

The nuclear leaking in japan engineering essay

[Engineering](#)



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Introductory Background

Although the nuclear power plants was dangerous and high cost in building. But it is still in use in many countries. This is because a small size of nuclear can produce high energy which means low cost for operating. For example the nuclear power plants in Japan, Finland, and France. The nuclear energy can give us more benefit in producing the electricity compare to other way of electricity generator. but it a type energy generation which controversial by the world due to worry about nuclear accident, spent fuel storage and the way of spread nuclear power might accident and bring huge side effect to descendants [1]. Fukushima is the best example for forefront ongoing concern about nuclear accidents and the handling with storage of spent fuel [1]. Fukushima accident in Japan is caused by magnitude 9. 0 earthquake during 11 March 2011 at 2. 46pm on Friday. The centred of earthquake was 130km offshore the city of Sendai in Miyagi on the eastern cost of Honshu Island. The time between double quake wave around 3 minutes, that even make Japan move few metres east. The earthquake cause 560 sq km was inundated and result more than 20 thousand human die in this natural disaster. Beside that, the disaster also damage to coastal ports and million buildings are destroyed and collapsed [2]. The earthquake created 15 metre tsunami and flooded entire site, power is lost an hour at 3. 42pm after the quake damage which disabled all six external power supply and 3 cooling nuclear plant reactors, this cause radioactive released accident in Japan. All three cores are melted in first three days, results in high radioactive releases. After 2 weeks, the unit 1 to 3 reactors were stable with supplying water, but it is not effective to remove decay heat from fuel [2]. After that, the workers work centred on restoring heat removal from the reactors and <https://assignbuster.com/the-nuclear-leaking-in-japan-engineering-essay/>

copied with overheated spent fuel ponds with few weeks. The used fuel is necessary to cooling down and shielded. For cooling and shielded, it is needed plenty of water, and used fuel can convert to dry storage after 3 year under water [2].

Problem Presentation

Based on the research from the article, newspaper, internet or other magazines, the problem presentation about the nuclear leaking in Japan is due to two major problems, which are disaster and human impact that occurs in 26 March 2011. For disaster part, we found that the nuclear leakage in Japan is due to the 9.0 earthquake. Because of this earthquake, subsequent tsunami was happened and directly impact to the nuclear power plant which is located on a 3.5-square-kilometre (860-acre) site in the towns of Okuma and Futaba in the Futaba District of Fukushima Prefecture, Japan. This incident permanently damaged most of the reactors and causes that reactor cannot function properly and disabled their cooling system. In order to launch a new water treatment system that can purify the contaminated water, the Tokyo Electric Power Company (TEPCO) recommended to make a machine called advanced liquid processing system (ALPS). However, due to the safety requirements by government regulators, this delay caused to accommodate the contaminated water backlog as a stopgap measure in nuclear plant. TEPCO officials have indicated they hope to release the water into the ocean, but the TEPCO spokesman Masayuki Ono didn't do any plans immediately. The effect caused by nuclear leakage:-The radioactivity had released and triggering a 30 km evacuation zone surrounding the nuclear plant. The containment shield around nuclear fuel rods in the plant might

have been weakened and causing much dangerous material leaked out from the plant. Low-level radioactive waste and enriched uranium are the dangerous material contain in the nuclear plant which will affect the health of human body. For example, lifetime risk of cancer for the residents around the nuclear plant will be increased. On the other hand, this seriously nuclear leakage associated with the impacts of climate change. For example, droughts, floods, displacement, and energy security are occurred at the certain places. In this sense, ethical and justice issues are far more complex and created more consequences of impacts [4]. Because the lack of control on the fuel rods melting, it produced a number of nuclear products such as caesium-137 and iodine-131. This product will

Case Study Analysis Depend on the Environment Ethics

According to the problem presentation above, this nuclear leakage incident critically affected the environment surrounding the nuclear plant. One of the examples is the pollution of the water and ocean. Their workers discovered the water include some of the high levels of radioactive iodine comes out from an 8-inch (20-centimeter) crack in a maintenance pit at the plant and flowed into the ocean for more than a week. This all radioactive water leaking directly flowed into the sea was first time discovered by them. As for the amount of the water splashing into the ocean is not clear. Although their engineers tried to seal the crack with concrete, their effort still failed. Therefore, they decided to inject the sawdust, 3 garbage bags of shredded newspaper and a polymer to absorb liquid in diapers and hopefully can expand to 50 times its normal size when combined with water [3]. Finally, the polymer mix had not leaked out from the crack with the water. However,

engineers still continuously were stirring it to get it to expand because they expected it may be work on Monday morning if not doing well.

Case Study Analysis depend on Responsibility for Safety

In this case study, the engineers are the important role in for safety when builds the nuclear plant. Firstly, the operational safety is the first concern for the engineer for those working in nuclear plants. The use of remote handling equipment is for operation to control the radiation. The continuous monitoring of individual are support and the work environment to ensure very low radiation exposure in Fukushima compared with other industries. Besides that, the other responsibility for safety that the engineers should concern is the possibility of uncontrolled radioactive material leading to contamination and consequent radiation exposure. In the nuclear plant in Fukushima, the core melt is due the major loss of cooling accident by the assumption of engineer. In March 2011, the Fukushima Daiichi nuclear power plant is testing some matter severely with three reactors. After the cooling system shut down, the nuclear plant is impossible to prevent severe damage of the fuel [5]. The graph 1. 1 is shown that the reactor and some energy related accident from several countries which are Three Mile Island, Chernobyl, Fukushima. C: UsersPentaDesktopcumulative_reactor_years. pngGraph 1. 1 The Nuclear Reactor Accident of 3 PlacesBased on the Graph 1. 1, we can conclude that the radiation of Fukushima accident doses to the public is greater than other country. To achieve the optimum safety to build the nuclear plant, the silver engineer should totally follow all the steps while constructs the nuclear plant.

Case Study Analysis depend on Risk of Statement

The most fear impact out of the benefit of nuclear power plant is the leakage of nuclear reactors. So, there are some risks for the human need to face the problem while the nuclear plant leakage in Fukushima, Japan. This risk of accident has the effect of short-term and long term is harmful to humans. It will affect in health impacts, economic, social and psychological. Firstly, the highest risk that will occur are the impact health of human body due to the radioactive material. In human body mechanism, its only can defend a certain amount of radiation. When the radiation is higher, it can damage the cells and organs of the body. In the long-term of exposure, the nuclear radiation will be causes some health effects. For example cancer, genetic mutation, premature aging and disorder of nervous system.

Case Study Analysis depend on Economic Impact

The other risk that will face by the Japanese are the economic down in their country and waste a lot of money for rebuild. One third of the Japan country's electricity is supply by the nuclear industry. While the earthquake or tsunami happened, Japan government will shut down the nuclear plant. The capacity of electricity reduces 40% and it will cause a lot of manufacture industry loses their money and profit. In addition, the country Japan government has to pay for rebuild. The market liquidity that provided by the Bank of Japan is to ensure the stability of financial market, the long-term impact has been negative to the country's struggling economy. The probable increase in national debt is due outweighed for rebuilding by Japan Government. This will cause many investors from other country afraid to invest in Japan country and the economy will lift.

Conclusion

Based on Japan situation, we can see that nuclear energy is the best way to generate electricity in Japan country, but if occur incident, that will bring very huge bad effect to the Japan development. Eventually, the disaster of nuclear plant leaking in Japan can be avoided by the way full of alerting. Fukushima nuclear power plant leaking occur during the 9.0 magnitude earthquake, it seem like leaking is cause by natural disaster, but actually if they make of full preparation, there can fully control radioactivity leaking in 30km area that will harm local people few decade of years. Beside that, the natural disaster are terrible, it cause Japan's economy direct broken some level, building collapse, more than 20 thousand people lost family, lost reputation of the world and so on. But, Japan is a high technology country, they growth the economy very fast to chase up other first world country. However, the effect of power plant leaking is unforgettable experience for them.

SUGGESTIONS

1: Increase awareness of crisis to everyone, make sure they understand the how serious problem will be faced if make even a small mistake. 2: They must set the precaution of safety rule, so the workers can reduce the mistake. 3: The worker should keep their body healthy at all the time, so they can increase efficiency at critical time. 4: Japan can find alternative way to generate electricity, so the supply will not only depend on nuclear power energy. 5: During construction, they should have few more alternative way to keep electricity supply, so the nuclear plant will not melting at any critical

period. 6: Government may build the nuclear power station underground, so while incident happen, can reduce the pollution.

Part2: Code of Ethic

Maintain and Practice knowledge and skills

-Knowledge and skills is needed for the engineers for Tokyo Electric Power Company (TEPCO) in order to generate the new water system that can purify the contaminated water. Due to the higher knowledge in such system , it may increase the efficiency of the system. The predominate of skills may decrease the failure of the system.

Respect the dignity of all individual

-Engineers should treat others with courtesy and without discrimination. As an engineer, we should apply knowledge and skills without bias in respect of race, religion, gender, age, sexual orientation, marital or family status, national origin or mental or physical handicaps.

Engineer shall perform services only in the areas of their competence

-Engineer shall undertake to perform engineering assignments only when qualified by education or experience in the specific technical field of engineering involved. Due to the cases of human impact that occurs in 26th March 2011, the negligence of the maintainance with the nuclear power station is the biggest reason that bring these happened. The engineer must act professionally when handling their job. They may accept an assignment requiring education or experience outside of their own fields of competence, but only to the extent that their services are restricted to those phases of the

project in which they are qualified. All other phases of such project shall be performed by qualified associates, consultants, or employees.

Communicate honestly and effectively, taking into account the reliance of others on engineering expertise.

-This ethic tells engineer should provide clear and timely communications on issues such as outcomes and the risks of the nuclear power. Nuclear power technology produces materials that are active in emitting radiation called "radioactive". Nuclear power plants produce no controlled air pollutants such as sulfur and particulates, or greenhouse gases and Nuclear energy is the most eco-efficient of all energy sources because it produces the most electricity relative to its environment impact if there is no any reactor accidents occurs. Therefore, Engineer has the responsibility to let the people know the risks that facing by every individual in that land.