Summary of Nuclear Safety Reform Plan Progress Report (3rd Quarter FY2014) [1/3]

Highlights

① The removal of all fuel assemblies, new and used, was completed from Fukushima Daiichi Unit 4, safely and on schedule, resulting in a significantly safer environment for workers and providing important experience that will be useful in the removal of fuel from other units.

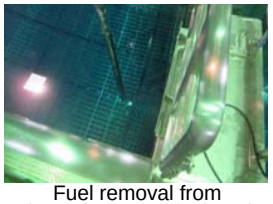
② Various water treatment systems were enhanced and accelerated at Fukushima Daiichi, and although the initial March target for completion of treatment of contaminated water, it is expected that treatment will be completed only a few months later.

③ Significant progress was made in development Key Performance Indicators to measure the extent to which the Nuclear Safety Reform Plan's safety recommendations, including adoption of a "safety culture," have been adopted throughout the company.

1. Progress of safety measures at each power station

Fukushima Daiichi NPS

- **Unit 4 Fuel Removal:**
  All 1,533 fuel assemblies have been safely removed from the Unit 4 spent fuel pool and have been relocated for safe long-term storage. The achievement generated considerable international attention, such as the *New York Times* article, "Fuel Rods Are Removed From Damaged Fukushima Reactor Building", which described the event as a major milestone that removed a worrisome vulnerability.


Fuel removal from the Unit 4 spent fuel pool

- **Unit 1 Fuel Removal:**
  In an illustration of the company's commitment to safety culture, the process was slowed to provide additional safeguards against inadvertent contamination from dust and debris associated with removal of the temporary cover that had been erected over Unit 1 immediately after the accident. The cover was removed and investigation has ascertained that preparatory cleanup work is not likely to damage the fuel pool or cause scattering of dust into the environment. Dismantling of the cover is proceeding carefully.
- **Water Management and Treatment:**
  A variety of water management strategies continue to be developed and implemented, including construction of the frozen soil wall and efforts to plug the trenches leading from the turbine buildings. Water treatment has been accelerated through the October 18 start-up of high-performance ALPS and additional purification devices. (*Subsequent to the period covered by this quarterly report, TEPCO announced that it would not meet the March 2015 target for the treatment of all contaminated water, but said that the increase in treatment capacity and capability would likely permit completion by the end of May 2015.*)

Comments of 7th Nuclear Reform Monitoring Committee (Dec. 1, 2014)

- Safe completion of spent fuel removal of Unit 4 can be evaluated as a significant progress.
- We may have to face many difficulties in future, but it is important to continue to give highest priority to "Safety" rather than "Process" and try to reduce the risks on entire site.
- Regarding the contaminated water treatment, further efforts are necessary even though the approach of conducting root cause analysis of all the troubles occurred in the past and work towards improvement and strengthening of facilities and operations etc. can be evaluated.

Fukushima Daini NPS

- **Cold Shutdown Safely Maintained:**
  To maintain various facilities necessary to maintain cold shutdown, TEPCO has proactively checked various facilities for symptoms of abnormality. If they are found, we are suspending their use, switching to alternate processes or facilities, and adjusting maintenance and inspection schedules (as appropriate in each situation) to assure continued stability of the cold shutdown.
- **Support of Decommissioning at Fukushima Daiichi:**
  Welded tanks designed for the safe storage of contaminated water are being produced at Fukushima Daini, transported by sea up the coast to Fukushima Daiichi, and assembled there. This procedure has reduced worker exposure to radiation by shifting the manufacturing work from Daiichi to Daini.

Kashiwazaki-Kariwa NPS

- **Regulatory Review of Restart Application:**
  Review by Japan's Nuclear Regulatory Authority (JNRA) of KK's regulatory compliance is fully underway. To assist in the JNRA's review, we have conducted additional geological surveys both inside and outside the power station site, and reported our analysis and evaluation of the data. We have accepted JNRA's on-site inspection of the plant facilities on Dec. 12. JNRA inspected approximated 100 items including safety facilities and safety drills.
- **Adoption of Additional Safety Measures:**
  A buffer zone, sometimes known as a "fire break", has been started around the perimeter of KK. In addition to preventing forest fires from reaching the facility, it will also help protect against tsunamis and flooding. When completed it will have a total length of 4 kilometers and is projected to be completed by the end of March 2015.
- **Independent Safety Reviews:**
  TEPCO is arranging for reviews by international third parties such as IAEA on hardware and software countermeasures.

Comments of 7th Nuclear Reform Monitoring Committee (Dec. 1, 2014)

- On Kashiwazaki Kariwa NPS, safety measures based on the lessons learned from Fukushima Daiichi accident are making steady progress.

2. Progress in Adoption of Safety Measures of Nuclear Safety Reform Plan

Measures	Main Implementation Items	Comments of 7th Nuclear Reform Monitoring Committee (Dec. 1, 2014)
1. Reform Top Management	• Benchmarking activities have been undertaken to compare and evaluate performance against world-class examples. These include the 10 Traits and 40 Behaviors of sound nuclear safety culture used by such organizations as INPO/WANO. The Nuclear Reform Monitoring Committee emphasized the importance of ensuring that these traits and behaviors, and the safety culture generally, permeate down to the level of front-line employees and supervisors, including contractors and partners. • Nuclear leaders have transmitted safety messages to all employees at least every three days and sometimes more frequently. • Key performance indicators (KPIs) are being developed to quantitatively measure progress in safety reform, including adoption of a “safety culture”. The Nuclear Reform Monitoring Committee has emphasized that the KPIs not be considered ends in themselves but rather tools by which to achieve the objective of safety.	• It is vital that TEPCO permeates safety culture throughout the entire organization, from upper management to first line managers in the field, and aims to constantly maintain higher standards. • In pursuit of this goal, it is evident that TEPCO has commenced activities to compare and assess the behavior and best practices of organizations and their employees that exhibit the world’s highest level of nuclear safety. • KPI itself is not the objective, but an important means to achieve the objective, and we expect TEPCO to follow through with this initiative and provide a progress report during the next committee meeting.
2. Enhancement of Oversight and Support for Management	• The Nuclear Safety Oversight Office has monitored and evaluated the progress of activities that the Board of Directors instructed to implement the Nucear Safety Reform Plan.	• The Board of Directors instructs management to make improvements based on this advice and periodically confirms the status of progress of these efforts thereby enhancing nuclear safety governance, culture and performance. • Out of the advice offered by the Nuclear Safety Oversight Office, there is still room for improvement and development in regard to items such as nuclear safety assurance and training, so further effort is required in regard to this and other matters. A report on further progress is expected to be heard at the next committee meeting.
3. Enhancement of Ability to Propose Defense in Depth	• The number of proposals for improvements in safety have significantly increased. In the second competition held in the fiscal year for safety improvement suggestions, a total of 134 were received, 60 percent more than the previous competition. Meanwhile, 10 out of the 11 top suggestions from last year’s competition have been implemented.	(No comment)
4. Enhancement of Risk Communication Activities	• Risk communication activities have focused on building trust with local communities. TEPCO has held briefing sessions for autonomous communities, concerned bodies, and siting communities. We will be using surveys in Fukushima and Niigata Prefectures, as well as in Tokyo and various embassies, to gather information on attitudes and perceptions that will help us improve future communications and make them more responsive to our target audiences.	• Communication during times of normalcy as well as during times of emergency has improved from the perspectives of transparency, speed and ease-of-understanding, but the committee would like to see further improvement as well as an external assessment by a third party.
5. Enhancement of Emergency Response Capability (Organization) of Power Station and Headquarters	• TEPCO participated in Niigata nuclear disaster prevention training, which confirmed the effectiveness of sharing information promptly with local government responders. The drills included Niigata Prefecture and nine municipalities.	• The fact that emergency response training now incorporates various scenarios and is being implemented jointly with external parties as suggested by this committee is a big step forward. • This committee hopes that training details and implementation methods will continue to be revised while TEPCO repeatedly implements training, identifies problems and makes improvements to ensure that training is even more effective, and that the status of these efforts will be conveyed both within and outside of the company.
6. Enhancement of Emergency Response Capability (Individual) and Enhancement of Field Force	• The capability of individuals was enhanced with repeated trainings for operators, maintenance personnel, and others. The training programs were designed with input from training programs used in North America.	(No comment)

3. Key Performance Indicators (KPIs) to Measure the Level of Nuclear Safety Reform Achievements

- TEPCO began an effort to develop Key Performance Indicators (KPIs) for each of the six categories of safety-related measures called for in the Nuclear Safety Reform Plan, as well as the adoption of the overall “safety culture”. A progress report was delivered to the Nuclear Reform Monitoring Committee at its December 1, 2014 meeting, and TEPCO was encouraged to consult with various North American companies to benefit from their experience with KPIs and to make efforts to simplify the KPIs to maximize their clarity and utility. At the same meeting, TEPCO provided the Nuclear Reform Monitoring Committee with the results of a study that benchmarked safety communications practices, including the use of KPIs, of five leading global companies including nuclear power producers.
- A chart outlining the current state of KPI development follows:

Root causes of accident (Situation prior to accident)		6 measures	6 KPIs		Quantification approach	Goal values
Insufficient safety awareness	• The management took for granted that safety has already been established. They lacked awareness that safety should be improved on a daily basis, and underestimated nuclear risks	Measure 1 Reform starting from the management Measure 2 Enhance monitoring / assistance for the management	**Safety awareness KPI (Traits)**	Did the management’s safety awareness improve? Has safety culture reached the organization as a whole?	• Focus assessment on management / nuclear power leaders based on self-assessment outcomes that involve nuclear safety • Represent as indicators in a 100-point scale	70 points or above
			Safety awareness KPI (M&M)	Are nuclear power leaders transmitting safety-relevant messages (“M”), and do employees understand them? Does the management perform on-site power plant observations (“MO”) to continue improvements?	• Evaluate based on the number of messages issued by nuclear power leaders, employees’ level of understanding, and the number of MO-based improvements • Represent as indicators in a 100-point scale	70 points or above
Insufficient technological capabilities	• Excessive reliance on manufacturers and contractors resulted in insufficient self-design / work capabilities, as well as unsatisfactory abilities to view the power plant’s system as a whole • Reluctant to address risks by harnessing domestic/international operation experience (OE) • Emergency drills lost its substance, leading to insufficient capabilities to respond to or expect accidents	Measure 3 Enhance the ability to propose defense in depth Measure 5 Enhance emergency response capabilities (organizational level) Measure 6 Enhance emergency response capabilities (individual level) and on-site workers’ potential	**Technological capability KPI (Plan)**	Are there multiple good-quality proposals on safety, and are they swiftly put into practice? Are domestic and international operation experiences (OE) harnessed? Are hazard analyses performed to carry countermeasures forward?	• Evaluate based on the rate of action plans set based on measures 3, 5, and 6, or WANO’s Performance Objectives and Criteria (PO&Cs) which are global standards of nuclear power excellence • Represent as indicators in a 100-point scale	70 points or above
			Technological capability KPI (Result)	Is the Incident Command System (ICS) fully used to raise emergency response capabilities? Is there a diverse range of personnel qualified in enhancing nuclear and industrial safety? Are efforts being made to boost each of their technological capabilities?	• Evaluate based on the achieved degree of goal values regarding measures 3, 5, and 6, or PO&C-based action plans • Represent as indicators upon setting 50 points as an on-schedule progress of the action plan	50 points or above
Insufficient communication skills	• Reluctant to disclose risk-related information	Measure 4 Reinforce risk communication activities	**Dialogue-promoting capability KPI (External)**	Are active, timely, and proper risk communications carried out to external stakeholders?	• Evaluate based on questionnaires to external parties concerning the quality and quantity, as well as TEPCO’s attitude on transmitting information • Represent as indicators in a 100-point scale	Increasing trends over time
			Dialogue-promoting capability KPI (internal)	Are safety-focused communication taking place to get across safety culture to the organization as a whole?	• Evaluate based on outcomes that involve communications on nuclear safety self-assessment • Represent as indicators in a 100-point scale	Increasing trends in the moving average