

Research Report

Environment Commission

Evaluating the security surrounding nuclear facilities
with regards to Fukushima

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Forum	Environment Commission
Issue:	Evaluating the security surrounding nuclear facilities with regards to Fukushima
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Introduction

The Fukushima Dai-Ichi *nuclear facility*, which has been active since March 26th of 1971, and is located North-East of Japan, is one of Japan's biggest *nuclear plants*. It is currently disabled due to the earthquake and tsunami which struck Japan's east coast on the 11th of March 2011. The plant was originally meant to be built 35 meters above sea level, but to prevent damage caused by earthquakes or tremors (which occur almost on a daily basis in Japan) it was built 10 meters above sea level. However, this made it vulnerable to any possible tsunamis. Its topographic location is on the eastern coast of Japan, and thus exposed to the Pacific ocean. To protect the power station from any dangers the ocean might bring, *sea walls* were built to make the power station more secure. Although there were attempts made to secure the area, not enough was done as can be seen from the results of the earthquake and the tsunami which recently occurred.



Arial View to the Fukushima Dai-Ichi Power station
http://upload.wikimedia.org/wikipedia/commons/e/e8/Fukushima_I_NPP_1975.jpg

Definition of Key Terms

Nuclear Facility/Plant/Power Station: A plant whereby electric energy is generated through atomic reactions.

Nuclear energy: Energy generated through atomic reactions

Nuclear Radiation: Emission of energy in the form of rays and waves.

Nuclear Reactor: A device in which atomic reactions take place to create the heat to generate the energy.

Moment magnitude scale: A term used to measure the strength of earthquakes by how much energy they release.

General Overview

Fukushima Dai-Ichi is the Nuclear power plant in Japan which generates the most energy (hence the name Dai-Ichi which means number one in Japanese). Fukushima Dai-Ichi is also among one of the 15 biggest nuclear power stations in the world. Since 1971 when it was built and started functioning, the use of nuclear energy has expanded in Japan. Currently nuclear energy is the nation's second largest electricity production source. Although less so since the earthquake on March the 6th 2011, Japan relies heavily on *nuclear energy* for its electricity. A little over a quarter of its energy is generated through nuclear power, despite doubts on how safe it is.

Current Security

The Fukushima nuclear power station has certain ways of ensuring safety from radiation leaks and external factors that might damage the plant:

Layout of the plant: The plant has different *nuclear reactors*; these *reactors* are built at a distance from each other. This is done so that if one has a problem (for example a fire or explosion) it is less likely to damage or create a domino effect on the other reactors.

Sea walls: A structure made out of concrete, stone, or metal built to prevent the water from washing away the shore or prevent large waves from reaching the the nuclear power plant.

Reactor cooling system: Each reactor has a cooling system, if the *nuclear reactor* reaches an uncontrollable temperature, this will cool the reactor down to prevent any accidents; this also prevents *nuclear radiation* from escaping.

Altitude of the plant: The plant was placed at a location 10 metres above sea level, rather than the 35 metres originally planned, because it makes it more stable and therefore protects the *nuclear power station* against earthquakes.



The Fukushima Dai-Ichi was not as safe as official documents would have suggested. *Tokyo Electric Power Company (TEPCO)*, who own the *nuclear plant*, have been found guilty of faking *safety and security test results*. Furthermore they have been following outdated *safety procedures and rules* when it came to generating energy. Non-governmental organizations such as *The Japanese Nuclear and Industrial Safety Agency*, and the *US Nuclear Regulatory Commission* warned TEPCO that the Fukushima nuclear station reactor cooling systems and generators failed the safety tests. These warning were ignored by TEPCO.

“Nuclear Disaster 2011”

On the 11th of March 2011, the earthquake and the tsunami hit the *nuclear power plant*. Fukushima Dai-Ichi had turned off 3 nuclear reactors, days before, for maintenance. The rest of the reactors were turned off as the earthquake began. The earthquake was measured at 9.0 on the moment magnitude scale. The *nuclear reactors* were designed to endure a maximum of 6.0 on the moment magnitude scale.



Waves storming into the edge of the power Plant
<http://www.bbc.co.uk/news/world-asia-pacific-13678627>

The *sea walls* could not hold off the waves, as they were built to prevent waves up to 6 meters high, whereas these waves were up to 14 meters high. The reactor cooling systems failed, this led to an explosion which resulted in the emission of radiation. People had to be evacuated from the area within a 30km radius of the *nuclear power plant*.

Major Parties Involved:

The security surrounding Fukushima *nuclear power station* involves several different parties, some within Japan and others outside it.

Japan and its population:

The Japanese population heavily relies on *nuclear energy*. Around 29% of the electricity is generated with the use of atomic reaction. Due to the fact that they rely on it so much, it is inevitable that they will need to continue using it. But there needs to be a review of security measures, seeing as how dangerous the use of *nuclear energy* can really be. Large amounts of the population support the use of nuclear energy, but there is opposition, and many people are not willing to take the risk. If *nuclear energy* stopped being used in Japan suddenly, its



economy would be heavily affected. After the disaster in March 2011, most parts of the north of Japan were without energy for a period of time and it prevented several car and other industries from functioning. If most nuclear power was taken away from Japan and they could not find something to replace it quickly, they would most likely face an economic crisis.

Tokyo Electric Power Company:

Tokyo Electric Power Company (TEPCO) is a firm founded in 1951, in Tokyo. Their main aim is to produce profit from generating energy through different sources. They generate energy with *nuclear reactions*, hydro power and burning fossil fuels. TEPCO owns two different *nuclear power plants* in Japan, including Fukushima Dai-Ichi. They are responsible for it, and they were the ones who ignored warnings and faked safety results in order to keep the plant running.

Citizens' Nuclear Information Center:

The Citizens' Nuclear Information Center (CNIC) is a Japanese non-governmental organization, established in 1975 in Tokyo, whose main goal is to inform the public about nuclear activities, and through that eventually create a nuclear free world. Their projects involve data collection and analysis of current nuclear power plants, they hold public education conferences where they lobby and campaign. They also publish pamphlets and books. They have a strong bias against the use of *nuclear power* and want to see its use discontinued. They strongly emphasize how TEPCO faked results to safety and security tests which have taken place, and they also predicted serious accidents.

US Nuclear Regulatory Commission:

The Nuclear Regulatory Commission (NRC) is an American governmental agency established in 1975. The NRC manages nuclear reactor safety and security, the licensing and renewal of *nuclear plants*, the safety of materials in nuclear power plants and the managing of the resources used for the nuclear power stations. Their work is focused on the United States of America, but they are often asked for help by other countries on issues involving safety and security assessment. Previous to the tsunami and earthquake, the NRC had already warned TEPCO, about the faults in the *Fukushima nuclear power station*, and they predicted that catastrophes were destined to occur.

Japanese Nuclear and Industrial Safety Agency:

The Nuclear and Industrial Safety Agency (NISA) is a Japanese governmental agency that was established in 2006 under their Ministry of International Trade and Industry. NISA regulates the security of the *Nuclear power plants* in Japan; they also regulate the construction of plants. The Fukushima nuclear plant was never checked by NISA security



wise before their plant started functioning. Their mission is to regulate security by ensuring that functioning power plants in Japan are secure. NISA, like the NRC, warned TEPCO about the dangers in the Fukushima Dai-Ichi power plant, and they also predicted it to be unsafe if any natural disasters were to occur.

Timeline of key events:

1971	Fukushima Dai-Ichi Nuclear Plant becomes functional
1978	Fuel rods fell in nuclear reactor 3, caused nuclear reactions
1990	The US NCR failed Fukushima Nuclear Station in safety regarding their reactor cooling systems and electric generators
2002	Reactors shut down, for series of safety test
2004	NISA reports that the management fails to take any actions regarding their security results
2005	Reactors open, passed safety checks
2009	Nuclear Power plant had to be shut down manually because of excessive reach of high pressure
2009	Nuclear reactor 3 broke down due to construction problems
2010	Emergency response center build on plant
2011	Tsunami and earthquake strike the Fukushima Dai-Ichi, cause explosion in active reactors at the time and there is nuclear radiation emission.

Previous Attempts to resolve the issue

Previous actions taken to attempt to solve this issue were taken by the NISA and the NCR. Both the governmental agencies contacted TEPCO and warned them of the old and inadequate security methods being used in the *nuclear power plant*. Although these were strong warnings, they were not very successful or very affective. These were only warnings; neither agencies actually took any action to helping TEPCO to make changes, (other than giving them information). Furthermore there was no demand for TEPCO to fix the problems from either agencies or any other organization, (governmental or non-governmental).



Possible Solutions

As a whole one can conclude that the cause of most of the safety issues relating to this *nuclear power station* is that TEPCO either ignored security warnings, or covered them up with false results. One possible solution is to have a United Nations body monitor the Fukushima nuclear power station on an everyday basis. This monitoring would not necessarily mean having safety tests everyday, but checking if all is running smoothly, and if not take action. Furthermore, there should be a timetable established for conducting security checks. The inspectors should be entirely independent of TEPCO, but should have a good understanding of how things should be run. If Fukushima Dai-Ichi were to fail these security tests, the part which was not secure, would be shut down until new approved measures were in place.

Appendices

Follow this to see what UN Secretary General stated about the Fukushima accident:

<http://www.un.org/News/Press/docs/2011/sgsm13583.doc.htm>

Follow this for further detail on the incident of March 11th 2011:

<http://www.un.org/apps/news/story.asp?NewsID=37749&Cr=earthquake&Cr1=>

Follow this link to learn more about the current situation in Japan:

http://business.blogs.cnn.com/2011/09/09/after-fukushima-japans-energy-crisis/?hpt=hp_c1

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