

Contribution Annick Pour articles Fukushima en Anglais

Brief summary of the Fukushima nuclear accident extracted from” Investigation Committee on the Accident at Fukushima Nuclear Power Stations of Tokyo Electric Power Company Interim Report, *December 26, 2011*”

“On March 11, 2011, the Fukushima Dai-ichi and Dai-ni NPS were hit by off the Pacific Coast of Tohoku District Earthquake (“the Earthquake”) and accompanying tsunami waves (“the Tsunami”). The Earthquake was of Magnitude 9.0 and the Tsunami waves height at the Fukushima Dai-ichi NPS exceeded 15 meters. Six nuclear power units stood at the Fukushima Dai-ichi NPS: Units 1 to 3 were in operation, and Units 4 to 6 were in maintenance modes for scheduled outage at the time of the Earthquake. It is believed that Units 1 to 3 were automatically scrammed at the Earthquake, but external power supplies and almost all in-house AC power supplies were lost due to the Earthquake and the Tsunami. Reactors and spent fuel pools at the Fukushima Dai-ichi NPS lost their cooling capabilities. Explosions occurred on Units 1, 3 and 4, which were caused presumably by the hydrogen released from the possible core damage and filled in the reactor buildings. The reactor core of Unit 2 also seems to have been damaged, although the investigation is still incomplete. A large amount of radioactive materials were released and spread from the Fukushima Dai-ichi NPS. The zone up to 20km from the site was designated as the Access Restricted Areas and no entry is allowed unless authorized. Some areas outside 20km from the site were also designated as the Deliberate Evacuation Area. As many as more than 110,000 people have evacuated. Many people are still forced to live in evacuation, and radiation contaminations have caused serious impacts on extended areas.”

Current status at the Fukushima Daiichi NPP site taken from TEPCO web site “Present Status of Fukushima Daiichi NPS and Implemented Countermeasures one year after”

Status of Cooling Water Flow, Temperatures and Pressure at Units 1, 2 and 3

As of December 2011, conditions equivalent to a cold shutdown have been achieved. This is the state where the inside reactor temperatures of Units 1 through 3 have decreased below 100 degrees C and the release of radioactive materials has been significantly suppressed and is being kept under control, by lowering the coolant water temperature below 100 degrees centigrade while bringing release of radioactive materials from primary containment vessels under circulating water to remove heat from the fuel. Plant operators have brought the reactors into a “cold shutdown condition” defined by TEPCO and the Nuclear Emergency Response Headquarters as: control and reducing the public radiation exposure by additional release (not to exceed 1 mSv/year at the site boundary as a target).”

Currently, efforts to steadily cool down the reactors, control radioactive emissions into the atmosphere, and stop all radiation leakage into the ocean remain ongoing. The following issues are considered to be solved: spent fuel pools, accumulated water /groundwater(began the water shielding wall construction and achieved it), , atmosphere/soil (completed the Unit 1 reactor building cover), measurement, reduction and disclosure (estimated amount of radioactive materials currently being released from the PCVs) and finally tsunami reinforcement.

Mid-and-Long-term Plan “TEPCO’s Fukushima Daiichi nuclear power plant station reactors 1, 2 and 3 require

pressure, of 1 atmosphere and reducing the pressure inside the reactor vessels to the same as the outside air.

Investigation of Reactor Interior at Fukushima NPS Reveals Clear Images

On March 26, the Tokyo Electric Power Co., Inc. (TEPCO) carried out its second investigation of the interior section of the Primary Containment Vessel (PCV) of Unit 2 at its Fukushima Daiichi Nuclear Power Station (NPS), using a radiation-resistant video image scope and thermocouple. The PCV is believed to have been partially damaged by the accident in March 2011.

It is assumed that the nuclear fuel in the Unit 2 reactor had melted, and that some of it had penetrated the reactor pressure vessel, cooling and solidifying on the concrete bottom of the PCV. It is further assumed that in the early morning of March 15, 2011, pressure in the PCV had dropped sharply following an explosive sound, and that the PCV had somehow been compromised. It has not yet been determined, however, which part of the PCV was damaged.

In order to continuously cool the melted fuel, a large volume of water has been injected from the top of the reactor. As a result of the investigation, which took about three hours, TEPCO estimated that water had only accumulated to a level of approximately 60cm from the concrete bottom of the PCV. The temperature of the water was measured to be about 48.5-50°C, indicating that the melted fuel is being continuously cooled. Although the accumulated water was relatively transparent, TEPCO did confirm that sediment and suspended material were present. The maximum exposure dose during the investigation was 5.29 mSv/day.

Mid-and-Long-term Plan

The Mid-and-Long-term Plan prepared in conjunction with the government was released in late December 2011 and includes activities towards decommissioning Units 1 to 4.

After the completion of the phase 2 of the accident recovery as indicated above, Mid- and long-term Plan roadmap shows the three phases leading up to the end of the decommissioning.

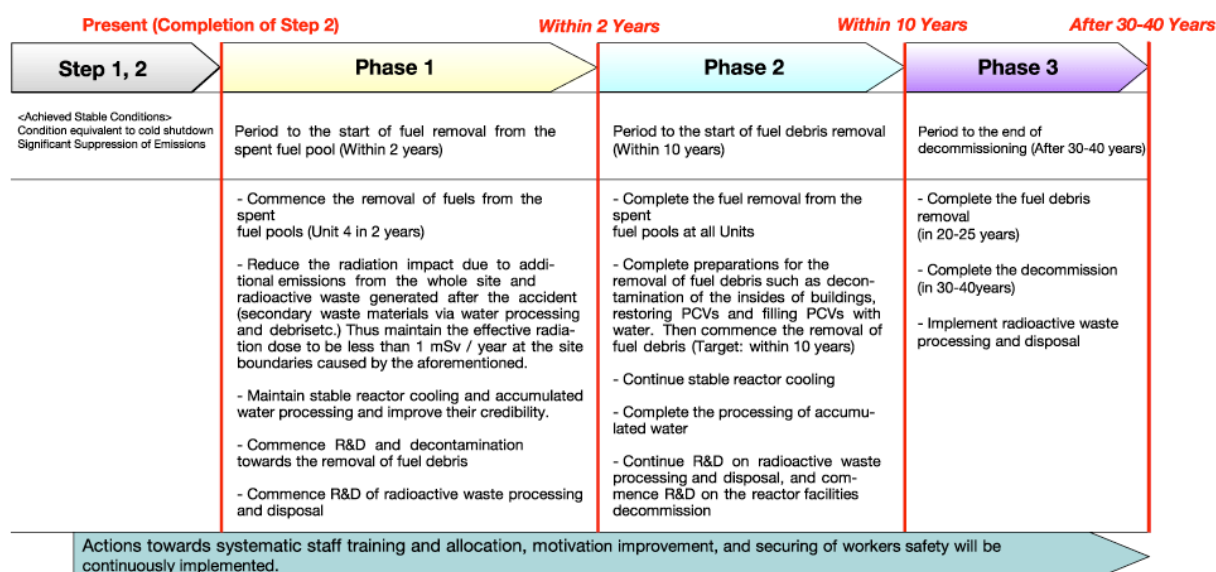
Phase 1: From the completion of Step 2 to the start of fuel removal from the spent fuel pool (target is within two years). In addition to work preparing to start removing fuel from the spent fuel pool, this phase will include research and development necessary for the removal of fuel debris, the start of site investigations, and other tasks in a period of intensive preparation for decommissioning.

Phase 2: : From the end of Phase 1 to the start of fuel debris removal (target is within ten years). Within this phase, we will step up many research and development tasks towards the removal of fuel debris, and tasks such as reinforcement of PCV. This phase will be further divided into three steps: early, mid, and late, as a guideline for judging progress within the phase.

Phase 3: From the end of Phase 2 to the end of decommissioning (target is 30–40 years). This is the phase for implementation of tasks from fuel debris removal to the end of decommissioning."

R&D will support these phases in the following areas: removal of fuel from spent fuel pools; preparation for removal of fuel debris; processing and disposal of radioactive waste, and remote control devices.

The following figure gives more details and is extracted from TEPCO's report:



Latest developments regarding protective measures for the public?

On 17 January METI released a new website designed to help the Japanese public access the various Government support programs that have been put into place to support those affected by the disaster.

On 26 January the Ministry of the Environment released the "Road Map of Environmental Remediation Activities". This Road Map covers the environmental remediation strategy to be employed in the Deliberate Evacuation Area and the Restricted Area. By the end of March, these areas are to be re-categorized as follows (by the Nuclear Emergency Response Headquarters as decided on 26 December 2011):

- The area prepared to call off the evacuation instruction, which will include those areas with estimated doses to the public of less than 20 mSv/yr;
- The area to restrict residency, which will include those areas with estimated doses to the public between 20 mSv/yr and 50 mSv/yr; and
- The area with difficulty of return, which will include those areas with estimated doses to the public of greater than 50 mSv/yr.

Convention on Nuclear Safety

The *5th Review Meeting of the Convention on Nuclear Safety (CNS)*, being held in Vienna, Austria, concluded on 14 April 2011: "Nuclear Safety Convention Meeting Commits to Learn Lessons from Fukushima Nuclear Accident".

During the 10 days of meetings, delegations from 61 of the 72 countries that are "Contracting Parties" to the Convention discussed long-term safety issues, as well as the unfolding nuclear emergency at the Fukushima Daiichi power plant in Japan.

As a result of the Japanese disaster, the contracting parties are carrying out safety reviews of their nuclear installations, including re-examining the nuclear power plants' safety measures that defend against extreme external events.

The Contracting Parties stated that the learning process following the Fukushima accident will continue as more information is acquired and analyzed.

Although the CNS is scheduled to meet every three years, it was agreed that they would convene an extraordinary meeting next year to analyse the Fukushima accident.

The extraordinary meeting will be convened in the last two weeks of August 2012 and national reports on post Fukushima actions are due in May 2012.

The Investigation Committee on the Accident at the Fukushima Nuclear Power Stations in Japan

The Investigation Committee of Tokyo Electric Power Company (TEPCO) was established by the Cabinet decision on May 24, 2011. Its objectives are: to conduct investigation for finding out the causes of accidents (the Accident) at the Fukushima Dai-ichi Nuclear Power Station (Fukushima Dai-ichi NPS) and Fukushima Dai-ni Nuclear Power Station (Fukushima Dai-ni NPS) of TEPCO as well as the causes of accident damage; and to make policy recommendations for limiting the expansion of damage and preventing reoccurrence of similar accidents.

The Investigation Committee has conducted its investigation and evaluation since its first meeting on June 7, 2011. Its activities included: site visits to the Fukushima Dai-ichi and Dai-ni NPSs, as well as to other facilities; hearing of heads of local governments around the Fukushima Dai-ichi NPS; and hearing of people concerned through interviews mainly arranged by the Secretariat. As of December 16, 2011, the number of interviewees reached 456.

The investigation and evaluation by the Investigation Committee are still ongoing and the Interim Report does not cover every item that the Committee aims at investigating and evaluating. Fact-finding of even some of those items discussed in the Interim Report are not yet completed. The Investigation Committee continues to conduct its investigation and evaluation and will issue its Final Report in the summer of 2012. Based on the examination of various facts found up to now, the Investigation conclusions are indicated in the following table:

Provisional Conclusions

Lack of severe accident preparedness for tsunamis

TEPCO did not take precautionary measures in anticipation that a severe accident could be caused by a tsunami such as the one which hit at this time. Neither did the regulatory authorities.

The tsunami that caused the Accident is an example of events that are believed to have a very small probability of happening but are likely to produce enormous damage if they do happen. We must refresh our awareness of the risks of such events. We should take the necessary measures to address such risks, which should never be ignored.

Lack of awareness of the ramifications of a complex disaster

A lack of foresight is identified as a great problem for the safety of both nuclear power plants and surrounding communities that nuclear accident had not been assumed to occur as complex disaster. Disaster prevention program should be formulated by assuming a complex disaster, which will be the major point in reviewing nuclear power plant safety for the future.

Lack of an all-encompassing perspective

It cannot be denied that the nuclear emergency response programs in the past lacked an overall perspective. This is a great shortfall in nuclear emergency response programs. The excuse cannot be justified that it had been difficult to make sufficient preparations for such an exceptional event because the plant was struck by a tsunami beyond design basis assumptions.

The Investigation Committee is convinced of the need of a paradigm shift in the basic principles of disaster prevention programs for such a huge system, whose failure may cause enormous damage.

“Whatever to plan, design and execute, nothing can be done without setting assumptions. At the same time, however, it must be recognized that things beyond assumptions may take place. The Accident presented us crucial lessons on how we should be prepared for such incidents that we had not accounted for.”

The Investigation Committee will continue its investigation and plans to deliver its final report in the summer of 2012.

IAEA ACTION PLAN

Safety assessments in the light of the accident at TEPCO's Fukushima Daiichi Nuclear Power Station

Undertake assessment of the safety vulnerabilities of nuclear power plants in the light of lessons learned to date from the accident

IAEA peer reviews

Strengthen IAEA peer reviews in order to maximize the benefits to Member States

Emergency preparedness and response

Strengthen emergency preparedness and response

National regulatory bodies

Strengthen the effectiveness of national regulatory bodies

Operating organizations

Strengthen the effectiveness of operating organizations with respect to nuclear safety

IAEA Safety Standards

Review and strengthen IAEA Safety Standards and improve their implementation

International legal framework

Improve the effectiveness of the international legal framework

Member States planning to embark on a nuclear power programme

Facilitate the development of the infrastructure necessary for Member States embarking on a nuclear power programme

Capacity Building

Strengthen and maintain capacity building

Protection of people and the environment from ionizing radiation

Ensure the on-going protection of people and the environment from ionizing radiation following a nuclear emergency

Communication and information dissemination

Enhance transparency and effectiveness of communication and improve dissemination of Information

Research and development

Effectively utilize research and development