

Dangers of nuclear power

1. Motivation behind Research Paper

Fukushima 50 is the name given to 50 workers who remained on-site at that time of the accident at the Fukushima nuclear power plant while about 750 people evacuated to avoid risks, following the instructions of Tokyo Electric power company. Despite the evacuation order, about 50 workers stayed and worked hard to stop damage from the accident. From these things, foreign media gave these workers the name "Fukushima 50." The accident at Fukushima's first nuclear power plant was caused by east Japan's great earthquake and Tsunami on March 11, 2011.

Many radioactive materials were put out into the air because of this accident. Radioactive materials that had no color, taste or smell were spread throughout an extensive area of Japanese islands. This caused pollution of the sea and rivers. This affected not only people inside and outside the radiation exposure area, but also vegetables, plants in the field and fish where radiation levels rose significantly. The accidents grew support for anti-nuclear sentiments. When I saw the movie "Fukushima 50", which depicts the struggle of 50 workers, I saw workers working at a nuclear power plant risking their lives while many citizens were evacuating. I just saw it and thought it was pathetic. Accidents such as this one should not occur again in the future so I started to research nuclear power plants. "Nuclear power for

peace.” This was said by Dwight David Eisenhower at the United Nations General Assembly about peaceful use of nuclear power 8,12,1953.

“The atomic age has moved forward at such a pace that every citizen of the world should have some comprehension, at least in comparative terms, of the extent of this development of the utmost significance to every one of us. —But the dread secret, and the fearful engines of atomic might, are not ours alone. But let no one think that the expenditure of vast sums for weapons and systems of defense can guarantee absolute safety for the cities and citizens of any nation. To pause there would be to confirm the hopeless finality of a belief that two atomic colossi are doomed malevolently to eye each other indefinitely across a trembling world. To stop there would be to accept helplessly the probability of civilization destroyed--the annihilation of the irreplaceable heritage of mankind handed down to us generation from generation--and the condemnation of mankind to begin all over again the age-old struggle upward from savagery toward decency, and right, and justice. Surely no sane member of the human race could discover victory in such desolation. Could anyone wish his name to be coupled by history with such human degradation and destruction. It is not enough to take this weapon out of the hands of the soldiers. I don't think the peaceful use of nuclear energy is the future we want. I know that many steps will have to be taken over many months before the world can look at itself one day and truly realise that a new climate of mutually peaceful confidence is abroad in the world. But I know, above all else, that we must start to take these steps--now.”

2. Introduction

The nuclear power policy is one of the alternative energy measures which has been taken as a goal to move away from oil and reduce dependence on foreign

energy sources. Nuclear power generation has unique advantages such as stable supply of uranium resources, high stockpiling effect, high power generation cost, etc., and has been used as a cheap and stable large-scale power source. However, it is by no means safe. Whenever a nuclear power plant is operated, various radioactive materials are emitted. For example, workers wearing gloves and protective clothing. Among these radioactive wastes, nuclear fuel used in power generation has the highest level of radioactivity. In Japan, reusable plutonium and other materials are taken out of this facility, and the remaining liquid waste is poured into stainless steel containers and solidified. This is nuclear waste. Nuclear waste has a very high level of radioactivity, and when it is freshly formed, it emits such strong radiation that a person would die within 20 seconds if they got close to it.



Figure 1. Nuclear Regulation Authority Nuclear Emergency Response Policy July 3,

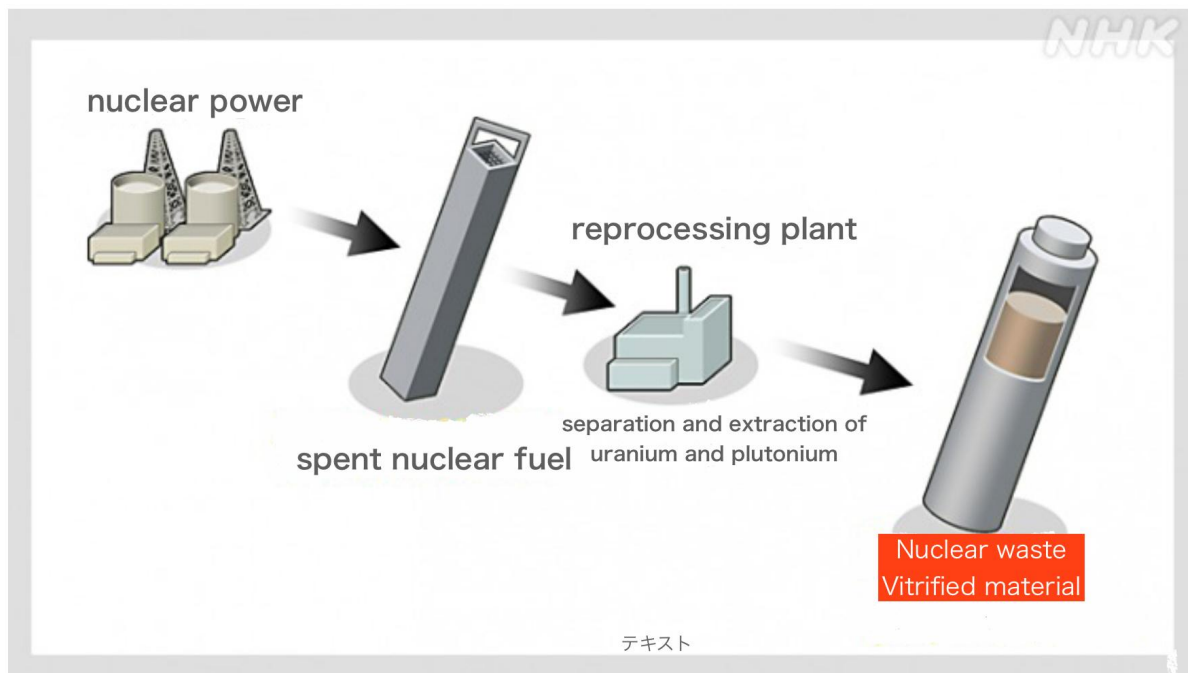


Figure 2. How nuclear waste is produced

However, it is said that high-level waste will be 99% free of radioactivity after 1,000 years, depending on the type of radioactive material. But that still doesn't make it safe. Also, there are more problems. It is still undecided where to dispose of this troublesome waste. Now, nuclear waste is stocked in the nationwide nuclear power plants and brought to the unfinished nuclear power plants. Putting these together, the amount is about 19,000 tons. In addition, about 7,000 tons have been shipped to the United Kingdom and France for reprocessing. All in all, it amounts to 26,000 tons. What will happen to nuclear waste if the amount of nuclear waste continues to increase and there is no place to dispose of it? Will it be disposed of in space or the sea?

3. Results and Analysis

Nuclear waste can't be disposed of in space or in the sea. This is because abandonment in space can scatter nuclear radiation in the air and abandonment in the sea is prohibited by the London Treaty. Considering these, there is no choice but to dispose of it in the ground where we live. Is there anyone in your town who accepts radioactive waste? I don't think so. Who will be responsible for managing the nuclear waste that must be stored for at least 100,000 years? If nuclear waste continues to increase, humans will lose the place where we live. It will continue to increase unless nuclear power generation that emits nuclear waste is eliminated. This should be the main focus, and how to resolve these problems. Another issue to focus on is nuclear disaster. The Fukushima nuclear disaster resulted in damage caused by the abnormal release of radioactive material. In the nuclear reactor facility, multiple physical barriers are provided, but if it doesn't work, radioactive material is released to surrounding areas. Then people suffer radiation exposure.

There are two types of radiation exposure. They are external exposure and internal exposure. External exposure means accepting radiation from sources outside the body. Internal exposure means inhalation of radiation materials, taking the materials into the body through oral ingestion, etc and accepting radiation from radiation sources inside the body. The characteristics of a nuclear disaster are:

1. Difficulty in doing restoration and reconstruction work because of radiation exposure or pollution.

2. Inability to immediately perceive the effect of radioactive substances or radiation with the five senses. But the use of radiation measuring instruments aids in detection.
3. Radiation exposure effects can show after a long time after exposure.



Figure 3. The red circle is Nuclear power plant in operation. The yellow circle is Nuclear power plant that Prime Minister Kishida is considering operating. Also the circle represents a radius of 30km from the nuclear power plant.

In the event of a nuclear disaster, an evacuation zone is decided to avoid serious deterministic effects caused by unclear exposure and to decrease damage. It is about 30 km radius from nuclear power plants. Evacuees were 470,000 people from the great east Japan earthquake. With reference to the nuclear power policy, I investigated the population of municipalities about 30 km from each nuclear power

plant to find out how many people would evacuate if radiation leaked from the existing 10 nuclear power plants. As the result, I found that it would include (about):

- 400,000 evacuees at the Genkai Nuclear Power Plants of Kyushu Electric Power
- 280,000 evacuees at the Kawauchi Nuclear Power Plants of Kyushu Electric Power
- 220,000 evacuees at the Ikata Nuclear Power Plants of Shikoku Electric Power
- 70,000 evacuees at the Takahama Nuclear Power Plants of Kansai Electric Power
- 250,000 evacuees at the Oi Nuclear Power Plants of Kansai Electric Power
- 410,000 evacuees at the Mihama Nuclear Power Plants of Kansai Electric Power.

Also, president Kishida expressed his thoughts on building new nuclear power plants and an extension of the operation period. President Kishida investigated restarting 10 units of operation after the accident at Fukushima's first nuclear power plant and adding 7 units. In particular, unit 1 and unit 2 of the Kansai Electric Power Takahama Nuclear Power Plant, unit 2 of the Tohoku Electric Power Onagawa Nuclear Power Plant, unit 2 of the Chugoku Electric Power Shimane Nuclear Power Plant, unit 6 and unit 7 of the Tokyo Electric Power Kashiwazaki Kariwa Nuclear Power Plant and Nippon Nuclear Power Tokai The Second Nuclear Power Plant. These 17 nuclear power plants will be put into operation. In the unlikely event that a large earthquake or tsunami causes radiation to leak from all 17 nuclear power plants, the total number of evacuees is found to be 3.97 million. This is 3 times the

total population in Nara. To put that number differently, the three regions of Wakayama, Nara and Kyoto's total population will be evacuated. If that happens, ½ of Kinki will become a difficult area to live in.

4. Conclusion and Future Problems

I have found that nuclear disasters cause human suffering from radiation exposure, require evacuation, restrict people's diet to avoid internal exposure, make restoration and reconstruction difficult due to exposure and contamination, and cause problems in disposal of nuclear waste, discrimination, etc. From these things, I thought that nuclear power was unsuitable for realizing a sustainable society. In order to prevent accidents like the one at the Fukushima Daiichi Nuclear Power Plant from happening again, we first need to know the power of nuclear power. It is also necessary for prompt evacuation and countermeasures in the event of an accident. If we don't know, we will never be exposed to the dangers and problems of nuclear power.

5. Reflection

Before I started my research, I also thought that nuclear power generation was good for the global environment, that it did not emit carbon dioxide, and that it was an important resource for us. However, actually, it is only during power generation that CO₂ is not emitted, and it is emitted as a matter of course during the construction of facilities and other processes. There may be tens of thousands or even hundreds of millions of people like me in the world. I think the task we should promote is to withdraw from nuclear energy before its enormous power destroys people's peace. I want to secure new energy and build a peaceful future so that the

world can escape from the threatening power of nuclear power, reduce it, and make positive progress toward peace. I would like to disseminate the threatening power of nuclear power generation, the problem of nuclear waste, nuclear disasters, and other things that people don't care about in everyday life, in order to realize a sustainable society.

6. Work Cited

Hajimu Yamana, "thinking about the impact of moving away from nuclear power."
Kyoto University Research Reactor Institute.

Nuclear Regulation Authority Nuclear Emergency Response Policy July 3, 2019

US Embassy State Department, "Basic Documents of American History and Democracy Presidential Speech

Yuji Kuroda, "Will phase-out of nuclear power and phase-out of coal succeed?"
Overseas Power Research Institute