

Nuclear Safety Reform Plan Progress Report  
(FY2013 2<sup>nd</sup> Quarter)

November 1, 2013

Tokyo Electric Power Company, Inc.

## Contents

|                                                                                                                                                |       |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Introduction                                                                                                                                   | ... 2 |
| 1. Progress on Nuclear Safety Reform Plan (Facilities, etc.)                                                                                   |       |
| 1.1. Fukushima Daiichi Nuclear Power Station (NPS)                                                                                             | ... 4 |
| 1.2. Fukushima Daini Nuclear Power Station (NPS)                                                                                               | ... 8 |
| 1.3. Kashiwazaki-Kariwa Nuclear Power Station (NPS)                                                                                            | ...11 |
| 2. Progress on Nuclear Safety Reform Plan (Management)                                                                                         |       |
| 2.1 Countermeasure 1: Reform from Management                                                                                                   | ...16 |
| 2.2 Countermeasure 2: Enhancement of Oversight and Support for Management                                                                      | ...17 |
| 2.3 Countermeasure 3: Enhancement of Ability to Propose Defense in Depth                                                                       | ...18 |
| 2.4 Countermeasure 4: Enhancement of Risk Communication Activities                                                                             | ...20 |
| 2.5 Countermeasure 5: Reform of Power Station and Head Office Emergency Response Organizations                                                 | ...21 |
| 2.6 Countermeasure 6: Reassessment of Non-Emergency Power Station Organization and Enhancement of Engineering Capability for Direct Management | ...23 |
| 3. Status of Investigations into Unidentified and Unexplained Matters in the Fukushima Nuclear Accident                                        |       |
| 3.1 Status of Examination of Unidentified and Unexplained Matters                                                                              | ...26 |
| 3.2 Status of Field Investigations                                                                                                             | ...26 |
| In Closing                                                                                                                                     | ...27 |

## Introduction

We want to present our heartfelt apologies again for the tremendous distress and hardship that the Fukushima Nuclear Accident and recent problems with contaminated water have placed upon the residents of communities around the power station and on society at large. TEPCO is united as we continue to work together to maintain the stable state of Fukushima Daiichi Nuclear Power Station, and we will strive in our efforts to provide damage compensation, decommission and decontaminate and restore Fukushima so that the people who evacuated are able to return home and all Japanese citizens can live with peace of mind.

On March 29, 2013<sup>1</sup>, TEPCO compiled the “Fukushima Nuclear Accident Summary and Nuclear Safety Reform Plan” (“Report”), and is currently implementing the Nuclear Safety Reform Plan. The Report summarized the cause of the Fukushima Nuclear Accident as having been "due to inadequate preparations for a severe accident from the standpoint of both equipment and personnel" that "invited the severe situation of a station blackout, causing loss of function in multiple safety facilities." Progress made on the Nuclear Safety Reform Plan is verified quarterly and the results released to the public. With regard to the verification of the Nuclear Safety Reform Plan in terms of progress made in the 1<sup>st</sup> quarter, issues to be addressed and problems that have occurred, we provided this information in the “Progress Report” and “Announcement Problems Regarding the Contaminated Water Outflow into the Station Port.” Here, we give an account of these matters in the “Progress Report” for the second quarter.

In the second quarter, we have taken very seriously and addressed as urgent, top-priority issues the problems of contaminated water flowing into the port and contaminated water leaking from tanks. Because prompt decisions need to be made and resources intensively committed, TEPCO established the Contaminated Water and Tank Countermeasures Headquarters to bolster the framework for addressing these issues. Throughout the company, we are working on comprehensive measures with an organization permanently stationed on site with a top official for nuclear power having overall responsibility. In implementing measures, the central government has guided activities and provided advice for their orientation and other aspects, along with assistance for technology development.

Moreover, we will provide expeditious and thorough publication of data concerning radioactive materials and contaminated water. New notification guidelines have been drafted and announcement methods devised for Fukushima Daiichi Nuclear Power Station

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<sup>1</sup> Hereinafter, dates displayed without a year are understood as this year 2013.

(announced on September 13), and these went into operation on September 17. We are moving forward to satisfy demands put forth by society for even greater disclosure of information.

## 1. Progress on Nuclear Safety Reform Plan (Facilities, etc.)

### 1.1. Fukushima Daiichi Nuclear Power Station (NPS)

#### (1) Establishment of the Contaminated Water and Tank Countermeasures Headquarters

Problems have arisen in which contaminated water flowed into the port and contaminated water leaked from tanks. We are taking these problems very seriously, addressing them as urgent management issues of the highest priority, and we are working on countermeasures.

On August 26, the Contaminated Water and Tank Countermeasures Headquarters (Chief: President Hirose) was established, and it was determined that:

- Due to the significant leakage of contaminated water from tanks, it has become evident that tank management has been insufficient. Therefore, urgent and fundamental reinforcement will be provided.
- The situation in which preventive measures have been insufficient to deal with these problems will be resolved and countermeasures accelerated, including those for the medium and long-term. Analysis and risk management will be enhanced as well.
- Resources throughout the company will be committed, and knowledge, proposals and know-how from both inside and outside Japan will be proactively introduced.

Under the Contaminated Water and Tank Countermeasures Headquarters, a total of 15 teams have been set up and personnel summoned from throughout the company. The Headquarters' mission has been clearly defined as described below:

- ① The “mobility enhancement team” is to strengthen the response to all sorts of problems including issues not related to contaminated water and tanks, as well as it will function in cross-sectional manner, emphasizing the field, actual items and actual circumstances.
- ② Four teams concerned with “tank countermeasures and operation” are to work to strengthen operations including conducting patrols and installing water level gauges, improving the reliability of tanks, water barriers and other components, managing risks associated with tanks, construct tanks, and accelerating the processing of highly contaminated water.
- ③ Four teams concerned with “ascertaining and analyzing the current status along with risk management” are to research and analyze groundwater; research, analyze and assess the behavior of radioactive materials in groundwater and seawater; identify sources of contamination; and manage risks for contaminated water in general.
- ④ Four teams concerned with “formulating and verifying measures to counter contaminated water” are to formulate and implement urgent countermeasures including soluble glass and well points; plan and implement groundwater bypasses, sub-drains, frozen soil barriers and other such measures; and confirm the

effectiveness of measures and study long-term measures.

- ⑤ Two teams concerned with “liaison, coordination and public relations” are to contact and coordinate with government agencies, administrative bodies and other such organizations as well as communicate information overseas, and the teams will share information with and strengthen cooperation among the Head Office, Fukushima Daiichi NPS and other such locations.

The Headquarters is tackling the resolution of these issues in a lateral manner across the organization.

Furthermore, an expert having in-depth knowledge of decommissioning technology, Lake H. Barrett (formerly with the US Nuclear Regulatory Commission and the US Department of Energy) has been retained. In addition to providing guidance and advice to the Contaminated Water and Tank Countermeasures Headquarters and each team, he provides advice and suggestions as well as consultative reports to the President.

The Contaminated Water and Tank Countermeasures Headquarters held a meeting on September 13 at which Dr. Dale Klein, Chairman of the Nuclear Reform Monitoring Committee and Mr. Barrett provided the following recommendations, which will be addressed in the future.

- Formulate a comprehensive contaminated water management plan
- Recognize that not all issues can be dealt with by TEPCO alone, and have outside experts develop technology which can be applied to the actual field
- Be one step ahead in addressing risks and communicate thoroughly and
- Strive to spread a culture of safety, even in the decommissioning work

## (2) Measures for Preventing Flow of Contaminated Water into Port

Emergency countermeasures and comprehensive measures are being advanced in a multi-tiered fashion based on the three principles for countermeasures: “removing the source of contamination,” “keeping water away from the contamination source,” and “not allowing contaminated water to leak.”

The emergency measures comprise the removal of highly contaminated water in contamination source trenches, soil improvement, construction of groundwater bypasses and other measures to be implemented, and the comprehensive measures (next 1~2 years) encompass an impermeable wall to be built along the seaside, the drawing up of groundwater through wells near buildings, and other such measures.

## Multi-tiered measures to address groundwater contamination

- 3 principles for contaminated water countermeasures**
1. **Remove** contamination source
  2. **Keep water away** from contamination source
  3. **Don't allow leakage** of contaminated water

### Emergency measures

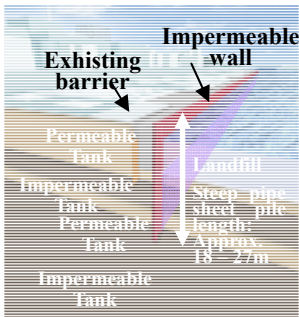
1. Cleaning up highly contaminated water from trenches **【Removal】**
2. Measures for contaminated areas  
Soil improvement, paving of surface, drawing up groundwater, etc.  
**【Keeping away from contamination sources】【Not allowing leaks】**
3. Groundwater bypass **【Keeping away from contamination sources】**

### Comprehensive measures (next 1~2 years)

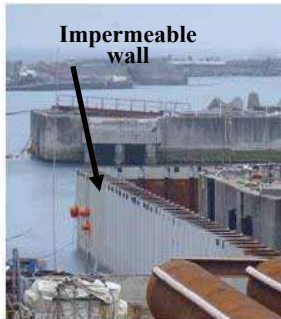
1. Drawing up groundwater using sub-drains (wells near buildings)  
**【Keeping away from contamination sources】**
2. Installation of seaside impermeable wall **【Not allowing leaks】**
3. Installation of landside impermeable wall using frozen soil method  
**【Keeping away from contamination sources】【Not allowing leaks】**
4. Development of more highly efficient decontamination treatment facilities for highly contaminated water **【Removal】**

### Installation of seaside impermeable wall

<Illustration>

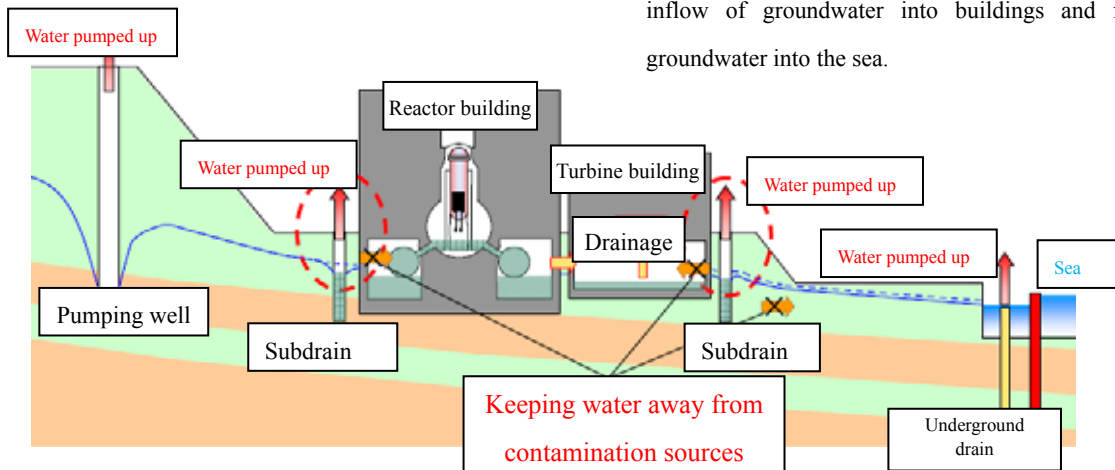


<Installation of wall>



Construction was started in May 2012 along the sea with the aim of completing the work by September 2014.

### Drawing up groundwater



Pumps will be used to draw up groundwater to lower the groundwater level around buildings so as to control any inflow of groundwater into buildings and flow of groundwater into the sea.

### (3) Measures to Counter Leakage of Contaminated Water from Tanks

The measures described below will be adopted to counter the problem of contaminated water leaking from tanks.

- ① Augmentation of the management system for tanks and the surrounding area
  - Ordinary operation with drain valves closed (August 28~)
  - Measures for concrete reinforcement of tank bottoms to be considered along with replacement of tanks
  - Installation of water level gauges in tanks and construction of centralized monitoring system (operation scheduled to commence at end of November)
- ② Augmentation of patrols
  - Increase patrol frequency to 4 times per day (August 26~)
  - Increase patrol personnel to 60 (day: 3 personnel × 10 teams; night: 6 × 5 teams for a total of 30) (September 2~)
- ③ Accelerated replacement of bolt-fastened tanks and additional construction of welded tanks
  - Accelerate additional construction of welded tanks through concurrent installation in multiple areas, and study measures for curbing waste during replacement
- ④ Accelerate treatment of highly contaminated water (Advanced Liquid Processing Systems will gradually go into operation from September 30) and reduce radiation levels in surrounding area by recovering contaminated soil
  - Corrosion countermeasures to be prioritized for the Advanced Liquid Processing System C, and hot run started (September 27~)
  - Study the introduction of a high-capacity contaminated water decontamination facility as part of a project subsidized by the Ministry of Economy, Trade and Industry
  - Finalize a plan to complete the cleanup of all contaminated water stored in tanks during FY2014, including further augmentation of Advanced Liquid Processing Systems
  - Recover contaminated soil in the vicinity of H4 area (August 23~)
- ⑤ Identify risks related to storage of highly contaminated water and examine measures to counter such risks
  - Preventive and multi-tiered measures in preparation for cases where current countermeasures are not effective
  - Broadly identify risks and implement countermeasures
- ⑥ Prevent leaks from spreading
  - Raise water barriers around tanks
  - Measures to prevent inflow of contaminated water by covering drainage channels



#### (4) Removal of fuel from Unit 4 spent fuel pool

Beginning in November, fuel is scheduled to be removed from the Unit 4 spent fuel pool<sup>2</sup>. This work is also an important step in the decommissioning process, and we have been steadily proceeding with preparations for such removal with the installation of a fuel removal cover and other measures as we regularly verify the soundness of the reactor building. In the future, we intend to expend all possible means to identify risks as well as formulate and implement measures to counter such risks along with providing extensive risk communication.

### 1.2. Fukushima Daini Nuclear Power Station (NPS)

At the Fukushima Daini NPS, restoration of permanent facilities was advanced, including those involved in maintaining the cold shutdown. On May 30, restoration of Unit 1 was completed. With this, the restoration of all equipment involved in maintaining the cold shutdowns of Units 1~4 has been completed.

In addition, work regarding the emergency safety measures has proceeded for securing equipment and materials, reinforcing power sources (deployment of power supply cars and air-cooled gas turbine generator vehicles), and ensuring means for injecting cooling water (deployment of fire engines). Preparations are underway so that restoration work is able to go ahead even if a similar situation as occurred with the previous accident were to happen during the process.

Based on the lessons learned from the Fukushima Nuclear Accident, four project teams were formed and commenced training on July 1 to acquire practical skills through direct management of engineering work so that even during an emergency, TEPCO employees are able to promptly and securely maintain cold shutdown of a reactor. All personnel on the restoration teams (113 people as of September 30) will undergo training according to a three-year plan to develop the capabilities to execute such a response.

Step 1: In one year, under the guidance of outside advisors, TEPCO Maintenance Department personnel will be able to restore damaged equipment for removing reactor residual heat, similar to the damage experienced during the Great East Japan Earthquake and Tsunami, by securing power from air-cooled gas turbine generator vehicles during a station black out resulting from a tsunami.

Step 2: In two years, TEPCO Maintenance Department personnel will be able to restore on their own damaged equipment for removing reactor residual heat, similar to the damage experienced during the Great East Japan

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<sup>2</sup> On July 18 and 19, work was performed to remove two new fuel units in the Unit 4 spent fuel pool.

Earthquake and Tsunami, by securing power from air-cooled gas turbine generator vehicles during a station black out resulting from a tsunami.

Step 3: In three years, even if an unexpected event occurs during an emergency, personnel will be able to demonstrate the applied skills developed through activities to enhance their engineering capability for direct management in the field on a daily basis so they can directly manage situations and resolve events.

The composition provides for four teams (7 personnel per team) with their respective roles as described below. In the approximately two months since activities commenced, a series of training sessions have been conducted mainly for the core members of each team. Later, each team will continue training at a frequency of 1~2 times per month to improve team capabilities.

- ① The team responsible for clearing away debris and restoring roads operates loaders, backhoes, forklifts and other heavy machinery and restores roads by removing debris scattered across roads as well as using gravel and steel plates to ensure access routes when the restoration work is being performed.



Clearing away debris

- ② The team responsible for replacing electric motors (instruments) transports electric motors for auxiliary cooling pumps, replaces those which have been submerged under water and are no longer usable, and connects cables in cooperation with the team responsible for laying temporary cables.



Work for replacing an electric motor

- ③ The team responsible for restoring cooling pumps disassembles submerged pumps and reassembles them after replacing bearings to restore the pumps.



Work restoring a cooling pump

- ④ The team responsible for connecting temporary cables connects cables to power panels and lays temporary cable to electric motors which power cooling pumps.



Work laying temporary cable

### 1.3. Kashiwazaki-Kariwa Nuclear Power Station (NPS)

In addition to the facility measures explained in the 1<sup>st</sup> quarter progress report, measures have been built up also to address operational issues where an accident response was not able to be sufficiently executed.

#### (1) Preparation for a Situation Exceeding Assumptions

Response procedures have been developed and education as well as training repeatedly conducted so that facilities with strengthened safety measures are able to be promptly and reliably operated. Also, employees have acquired the qualifications necessary for operating heavy machinery and other such equipment so that they are able to undertake such a response. In the future, we will continue in this direction and increase the number of personnel holding such certification.

- Response procedures

Manual, etc. for providing alternate injection of cooling water into reactor and spent fuel pool as well as supplying power using power supply cars and other means during a loss of power, and other procedures.

- Training achievements

Integrated training: 19 sessions, total of 4100 participants (as of September 30)

Individual training: Approximately 1,800 sessions (as of September 30)

- Qualifications acquired (as of September 30)

Large vehicle license: 109 people certified

Special oversized vehicle license: 79 people certified

Large-vehicle towing license: 60 people certified



Training in supplying power using GTG



Training in using fire engine for cooling water injection



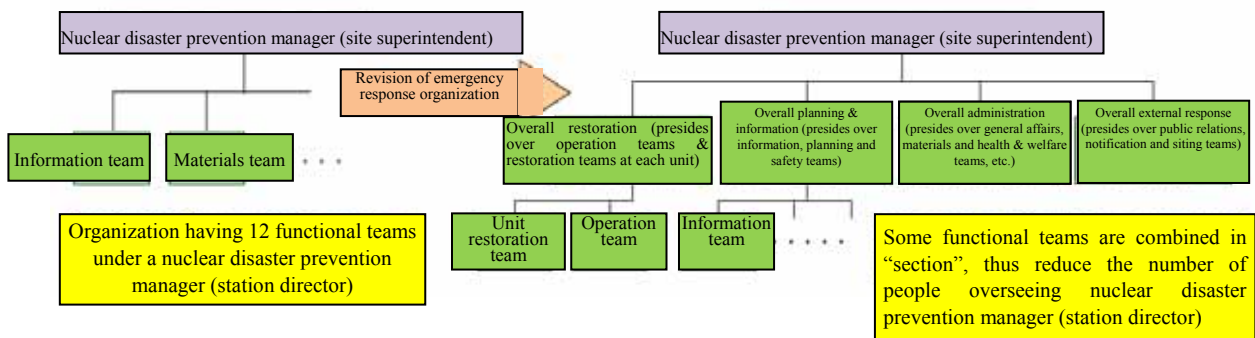
## (2) Preparation for Simultaneous Disasters at Multiple Plants

Power station operators and personnel on night duty have been increased in order to provide an early field response. Also, the number of power station emergency response personnel has been significantly increased to prepare for simultaneous disasters at multiple plants and to provide for long-term accident response.

- The night duty system is scheduled to be augmented from the current number of 8 personnel to 40 so that an early response can be initiated in the field, including the restoration of power sources, injection of cooling water into reactors, removal of debris and so on.
- Taking into consideration the shift system, the number of emergency response personnel will be increased (324→677).
- The number of operators is scheduled to be increased by 60 from the current 205 to 265 for all Units 1~7 (30 of those 60 have already been increased) for the field response operation after a tsunami.

In addition the chain of command for the emergency response headquarters has been clarified, and a framework implemented, which has the capability also to respond to simultaneous disasters at multiple plants.

- The Incident Command System has been introduced, which serves as a field command system during a disaster that has the capability to implement restoration activities based on prompt decision-making
- The chain of succession for times when top managers are not present has been clarified and a reassessment conducted also of executives dispatched to off-site centers



## (3) Enhancing Information Communication and Information Sharing

Monitoring and information communication means have been augmented, including the reinforcement of power sources and diversification of communication tools, which has made it possible to share important information with power stations and the Head Office. In addition, teleconferencing systems, which link central government and relevant institutions, have been developed, and the means for notifying local municipalities have been diversified.

- In addition to existing communication tools, communication facilities for main control rooms (7 wireless equipment units, 7 satellite phones, and 21 transceivers) have been augmented
- Full-time personnel have been assigned and two more added to the night shift to collect plant information
- Formats and guides have been prepared to share important information if the plant parameter transmission system shuts down
- Liaison has been provided with teleconferencing systems which link central government and relevant institutions
- Simultaneous broadcast FAX using satellite lines is being introduced to diversify the means for providing notification to local municipalities (work in progress)

#### (4) Augmentation of Framework for Procurement and Transportation of Equipment and Materials

Food, fuel and other supplies have been stockpiled at the power station so that a response can be mounted for a period of seven days without resupplying. Also, two rear-area logistics support points (bases for managing distribution and access) are maintained at the Sinanogawa Power Station (Ojiya City) and at Energy Hall (Kashiwazaki City), and a framework has been developed with the capability to transport necessary provisions.

- Stockpiling eight days of food and beverage for emergency response personnel along with approximately 150 days of fuel (diesel) for driving power supply cars and fire engines
- Concluding procurement agreements with fuel supply companies in local communities for supplies during emergencies
- Selecting locations for rear-area logistics support (bases for managing distribution and access) and prepare start-up guides
- To have needed equipment and materials transported to power stations from outside any affected areas, concluding transport agreements with transport companies, and conducting radiation protection training in advance for transport company drivers and others (58 attendees)

#### (5) Augmentation of Radiation Control System during Accidents

To ensure the stable operation of monitoring posts, emergency generators have been installed exclusively for monitoring posts and power sources reinforced. Also, alarm person dosimeters (APD) and radiation protection equipment, which are deployed at important anti-seismic buildings and main control rooms, have been augmented. Simplified entry control units have been deployed at important anti-seismic buildings so that radioactive materials are not brought into such buildings during an emergency situation. Moreover, training has been conducted for radiation measurement personnel so that they are able to

handle a wide range of radiation measurement work.

- Three emergency generators exclusively for monitoring posts (power supply back-up generators) have been installed so that power can be supplied to all monitoring posts
- The number of APD units deployed at important anti-seismic buildings has been increased from 120 to 500, and 20 APD units have been newly put in place in main control rooms (case of Unit 7)
- The number of sets of radiation protection equipment for restoration personnel deployed at important anti-seismic buildings has been increased from around 50 to 4000 (8-day supply), and the number in the main control room has been increased from several sets to 40
- Two simplified entry control units have been deployed at important anti-seismic buildings
- Training has been conducted for approximately 27,200 radiation measurement personnel (as of September 30: excluding approximately 670 personnel at the Kashiwazaki-Kariwa NPS), and personnel are able to be mobilized company-wide for radiation measurement during emergency situations



Monitoring post back-up generator



Alarm person dosimeters: 120→500 units  
(Anti-seismic building)



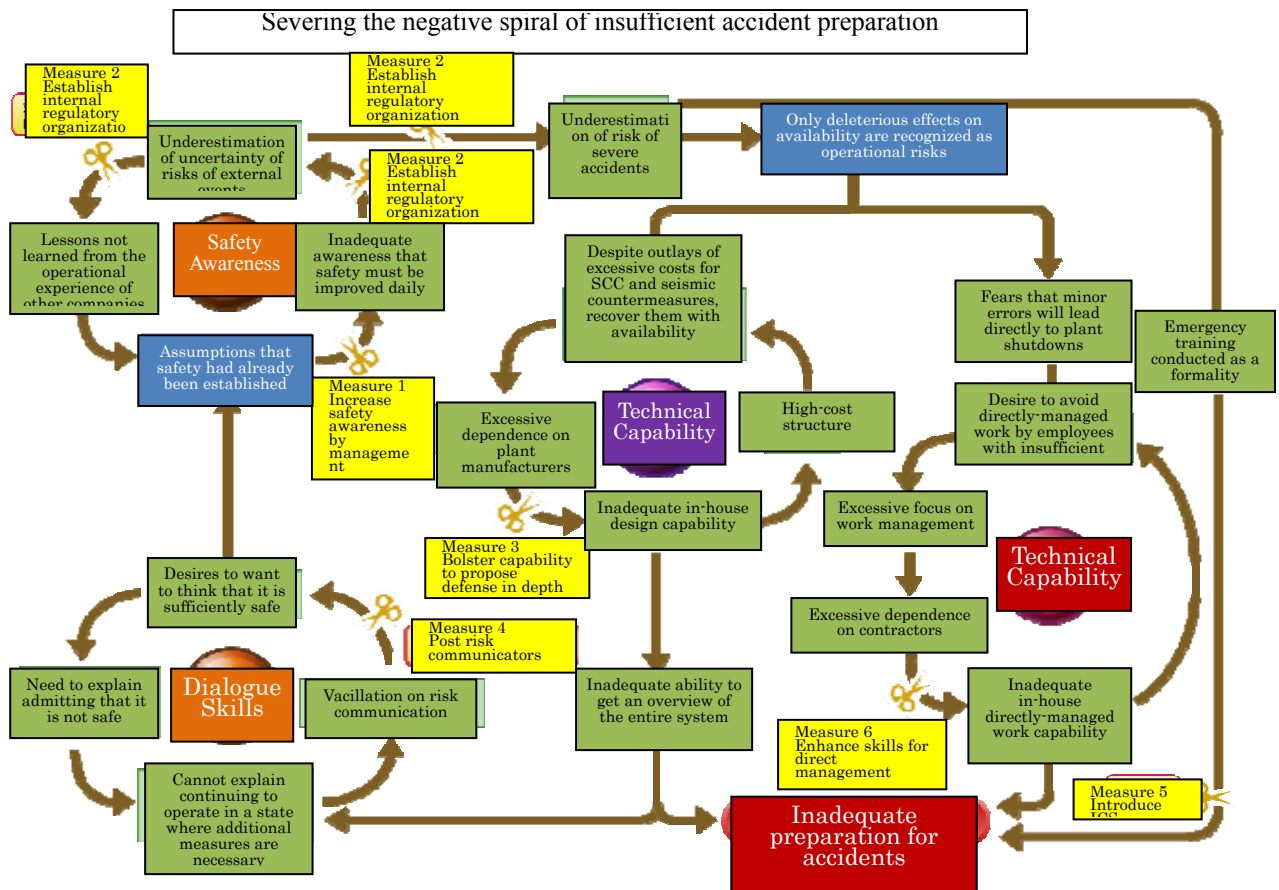
Simplified entry monitoring system



Radiation measurement training

## 2. Progress on Nuclear Safety Reform Plan (Management)

Turning to progress on the Nuclear Safety Reform Plan (management), this report provides explanations in two areas, "items implemented" and "future plans," for each of the six measures to sever the so-called "negative spiral" which contributed to the structural issues which nuclear power departments have faced.



Once every half year, a review is conducted to determine if there are any items which should be reassessed among the measures put forth in the Nuclear Safety Reform Plan and to undertake further improvements. However, at the current point in time, we are at a stage where the focus is on faithfully implementing the individual measures. Also, based on the accidents and problems which have arisen during these past six months, we decided to continue the current plan because the situation necessitates that it be accelerated rather than being reassessed.



## 2.1 Countermeasure 1: Reform from Management

### <Items implemented>

- For nuclear power leaders<sup>3</sup>, simulator training was conducted which modeled a main control room during an accident, and power station walk-downs were also held (July).
- Also, "360-degree assessments of behavioral indicators" were conducted in August and September for nuclear power leaders. The results of observations of the leaders' behavior by their superiors, co-workers and subordinates were compiled and feedback given to each nuclear power leader so that the person would be aware of any gaps between the behavioral indicators and the person's own perceptions (evaluators assessed each item of the five behavioral indicators on a scale of one to four)
- Opinions put forth by the Nuclear Reform Monitoring Committee, Nuclear Safety Oversight Office and other third-party perspectives with regard to fostering a safety culture and making it more widespread are currently under review. In self-assessments, an issue of which personnel were aware was: "In the second quarter, discussions about the safety culture within occupational levels could not be held due to the response being undertaken to address contaminated water and other issues, and we will make multi-tiered discussions about safety culture take root as part of our routine work."



Training for nuclear power leaders (July 19)  
Simulator training and power station walk-downs

### <Future plans>

- Training will be held for executive officers, nuclear power leaders and others of such rank in conducting self-assessments regarding safety culture using an IAEA-maintained program revised for TEPCO (October)
- For promoting risk communication, training will be held for managers to reconfirm such importance (November)

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<sup>3</sup> Executives and corporate offices responsible for nuclear power, Fukushima Daiichi Stabilization Center Director, power station directors and construction directors, Head Office nuclear power-related general managers and anyone equal to or above these ranks.

- Forums on safety culture will be held according to occupational level (nuclear power leaders, management, members) (October ~ December)

## 2.2 Countermeasure 2: Enhancement of Oversight and Support for Management

### <Items implemented>

- Preparation of a structure for the Nuclear Safety Oversight Office was completed on July 1, and the Office commenced its activities in accordance with the following activity principles:
  - To monitor and support the performance of safety-related activities of executives (management, Head Office, power stations) in accordance with appropriate management processes, so that a major accident which results in damage to the reactor core is never allowed to occur again
  - To broadly analyze hindrances (including human resources, budget allocations and other infrastructure factors) by taking a comprehensive view from a position independent of executive officers, and to support solution strategies
  - With regard to the nuclear safety culture, to conduct realistic evaluations of whether or not effective processes are being carried out, appropriate action taken and other such aspects through detailed observations of the status of operations executed by executive officers
  - To sufficiently make use of and propose best practices, guidelines and other external knowledge from around the world
- For the purpose of improving the capability of personnel in the Nuclear Safety Oversight Office to conduct assessments, a British consultant, who is an expert in monitoring nuclear safety, was invited to mentor training sessions held in August and September. Also, monitor training was conducted by the Institute of Nuclear Power Operations (INPO), which is headquartered in the United States, (two INPO employees and one active service monitor with a US nuclear operator) from September 16~20.



Training conducted by the Institute of Nuclear Power Operations (INPO)

- From September, monitoring activities will begin for the following four items:
  - Activities for stabilizing Units 1~4 at Fukushima Daiichi NPS (criticality safety control, cooling management)
  - Activities for improving safety of the Kashiwazaki-Kariwa NPS (safety enhancement measures (facility planning, design and work implementation, and status of operation planning and its implementation ))
  - Activities for setting nuclear safety as the highest priority in the Nuclear Power Division (effective promotion of the Nuclear Safety Reform Plan as well as management and governance related to nuclear safety)
  - At Fukushima Daini NPS, the aforementioned mentor training will be conducted through observing work such as moving heavy objects and work being directly managed

<Future plans>

- The results of the aforementioned monitoring activities will be reported to the Board of Directors in December

### 2.3 Countermeasure 3: Enhancement of Ability to Propose Defense in Depth

<Items implemented>

- The Head Office solicited proposals pertaining to nuclear power stations from all employees in the “Safety Improvement Competition” from June until August (approximately 3 months), for which were 69 applicants with a total of 33 entries
- The Head Office reviewed approximately 20 items pertaining to information about operating experiences (OE) both inside and outside Japan, which had been extracted for detailed review by the end of the first quarter, then conducted analyses and assessments of the impact on facilities for eight of these, and directed power stations to adopt countermeasures. In the second quarter, the Head Office similarly analyzed approximately 50 OE information items, but no items have been extracted for detailed review as of the current point in time.
- With regard to the approximately 30 external hazard events extracted by the Head Office to be subject to analysis in the first quarter (natural phenomena, external man-made events), plans were formulated for analyzing impact and other effects on nuclear power generation facilities in a case where a hazard arises exceeding design guidelines. In accordance with this plan, step-by-step analysis was performed by the Nuclear Quality & Safety Management Department (and by the Nuclear Safety & Supervisory Department since September). Analyses for five of these items including volcanoes and tornadoes have been completed. Along with the relevant areas of the Nuclear Asset Management Department, a review has begun based on the content of the analysis performed by the Nuclear Safety & Supervisory Department.

- The activities selected as part of the power station safety activities to be periodically assessed (safety review) from the perspective of improving nuclear safety include the formulation of procedures for accident responses and nonconformity management at the Head Office as well as emergency training and other areas. Safety review implementation guidelines, implementation flow charts and specific review guidelines have been prepared.
- In order to improve the quality of operations by alleviating the burden due to a disproportionate emphasis on evidence<sup>4</sup> and other factors, work was recommenced in September in accord with a plan for redeveloping manuals reviewed in June at the Head Office. In particular, revision of the Design Management Basic Manual, which is considered to have a significant effect on alleviating the operational burden, is scheduled to be implemented by October.
- Using the introduction of information technology into the maintenance operation process as an example, analyses were conducted at the Head Office to identify issues to be addressed, such as weakness in ability to resolve cross-organizational issues and poor project management. Measures to improve the framework and schedule for advancing the introduction of information technology were formulated on August 20 and initiated under a new organizational framework in September (one month earlier than originally planned).
- Following the organizational review in September, a new group was set up which is responsible for communication system operations within the Kashiwazaki-Kariwa NPS. Also, engineering personnel, which had been dispersed through assignments to each group, have been brought together and assigned to the same group.

#### <Future plans>

- Nuclear power leaders will take the lead in determining outstanding proposals from among the 33 received in the Safety Improvement Competition (October). Plans will be formulated to utilize TEPCO's technical capabilities to realize outstanding proposals.
- With regard to OE information, checks will be performed on those previously screened at the Head Office, and an effort made to make up any delays in the screening schedule. This work is scheduled to be completed by the end of 2013 (as of September 30, there are approximately 300 items for which analysis and assessment have not been completed).
- As for hazard analyses, individual hazards will be successively analyzed at the Head Office, and responses will be successively coordinated with relevant sections including

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<sup>4</sup> An overemphasis on securing evidence from the results of operations implemented

departments responsible for countermeasures to address those hazards having high potential for cliff-edge effects.

- Safety reviews will begin in October at the Kashiwazaki-Kariwa NPS to examine individual activities with regard to nonconformity management. Implementation plans will be prepared for other areas subject to review.
- So that nuclear safety-related assessments are conducted in performance evaluations throughout the Nuclear Power Division, such factors will be incorporated into this year's policy on the preparation of operational plans and reflected in each individual's operational plan. The results are scheduled to be implemented beginning with the performance assessments for the first half of FY2013.
- For operations having many rules or requiring a large amount of evidence (disproportionate emphasis on evidence), countermeasures will be studied and implemented at the Head Office based on an awareness that the problem may be there is little contribution to improving the quality of operations yet the burden posed is great. Verification will be conducted to determine whether or not there is a balance between the amount of resources committed and the effect obtained by studying the respective results of countermeasures.

#### 2.4 Countermeasure 4: Enhancement of Risk Communication Activities

##### < Items implemented >

- Plans were formulated for improving risk communicators' (31 personnel as of October 1) communication skills, including practice giving simulated presentations. The training has been conducted successively for risk communicators since June (total of 28 personnel have undergone such training as of September 30).
- Clarification of the roles that risk communicators and the Social Communication Office perform during emergencies as well as appropriate assignments and other aspects were studied. Verification was conducted during the integrated training for the Kashiwazaki-Kariwa NPS and Head Office on September 27. The training results confirmed the effectiveness of dispatching technical staff, including risk communicators, to local municipalities.
- Because explanations provided for the benefit of those outside of Japan about the flow of contaminated water into the port have been inadequate, risk communicators held briefings at the local Japanese embassies of 13 countries from August 28~September 18. Also, material concerning the contaminated water issue has been posed on the English-version of the website.



Briefing for an embassy about the current contaminated water situation and countermeasures

#### <Future plans>

- Selection is underway to invite an outside expert to head the Social Communication Office, which is currently led by the TEPCO President
- Regarding Fukushima Daiichi NPS, risk communication will be conducted to share information about the risks associated with treatment of contaminated water, decommissioning and other such work. Particularly for important steps in the decommissioning process, risk communication will be provided so that we are able to respond to stakeholders' concerns.
- Regarding Kashiwazaki-Kariwa, in addition to explanations about defense-in-depth based safety measures, we will engage in risk communication about the evacuation of residents, which has not been sufficiently practiced, with consideration for the situations which local municipalities and local residents face, while taking into account the opinions voiced by outside experts.
- We will be sure to expeditiously dispatch information about accidents and problems to the public, and practice risk communication in situations where safety measures are implemented at Kashiwazaki-Kariwa and for information about the current status and countermeasures at Fukushima Daiichi
- In consideration of the concerns voiced about removal of spent fuel at Unit 4, and following the guidance we have received from overseas experts, we plan to provide messages employing video and animation to people in other countries.

### 2.5 Countermeasure 5: Reform of Power Station and Head Office Emergency Response Organizations

#### <Items implemented>

- Standards have been developed for the emergency response organizations at Fukushima Daiichi NPS and Fukushima Daini NPS also to transition to a framework

based on the Incident Command System<sup>5</sup> (ICS), just as was done at the Kashiwazaki-Kariwa NPS and the Head Office, and operations will commence in October.

- Development of a structure based on the Incident Command System (ICS) began in January of this year for the emergency response organization at the Kashiwazaki-Kariwa NPS. Since March, the emergency response organization has been operating generally in line with the ICS approach (in the second quarter also, integrated training was conducted on September 27, which included the Head Office emergency headquarters).
- With regard to methods for sharing information with administrative agencies, off-site centers and other parties outside the power station which has been an issue in previous training, improvement measures for sharing information by using mobile telephone terminals (“smartphones, tablets) were studied, and verified during the integrated training at Kashiwazaki-Kariwa NPS on September 27. The training results confirmed the effectiveness of information sharing. In the future, usability and other such features will be further improved.
- With regard to issues such as “making the information sharing system more efficient (reassessing operational rules and improving the usability of tools)” and “clarifying the chain of succession and the division of responsibility for management during a compound accident or other such incident,” improvements have been made including holding briefings at Head Office headquarters, improving risk communication tools and clarifying the division of responsibility and chain of succession, and the effect of these improvements was confirmed during the integrated training at Kashiwazaki-Kariwa NPS on September 27.
- A study was conducted of the ICS training programs systematized in the U.S. With regard to methods for utilizing this program, a review is being conducted with organizations administering the rights for the program.

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<sup>5</sup> Incident Command System (system for issuing field commands during a disaster and has been adopted as the standard in the U.S. and elsewhere)





Training at Kashiwazaki-Kariwa Nuclear Power Station (September 27)



Training for the Emergency Response Office at the Head Office (September 27)

#### < Future plans >

- Integrated training will continue to be held at Fukushima Daiichi NPS, Fukushima Daini NPS, Kashiwazaki-Kariwa NPS and the Head Office.
- Training has previously been conducted in cooperation with local municipalities and other such bodies. However, training content, schedules and other details will be coordinated in conjunction with the planning of joint training so that in the future, training will be able to be held jointly along with an even broader range of concerned organizations.
- Because it is important in the evacuation of local residents to have effective plans set out in advance and adequately shared by TEPCO with local municipalities, teams of experts will be established in-house to cooperate on formulating disaster readiness plans for local governments.
- Emergency response capabilities will be maintained and improved through a variety of training exercises, and items for improvement will repeatedly be deduced, reflected in subsequent training, and their effects confirmed. In particular, improvements will be made such as clarifying the procedures for determinations concerning PCV venting and the decision-making process, and these improvements will be verified through training conducted in the third quarter and thereafter.

### 2.6 Countermeasure 6: Reassessment of Non-Emergency Power Station Organization and Enhancement of Engineering Capability for Direct Management

#### < Items implemented >

- With regard to reassessment of the non-emergency power station organization at Fukushima Daini and Kashiwazaki-Kariwa Nuclear Power Stations, an application filed for authorization to revise technical specifications of the nuclear reactor facilities was approved in August 12. The particulars concerning the division of operations and



organization at each power station have been stipulated, and transition to the new organizational framework started on September 1.

- A system engineering group of 20 personnel was set up at Kashiwazaki-Kariwa NPS on September 1 (4 professional system engineers). The expectations of senior engineers and descriptions of their future activities shared, and the plans for their present activities as well as training prescribed and implemented.
- Operators at the Kashiwazaki-Kariwa NPS started participating in training for connecting power supply cars, which has been conducted by the emergency response organization since July (as of September 30: 7 operators out of 35 assigned to Units 6 and 7 have undergone the training). Training in facility diagnostic operations commenced in September, and these operations are scheduled to begin in November.
- Since July at each power station, training has been conducted for maintenance personnel to enhance basic skills (training in handling annealing wire, rope, etc.) and gain experience and knowledge through direct management of work (power supply cars, gas turbine generator vehicles, alternate heat exchanging vehicles and other such inspections; taking out temporary hoses for emergency measures & connecting electric cables; replacing electric motors; disassembling and assembling pump bearings; ground leveling using heavy machinery, etc.) (Total of 1247 personnel have received training at the three power stations as of September 30: total of 26 at Fukushima Daiichi NPS, total of 638 at Fukushima Daini NPS, and total of 583 at Kashiwazaki-Kariwa NPS).
- For the purpose of ensuring safety in the commencement of work under direct management as well as assuring facility reliability, work quality and scheduling, the basic rules for direct work management were established (July) and have been put into operation.



Training in withdrawing hoses  
for emergency measures

Training in handling ropes

(Fukushima Daiichi employees in training)

<Future plans>

- Methods for assessing the effectiveness of the revised power station organization will be formulated and assessments conducted by the end of FY2013.
- A framework for personnel rotations over the mid-to-long term to foster the personnel needed for administering the organization (operators and maintenance personnel) will be studied and go into operation in 2014.
- Maintenance personnel will work to become more proficient with continued training conducted through direct management of work and strengthening of their basic skills, and such personnel will incrementally enhance the content of their work, further augmenting their applied skills. In addition, full-time personnel assigned to maintenance departments will efficiently and reliably promote the improvement of engineering capabilities for direct managing work by sharing the status of their activities at each power station and expanding such activities. In particular, the titles of individual work projects and the number of personnel will be managed for each acquired technology.
- In the second half of the fiscal year, training will commence for Kashiwazaki-Kariwa NPS operators for fire engine connections. Also, in keeping with the increase in personnel, daily maintenance work performed by operators will be successively expanded.

### 3. Status of Investigations into Unidentified and Unexplained Matters in the Fukushima Nuclear Accident

As was also reported in the Nuclear Safety Reform Plan Progress Report (FY2013 1<sup>st</sup> Quarter), we have continued to further analyze and reassess existing records, data and other evidence as well as conduct field investigations with the aim of resolving any unidentified and unexplained matters from the Fukushima Nuclear Accident.

We will continue to strive to shed light on unidentified and unexplained matters through analysis and reassessment of current records and data as well as field investigations, and will release these results.

#### 3.1 Status of Examination of Unidentified and Unexplained Matters

A report on the status of reviews on these unidentified and unexplained matters is compiled separately as the first Progress Report<sup>6</sup> (hereinafter, “Report”). The principal matters are set forth below.

- Loss of function of emergency generators and other equipment due to arrival of tsunami
- Event involving rapid depressurization of Unit 3 reactor pressure
- Operational status of Unit 3 high-pressure coolant injection system
  - Event involving water effluence from 4<sup>th</sup> floor of Unit 1 reactor building
- Quantity of cooling water from fire engines

#### 3.2 Status of Field Investigations

While taking care so that no important evidence is lost during decommissioning or other such work, we are utilizing industrial endoscopes, robots and other such tools as we systematically proceed to investigate the inside of the primary containment vessel and conduct other field investigations.

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<sup>6</sup> 1<sup>st</sup> Progress Report: Estimate of Status of Cores and Primary Containment Vessels at Fukushima Daiichi Nuclear Power Station Units 1~3

## In Closing

In the second quarter, particularly with regard to revision of power station and Head Office emergency response organizations, training has been enhanced and strengthened under a new framework at the three power stations, encompassing as well the introduction of incident command systems at Fukushima Daiichi NPS and Fukushima Daini NPS. In addition, the Nuclear Safety Reform Plan has advanced steadily in all areas as evidenced by the start of the Safety Improvement Competition as an activity for strengthening the ability to propose defense in depth and direct work management implemented to enhance applied capabilities during an emergency. We aim to increase the effectiveness of each of these activities in the future.

With regard to the overall status of progress on the Nuclear Safety Reform Plan, preparations are underway for creating a “target management schedule” so that the status of achievement on the Nuclear Safety Reform Plan can be managed, a point which was also pointed out by the Nuclear Reform Monitoring Committee. Based on this Progress Report and the “target management schedule,” management and nuclear power leaders will demonstrate leadership to further accelerate nuclear safety reforms and steadily implement the Nuclear Safety Reform Plan.

On the other hand, accidents and problems have occurred since the first quarter at Fukushima Daiichi NPS, including power outages due to mice, leakage from underground water storage tanks, and problems with contaminated water and tanks. Measures are being studied and implemented to address these problems. Specifically, the Contaminated Water and Tank Countermeasures Headquarters was established and a framework strengthened by committing company-wide resources. In the future, so that countermeasures are not adopted only in retrospect, we believe that it is necessary to broadly identify any anticipated risks and to be able to formulate and implement multi-tiered measures so as to preemptively and fundamentally address such risks.

For these commitments as well, we will accelerate our efforts to implement the Nuclear Safety Reform Plan, improve issues traceable to safety awareness, technical capability and dialogue skills, and strive to make further improvements in risk management.

We will issue a separate report on the causes of and measures to address the “leakage of contaminated water from H4 area steel tanks (confirmed on August 19)” and “detection of high levels of tritium in groundwater on east side of Unit 1&2 turbine building into the port (case continuing from first quarter),” which occurred during the second quarter.

In the future as well, we will receive objective assessments from the Nuclear Reform Monitoring Committee and advance reforms base on those evaluations. Also, we welcome

any opinions or thoughts about these reforms, which may be forward to us through the TEPCO website.

As a nuclear power operator, we will continue to tackle nuclear safety reform based on our resolution that the “Fukushima nuclear accident will never be forgotten and we will be a nuclear operator that continues to create unparalleled safety and increase the level of safety to be greater today than yesterday and still greater tomorrow than today,” so that we may regain the trust of everyone in society and the people of Fukushima Prefecture.