Case study of nuclear disaster | fukushima nuclear power plant

1. Abstract

This assignment purpose is to do analysis case studies and the Fukushima nuclear disaster. The purpose of this work is for students to use the appropriate method to verify each problem. To study a range of industries (EAT221), there are several levels of courses. In order to complete this news report, the instructor provides the learning needs of students. It also describes how to improve the Tokyo electric power company management of nuclear power plants, manufacturing and safety. Students study was to create recommendations on the basis of this report the nuclear disaster. This case study is one way to measure the impact or accidents related to the theme of the students in the classroom effectively. In addition, we recommend that the case study, students will analyze the problem in an appropriate way.

Introduction

Fukushima Nuclear Power Plant also known as Fukushima Dai-ichi is located on a 3. 5-square-kilometre (860-acre) between the towns of Futaba and Okuma of Fukushima Prefecture, Japan. The plant consists of six boiling water reactors (BWR). These light water reactors drove electrical generators with a combined power of 4. 7 GW, making Fukushima Daiichi one of the 15 largest nuclear power stations in the world. First nuclear power plant was designed, built, and was run in conjunction with General Electric, Boise, and Tokyo Electric Power Company (TEPCO).

March 11, 2011, the 9. 0 earthquake and followed by a not expected tsunami to hit at the power plant factory in Japan cause a major damage to the plant.

It trigger the evacuation zone of 30 km around the plant which would lead to nuclear radiation leak. The earthquake and tsunami has disabled the cooling system of the nuclear reactor. As of April 2012, Units 1-4 are no longer in operation. In Unit 1 to shut down on April 20, unit 2-4, closed on April 19, 2012 while was the last of these four units. It was the most powerful disaster that have been hit the country so far. It has resulted in a massive tsunami that destroyed many towns and villages, nearly have led to 20 000 people death.

3. Man-Made Disaster

From the natural disaster, 9. 0 earthquake followed by a tsunami it was truly unfortunately become a man-made disaster when the nuclear reactor melt-function cause many death in the country. The power plant shouldn’t have shut down automatically when the earthquake happen because when the plant was build it already have been consider to avoid this accident happen when the natural disaster happen.

Japanese parliamentary panel challenged claims by the plant’s operator, Tokyo Electric Power (Tepco), that the triple meltdown at the plant in north-east Japan had been caused solely by a 14-metre tsunami on 11 March last year. The panel said the magnitude-9 earthquake that preceded the waves could not be ruled out as a cause of the accident.

It accused Tepco and regulators at the nuclear and industrial safety agency of failing to take adequate safety measures, despite evidence that the area was susceptible to powerful earthquakes and tsunamis.

Since 2006, the regulators and Tepco were aware of the risk that a total outage of electricity at the Fukushima Daiichi plant might occur if a tsunami were to reach the level of the site. But it accused Tepco of ignoring warnings going as far back as 2006 that a tsunami could cause a blackout at the plant. (Acton J. M. & Hibbs M, March 2012)

It is unknown how TEPCO plans to use broken and damaged reactors but they risk damaging the world’s environment to save money and in their greed and stupidity- they could blow us all up.

the dangers of nuclear power -it is not cheap and it is highly dangerous especially when you do not study geography very well. The fact that these nuclear plants were wrongly built on a fault line makes it further a danger to the world and not only Japan.

In February 2011, Japan’s regulatory approval to extend the 10 years of continuous operation of the reactor. It is in the northeast in 2011 a major earthquake and tsunami damage.

TEPCO bears critical responsibilities to society as a nuclear operator primarily responsible for nuclear power plant safety. Nevertheless, TEPCO was not sufficiently prepared for such an accident, that natural disasters including tsunami may lead to large-scale core damage. Furthermore, TEPCO had not taken adequate preparedness for tsunami risks beyond design basis at the Fukushima Dai-ichi NPS.

Industrial process and operation of the Fukushima nuclear plant.

The reactors for Units 1, 2, and 6 were supplied by General Electric, those for Units 3 and 5 byToshiba, and Unit 4 by Hitachi. All six reactors were designed by General Electric. Architectural design for General Electric's units was done by Ebasco. All construction was done by Kajima. Since September 2010, Unit 3 has been fueled by a small fraction (6%) of plutonium containing mixed-oxide (MOX) fuel, rather than the low enriched uranium (LEU) used in the other reactors. Units 1-5 were built with Mark type (light bulb torus) containment structures.

460 MW boiling water reactors was constructed in July 1967 name Unit 1(BWR-3). Electric start commercial production on March 26, 1971, it originally had been scheduled to shut down in early 2011.

Unit 1 is designed for peak acceleration of 0. 18 g (1. 74 m/s2) and based on the 1952 Kern County earthquake response spectra of ground motion for 0. 498 g Unit 6 Unit design basis, but rated at 0. 45 g(4. 41 m / S2) and 0. 46 g (4. 48 m/s2). In 1978, the Miyagi Prefecture earthquake ground acceleration of 0. 125 g (1. 22 m/s2) for 30 seconds, check each unit, but found no damage to the key part of the reactor. The design basis tsunami is 5. 7 m. An important part of the reactor's emergency diesel generators and DC batteries, helps to keep the reactor cool in case of power failure, located in the basement of the reactor turbine room. Plan designated by the General Electric Company generators and batteries placed in the position of the reactor design, but the concern of the construction work of the mid-level engineers factory, which makes backup power systems vulnerable to flooding. Tokyo Electric Power Company elected to strictly follow the design of the General Electric Company, the construction of the reactors.

How nuclear power station produce electricity?

Basically, all power stations use the same method to produce electricity. A turbine rotation is the main as generating electricity. The generator is attached to the shaft of the turbine and turbine turns, electricity will produced in by generator. Electricity is transmitted via a transmission line to the station power distribution agency. In a hydroelectric power plant, the turbine is turned by running water. In thermal power plants, steam is produced by heating the water with the coal and oil burning furnace. In the nuclear power plant, steam is generated by the heat with fission process.

Cross-section sketch of a typical BWR Mark I containment, as used in Units 1 to 5. The reactor core (1) consists of fuel rods and moderator rods (39) which are moved in and out by the device (31). Around the pressure vessel (8), there is an outer containment (19) which is closed by a concrete plug (2). When fuel rods are moved in or out, the crane (26) will move this plug to the pool for facilities (3). Steam from the dry well (11) can move to the wet well (24) through jet nozzles (14) to condense there (18). In the spent fuel pool (5), the used fuel rods (27) are stored.

How to control the nuclear power plant to generate electricity?

Control the operation of the nuclear plant involves two things. Namely the power control

generation to maintain the secure and stable level, secondly is to shutdown of the reactor very quickly if needed. In MAPS, the power is kept constant by the use of so-called adjusters. These are stainless steel rods. When these

rods are introduced into the reactor vessel, the chain reaction and slows down the production of heat is reduced. If the control rods are slightly pulled out of the reactor vessel, and the chain reaction is the power level increases. When the shutdown is completely, the heavy water is discharged from the reactor vessel in a fraction of a second. In the absence of heavy water in the box, the chain reaction ceasestotally.

What are the fuel requirements for a nuclear power station?

Compared to the burning of coal, the fission process is far more efficient. One gram of fissionable uranium can produce a million times more heat than one gram of coal. At MAPS which produces 400 MW of electricity, only 20 kg of uranium fuel is required per day, i. e. about one truck load of fuel per month from Hyderabad where the fuel is produced. In comparison, a coal burning thermal power station of the same capacity would require about 2000 tonnes of coal daily, i. e. 2-3 train loads of coal to be transported everyday from the coal mines of Singareni over 1000km away. Also the coal has to be continuously fed to the furnace at the rate of 4 tonnes each minute. At MAPS, fresh fuel is charged into the reactor about once daily.

5. Impact of the Fukushima Nuclear Disaster

Society

The emotional trauma of the devastating events in Japan is overwhelming.

Radioactivity has been detected in nearly every state, whether it be in the air, rain water, food or in milk. The fear that arises from hearing about radioactivity being found nearby can cause increased stress and, sometimes,

an overwhelming sense of loss of control. As for foods that may be imported from Japan, there are three safety nets in place so you can feel safe eating what you buy at the grocery store. The first safety net is the ban on importing food from within Japan’s evacuation zone (within about 20 kilometers of the nuclear reactors), the second safety net is Japan’s monitoring of other foods prior to leaving Japan, and the third safety net is the United States Department of Agriculture, which monitors and inspects our imported food.

Ecology

A rabbit born after the nuclear explosion was born with no ears and sending fear throughout the world of the mutations and deformities to come. The world has been exposed to very high amounts from five nuclear reactors in Sendai off of Japan’s east coast, and still to this day they are contaminating all of Japan’s farms, cities and lands with radioactive material-very dangerous and toxic to humans and animals.

http://www. politicolnews. com/japan-nuclear-rabbit-born-with-no-ears/

Health

According to a study by Stanford University in June 2012, 130 people died from (bound for estimator in the year is 1100 upper and 15 lower) cancer, and 180 radiation emission limit cancer cases (24 radiation exposure to the workers in the factory in. Japan, can lead to the death of up to 2-12 was predicted mainly there is a lower limit 1800) is a possibility. The emission radiation was an order of magnitude lower than that released from

Chernobyl, about 80% of the radioactivity from Fukushima has been deposited on the Pacific Ocean. Precautions taken by the Japanese government may have to reduce the health effects of radiation emitting substantially. Radiation causes such as non-mandatory evacuation of about 600 people to death to be caused by such further has been reported. Evacuation procedures after the accident, may have reduced deaths from radiation by example 3-245 potentially, the best estimate is 28, the projected upper limit of the life that was saved from the shelter even itself evacuation already is lower than the number of deaths caused by.

Radiation exposure “ may cause 1, 300 deaths worldwide and 2, 500 cases of cancer in Japan.” However, there is a bigger issue. The radiation emitted at Fukushima trigger transplant “ 16, 000 people,” which, according to the study, also caused mental illness and psychological impact on these people. Stress, fatigue and even being around other sick people are the main contributors to the mental health of many individuals during the evacuation. The study also identifies how these children are more susceptible to radiation “ because their cells are dividing more rapidly and radiation-damaged RNA may be brought in the younger generation of cells.” In addition, DNA damage is also common among people with prolonged exposure to radiation through “ land, air and food”.

Actions taken by Tokyo Electric Power Company (TEPCO)

The roadmap shows the three phases leading up to the end of the decommissioning.

Phase 1: In 2 years, begin the process of fuel removal from the spent fuel pools

Phase 2: In 10 years, begin removing fuel debris (solidified fuels and claddings that had melted).

Phase 3: In 30-40 years, complete fuel debris removal and the processing and disposal of radioactive waste.

http://www. tepco. co. jp/en/nu/fukushima-np/review/review3_1-e. html

Improvement

TEPCO have to reconsider including the condition of design flaws and the safety systems/measure after the Fukushima nuclear accident analysis and mitigation.

TEPCO have to increase the knowledge management, safety culture, and regulatory oversight and the enforcement.

Operator/technical people must know technical measurements in operating NPPs based on stress test results and Passive safety systems for nuclear power plant safety enhancement

Study the advanced nuclear power plant with the existing design / passive security capabilities to prevent accidents Chernobyl / Fukushima-type

Nuclear accident modeling and simulation and prevention action for disaster.

Conclusion