

Analyzes the Status of Patents and Utility Models Related to Domestic Self-Disposal

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1. Introduction

The fields where self-disposal takes place can be divided into nuclear power plant sector and non-nuclear power plants sector.

First, in nuclear power plant sector 23 nuclear power plants are currently operating commercially, and Wolsung Unit 1 is proceeding with the procedure to Reactor shutdown by taking out the fuel rod, and applied to the Nuclear Safety And Security Commission for a change of operation for permanent shutdown on February 28, 2019. In addition, Kori Unit 1 was permanently shutdown on June 18, 2017 and is already undergoing a decommissioning process.[1] The quantity of self-disposal at nuclear power plants will be generated in large quantities during commercial operation and during the decommissioning of nuclear power plants.

The following are non- nuclear power plant sectors: medical institutions, industries, research institutes, educational institutions, public institutions, and military organizations, In particular, medical institutions periodically apply for their self-disposal, and when permission to use facilities is terminated, unlike nuclear power plants, the radiation controlled area is not wide, so select a method to deregulate the facilities.

In this paper, we have identified and analyzed the trends of domestic self-disposal technologies related to the decommissioning of nuclear power plants that are expected to be self disposed of in large quantities in the future. Increase economic effects by reducing the cost of permanent disposal by increasing the amount of self-disposal according to the establishment of self-disposal technology and the direction of future technology development, through high level, intermediate level, low level and extremely low level radioactive wastes will be disposed of safely through the Korea Radioactive Waste Agency, it is expected social effects through changing the public's perception of nuclear facilities.

2. Main Subject

In this paper, the status of patents-utility models registration related to self - disposal registered in the Korean Intellectual Property Office was examined in Patent Information Net KIPRIS. Search method is free search, and among patents-utility models that include one of the four search words 'Radiation', 'Radioactivity', 'Radioactive', 'Nuclear power plant', and searched for registered patents-utility models containing the words 'self' or 'disposal', and a total of 1,363 patents-utility models were searched, among these were 88 patents-utility models related to self-disposal.[2]

For 88 registered patents-utility models related to self-disposal, based on the year of application, the status by annual patentee, by year, by content, by type of waste subject to disposal are shown in Fig. 1, Fig. 2, Fig. 3.

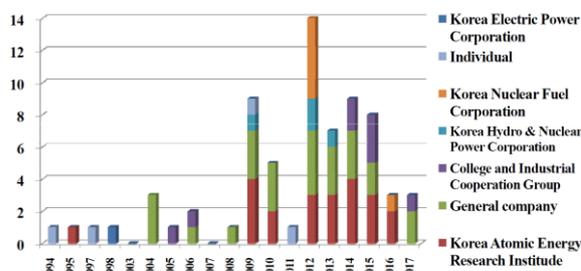


Fig. 1. Application status of patents-utility models by patentee per year (caution) If the two organizations have patents together, they are divided by half.

In Fig. 1, shown the status of application by agency from 1994 to the present, general companies that promote self-disposal projects is 32 the number of patents-utility model registration, followed by the Korea Atomic Energy Research Institute (KAERI), which is the research institute, with 28.5, and the university-industry cooperation group with 8.5. In addition, it was confirmed that a total of 12 patents-utility models were registered in 13 years from 1994 to 2007, and 76 cases were registered in 9

years 2008 to 2017. Until 2007, the registration status of patents-utility models related to self-disposal was a low registration rate, but the registration has been steadily carried out since 2008. This is when self-disposal services are ordered from Korea Hydro & Nuclear Power Corporation, companies have begun to develop their self-disposal related technologies in earnest in order to receive their self-disposal service.

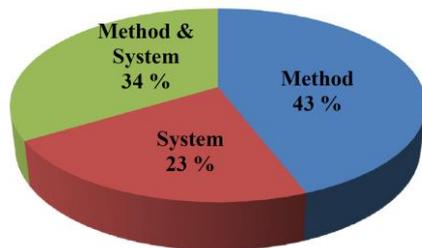


Fig. 2. Application status of patents-utility models by technology content.

Fig. 2. analyzed the technology-specific contents of patents-utility models registered as self-disposal technologies, method (44%) was studied twice as much as the system (23%) and it was found that it was registered as a patent-utility models.

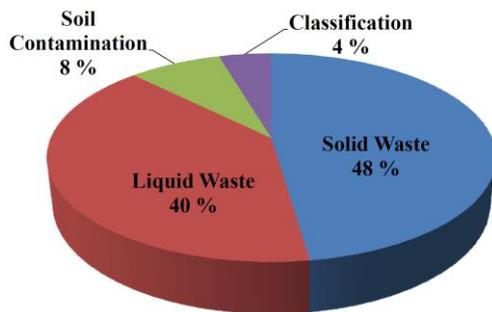


Fig. 3. Application status of patents-utility models by target waste.

Fig. 3. shows that solid waste disposal technology accounts for 48% and liquid waste disposal technology accounts for 40%.

The content covered in this paper is the analysis of the patent and utility model registered in the Korean Intellectual Property Office with the related search terms in the title and text contents.

This method of searching may omit some self-disposal technologies. For example, in case 'A decontamination device inside of pipes contaminated with radioactive material' of the application number (date) 1020150151197 (2015.10.29) developed by SAE-AN ENERTECH CORP., when grinding the

inner circumferential surface of the contaminated pipe to a uniform thickness and it is possible to reliably prevent re-contamination due to the by-products of grinding, after decontamination, the piping is self-disposal, which corresponds to its self-disposal technology, but It has been confirmed that omitted from the technical analysis because are cases in which the titles and texts do not contain "self" or "disposal"

3. Conclusion

In this paper, it was confirmed that the patent and utility model related to domestic self-disposal are concentrated in the field of decontamination of liquid and solid waste, and the accidents at the Fukushima nuclear power plant increased interest in patent and utility model related to soil contamination.

In addition, there have also been inventions of facilities or devices capable of decontamination using existing technologies and have been many cases where the decontamination method and the apparatus have been registered together.

However, since decontamination methods are registered but the device has not yet been registered, it would be very desirable if the device is developed for the registered patent technology to be actively implemented, and the development of automatic decontamination equipment is also carried out.

In addition, information provided by OPIS(Operational Performance Information System for Nuclear Power Plant) indicates that 168 nuclear reactors went into decommissioning in 38 countries and 454 nuclear reactors in operation (based on 2018.11.07.). Of these 454 reactors, more than 60 percent of them have been operating for more than 30 years, more nuclear power plants will go into decommissioning in the future.

Therefore, it is necessary to secure a favorable position in the overseas decommissioning market in the future by supplementing the insufficient parts of the domestic self-disposal technology when the Kori Unit 1 is decommissioning

REFERENCES

- [1] Homepage of Korea Atomic Industrial Forum
<http://www.kaif.or.kr>
- [2] Patent Information Net KIPRIS
<http://www.kipris.or.kr>