

- ❖ According to DOE report, NUKEM copper cable recycling system consists of shredding, grinding, separating and filtering. The recycling of contaminated cable was conducted with two types of cables in the area of non-radiation. And this process was produced with three kinds of final products.



Fig. 4. Copper cable recycling system (NUKEM) and Final product using recycling cable system (dust, insulation and copper)

Table 2. Contamination on the cables

	Loose contamination	Fixed contamination
Material	Phosphorescent powder	Cesium nitrate
Method	Dust onto the surface of the cable	Apply latex paint after use pressurized sprayer

## 3. Conclusion

- ❖ It is possible to minimize the amount of cable generated decommissioning of NPPs through decontamination.
- ❖ In particular, in order to a successful decommissioning of NPPs in Korea, pre-treatment before recycling cable system and radiation detection before and after recycling cable system research are needed.