A public awareness improvement of nuclear energy by correcting wrong information

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1. Introduction

The general public began to take some interest in nuclear energy with the trend of de-nuclear since the South Korean government's declaration of de-nuclear policy in 2017. The public's interest in the field increases rapidly as soon as they hear negative news that can be a threat to their health or daily life. In other words, in the process of being interested in things that are not in their field, positive content does not give much impact. Therefore, the public starts searching for nuclear energy on portal sites when they hear negative news such as 'Fukushima Accident', 'Film Pandora' and 'De-nuclear Policy' rather than positive news such as 'First Korean Nuclear Power Plant Overseas' and 'Foreign media's high evaluation of Korea's nuclear power plant technology'. The main route for non-professional to learn about nuclear energy is through the internet. However, they are repeatedly exposed to exaggerated and wrong information by civic groups advocating de-nuclear, finally the perception of nuclear energy is changing negatively. In addition, even if nuclear agencies or organizations reveal the authenticity of these news, the public's negative perception of nuclear energy is getting worse due to the lack of procedures for corrective information. Thus, if exaggerated and wrong articles or claims on the Internet are collected and refuted by majors and delivered to the public, it could make a great contribution to improving public awareness of nuclear energy.

2. Methods and Results

In this section, two main criteria were established in consideration of the position of the non-professional public due to the need for clear classification criteria for selecting wrong and exaggerated information. Since then, a total of four topics have been selected according to the criteria.

2.1 Creating Fear of Nuclear Power Plants Accidents

Nuclear power plant accidents are one of the main reasons why the public feels fear of nuclear energy. The Chernobyl accident and the Fukushima accident are typical examples of accidents that rank seventh, the highest in the International Nuclear Event Scale (INES), as defined by the IAEA. And there are numerous exaggerated and misleading claims about these two accidents.

2.1.1 Chernobyl Accident

The Chernobyl accident occurred on 26 April 1986 at the Chernobyl Nuclear Power Plant in Ukraine, the Soviet Union, when the radiation leak occurred. Some raised questions about the safety of nuclear energy, arguing that at least 200,000 people were killed in the Chernobyl accident and millions suffered from radiation exposure, along with calling for speeding up de-nuclear policy such as early shutdown of old nuclear power plants for a safe society [1]. However, according to a report written by the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), 134 of the plant's workers suffered from acute diseases caused by radiation exposure, of which 28 died from excessive exposure at the time of the Chernobyl accident. Over time, 19 additional survivors of acute diseases died, but it was confirmed that there were cases that were unrelated to radiation exposure among the causes of death. In addition, it was confirmed that the general public received a large amount of thyroid exposure due to a large amount of I-131 spill caused by insufficient emergency response in the Chernobyl accident. And this resulted in approximately 6,000 cases of thyroid cancer in children/adolescents, with about 15 deaths as of 2005. Consequently, the total number of deaths from the Chernobyl accident was 62, including 28 deaths from the plant workers, about 15 deaths from the general public, and 19 additional deaths from the plant workers conservatively considered [2]. Although it is undeniable that the Chernobyl accident is a fatal and dangerous accident, it can be seen that exaggerated claims by civic groups aiming for de-nuclear can be a fatal factor that undermines public awareness.

2.1.2 Fukushima Accident

The Fukushima accident was an accident in which radiation leaked from a nuclear power plant located in Fukushima, Japan, due to massive earthquake and tsunami that penetrated northeastern Japan on March 11, 2011. In fear of the wider range of radioactive contamination after the Fukushima accident, exaggerated and wrong information is spreading indiscriminately in neighboring countries, including the Japanese people. Fig.1 is a picture circulating among the general public on the Internet titled "Radioactive Map published by the PNAS(Proceedings of the National Academy of Sciences of the USA)". According to this figure, the black colored part represents an area

contaminated by radiation leaks. In other words, more than 70% of Japan's land has already been radioactively contaminated, and it is amplifying public anxiety, claiming that the scope of pollution will expand not only to Japan's inland but also to the sea as time. The reason for the circulation of this picture is related to Fig.2, which is the actual data excerpted from the corresponding paper of PNAS. A Korean professor who claims to be de-nuclear cited PNAS's data and claimed that about 70 % of the land is colored, so 70 % of Japan's land is contaminated by radioactivity.[3] And in the process of spreading it to the public, a "Fake radioactive map" was created in which all the colored parts of the data were painted black. However, according to Fig.2, the 'actual radioactive map' provided by the PNAS, this data does not refer to all of the painted areas as serious radioactively contaminated areas. So, depending on the type of color, it is necessary to distinguish the areas that maintain the same level as the soil's radioactive concentration before the accident.

Fig. 1. The estimated Cs-137 concentration in soil circulating on the Internet [4].

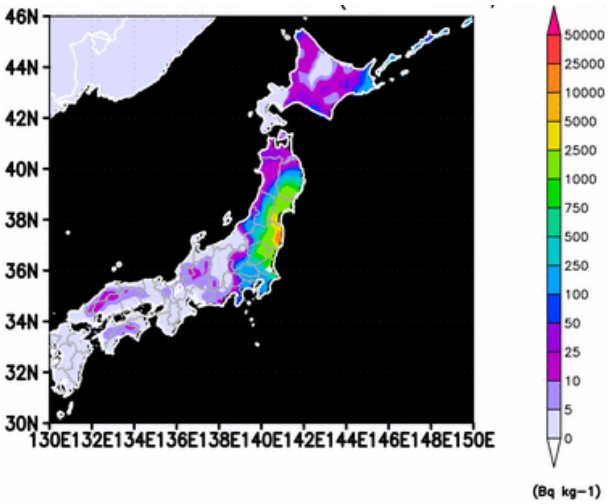

Fig. 2. The estimated Cs-137 concentration in soil actually presented on the PNAS. DRT of 0.001 (upper bound estimate on Cs-137 deposition within all of our estimates with DRTs of 0.001–0.1) and CC of 53 kg m−2 were used. Outputs with 0.2° × 0.2° were interpolated to finer resolution using cubic interpolation. The Merged IBCAO/ETOPO5 Global Topographic Data Product (25) was used to mask out ocean area below 0 m above sea level (a.s.1.) [5].

2.2 Creating Fear of Radiation Exposure

Radiation exposure directly affects human health. Therefore, permitted doses which are prescribed by law or radioactive materials that cause exposure are highly sensitive issues to the public.

2.2.1 Differences in risk between natural and artificial radioactive materials

The non-professional public sometimes thinks that artificial radioactive materials made in nuclear facilities and nuclear tests are more dangerous than natural radioactive materials present in nature. These cases are usually caused by a lack of basic radiation knowledge and the stereotype that natural substances are safe. However, whether it is natural or artificial radioactive materials, it affects the human body by exposure to radiation (ex. beta-ray, gamma-ray, etc.) that is not the substance itself. Because the nature of radiation from artificial radioactive materials or natural radioactive materials is the same, artificial or natural radioactive materials cannot be a measure of risk. That is, the effects of radioactive materials on the human body are related to the total amount of energy transferred by the radiation emitted, and whether natural and artificial radioactive materials are not.

2.2.2 Differences in exposure dose limit between general public and radiation workers

The Nuclear Safety Act differs from the dose limit of the general public and radiation workers. The reason for the separation of the public from the radiation workers in radiation protection is whether they have intentional exposure. In addition, the most significant difference between exposure to radiation workers and exposure to the public is the presence of 'agree of understand' to understand and agree to that exposure, and differences arise at the level of acceptance of risks. Therefore, the public was conservatively set at 1 mSv per year because it was impossible to manage exposure and included radiation-sensitive children. Also, Radiation workers were set at 100 mSv for five years, within the range of not exceeding 50 mSv per year, because they were able to manage exposure [6].

3. Conclusions

The exaggerated and misleading information spreading to the non-professional public has been scientifically refuted from the perspective of a major through this project. The project is expected to improve the perception of nuclear energy that is currently spreading to the public, while contributing significantly to the possibility of objective thinking and judgment that is not biased to either side when the public looks at the de-nuclear policy.

REFERENCES

[1] “Gyeongnam Environmental Organization, 32nd year of Chernobyl, 200,000 dead... We need to get out of the nuclear power plant”, Yonhap News, last modified Apr 24, 2018, accessed Mar 15, 2021, https://www.yna.co.kr/view/AKR20180424103800052?input=1195m.
[2] UNSCEAR Report, Evaluation of Data on Thyroid Cancer in Regions Affected by The Chernobyl Accident, Source and Effects of Ionizing Radiation, p. 9-13, 2008.
[3] "Japan, the Land of the Dead [Korea, Why is it De-Nuclear? Part 1]." YouTube video, 27:20, posted by "Deeper10," September 28, 2017, https://www.youtube.com/watch?v=XLFB06M371c&t=820s.
[4] “The seriousness of radioactivity in Japan”, ezday, last modified Sep 11, 2013, accessed Mar 15, 2021, http://www.ezday.co.kr/bbs/view_board.html?q_sq_board=5275226.
[5] Cesium-137 deposition and contamination of Japanese soils due to the Fukushima nuclear accident, PNAS April 30, 2013 110 (18), p. 7525-7528.
[6] Article 2(4), the Enforcement Decree, the Nuclear Safety Act.