Report on initial responses to the accident at Tokyo Electric Power Co.'s Fukushima Daiichi Nuclear Power Plant

December 22, 2011

Tokyo Electric Power Co., Inc.

1. INTRODUCTION

We are now involved in the ongoing process of examination/verification about the accident at our Fukushima Daiichi Nuclear Power Plant, and we have summarized developments which have become clear to date as well as various measures to prevent a nuclear reactor core from being damaged, following which we announced them in the form of an interim report on December 2, 2011.

What are arranged in order and summarized in this report are the initial responses to the accident which were not included in the interim report; main actual relations of establishment of responsive arrangements, information provision and the support for the electric power plant over the five days from March 11 to March 15, 2011.

In the future, we will pick out agenda items in connection with countermeasures against the accident, while fully discussing such countermeasures, then we are poised to announce them once again to the public after having deliberations at the in-house investigative committee on the accident and the Investigation Committee on the Accidents at the Fukushima Nuclear Power Station of Tokyo Electric Power Company set up by the government.

Contents of this report

2. OVERVIEW OF EMERGENCY ACTION

2.1 Responsive Arrangement at Occurrence of Nuclear Disaster

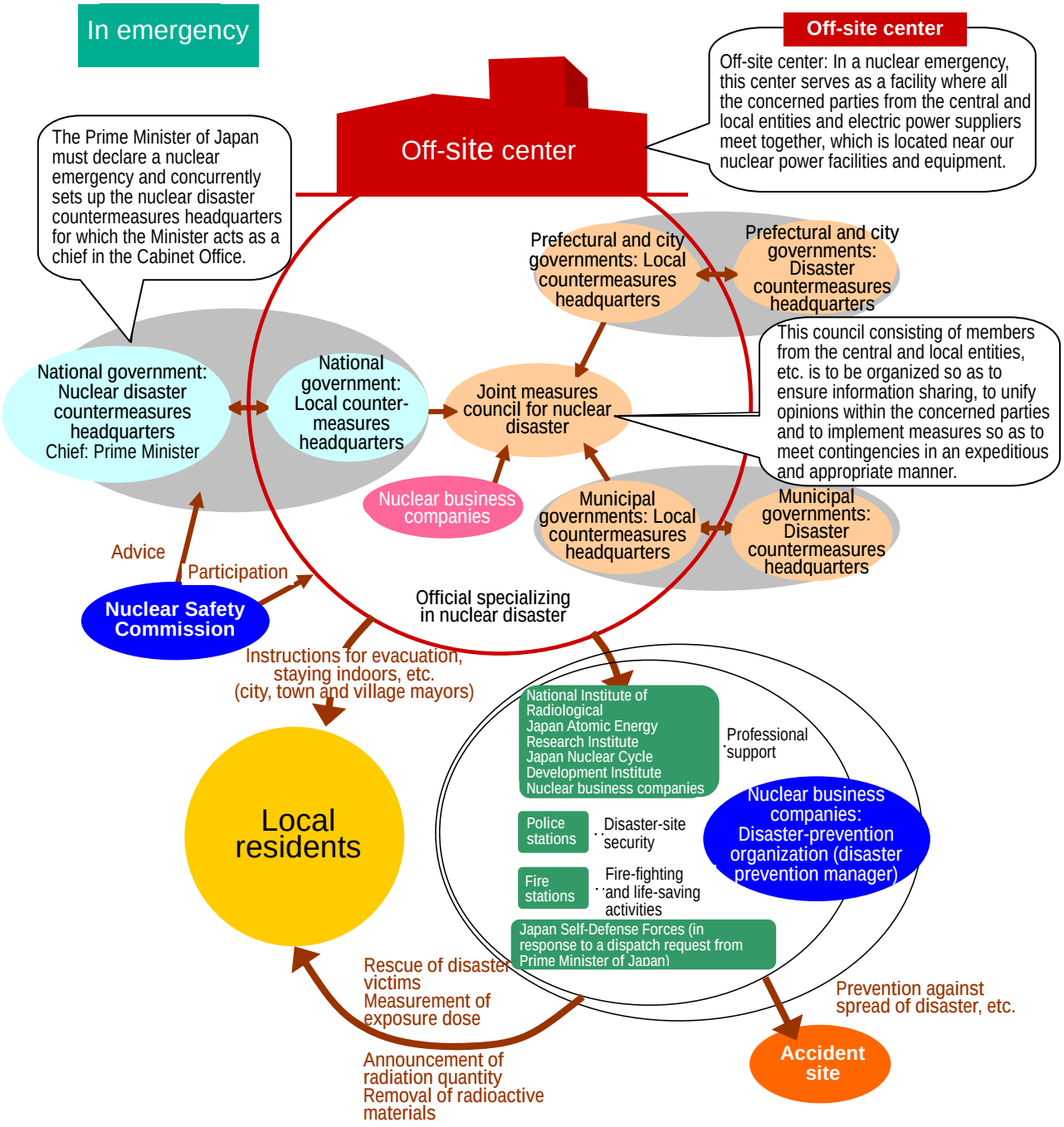
(1) Working out disaster prevention plan

The Nuclear Disaster Special Measures Law (Act No. 156 of 1999; hereinafter referred to as "Nuclear Measures Law") aimed for consolidation of an anti-atomic energy accident measures was established from the viewpoint that it is indispensable for the relevant authorities, such as the national government, local public entities and nuclear business companies, to perform nuclear-disaster prevention activities and prevent such disaster from occurring and expanding in close cooperation with each other and in an expeditious and appropriate manner. In this connection, a specific disaster-prevention action plan or the like has been streamlined, and measures have been taken with a focus on the points as mentioned below.

- ⊙ Prompt initial action to be taken based on accurate information acquisition, and securing dynamic and realistic collaboration between the central government and local public entities
- ⊙ Consolidation of the emergency correspondence system of the central government depending on special characteristics of nuclear disaster
- ⊙ Clarification of a role of electric power suppliers including quick communication in the event of accident, etc.
- ⊙ Improvement in monitoring system as well as in information and telecommunications equipment

In preparation for a nuclear disaster, an off-site center has been put in place as an emergency operation center at the time of emergency to effect a close cooperation between the parties concerned, where all of the central government, local public entities, various institutions concerned and nuclear business companies meet together, and this center plays the leading role for nuclear disaster countermeasures in collecting information, considering emergency measures, taking protective measures for local residents at large, conducting joint press conferences and so on. The basic system and role at the off-site center are as discussed below.

Nuclear-disaster Prevention Organization



Reference: Materials from Agency for Natural Resources and Energy

(2) Basic system and roles pertaining to off-site center

[1] System and roles of national government

- If, in adjacent areas of any nuclear power operation sites, a radiation quantity that is equal to or greater than 5 μSv/hour (micro sievert per hour) is detected which exceeds the normally permitted level, or if part of a safety function does not function properly and in other similar cases, the applicable nuclear business company must give notice of "Article 10 of Nuclear Measures Law" to the central government and local public entities concerned. Then, the cabinet minister in charge (Minister of Economy, Trade and Industry for this case) who is notified thereof shall set up a nuclear disaster alert headquarters under control of the Ministry of Economy, Trade and Industry together with a local alert headquarters in the off-site center. Subsequently, an official specializing in nuclear disaster or the like who resides in the area where the affected nuclear operation site is located shall embark on activities to collect necessary information, etc. while cooperating with any relevant nuclear business company and local public entity.
- Furthermore, if such nuclear disaster worsens and the radiation quantity that is equal to or greater than 500 μSv/hour is detected, the nuclear business company shall give a report of "Article 15 of Nuclear Measures Law" to the central government and local public entities concerned. In the event that the cabinet minister in charge admits after receiving this report that a nuclear disaster emergency situation occurs, the minister shall notify the Prime Minister thereof, following which the Prime Minister will declare a "Nuclear emergency" and concurrently sets up the "Nuclear-disaster countermeasures headquarters" for which the Minister acts as a chief, and at the same time, the "nuclear-disaster local countermeasures headquarters" for which the Deputy Prime Minister or Parliamentary Secretary acts as a chief will also be set up.
- The chief of nuclear disaster countermeasures headquarters (Prime Minister) shall primarily instruct the Minister of Economy, Trade and Industry to take urgent measures in a state of emergency based on Nuclear Measures Law, whereas he/she may give necessary instructions to the heads of the designated administrative agencies and public institutions concerned or relevant nuclear business companies within the limits necessary for implementation of such measures. In addition, a request can be made to the Minister of Defense for dispatching Self-Defense Forces when it is found to be necessary.
- Because special knowledge is essential to any nuclear disaster, some advice can be sought from the Nuclear Safety Commission as required.
- The chief (Deputy Prime Minister or other) of the "Nuclear-disaster countermeasures headquarters" under control of the central government, which is established in the off-site center, shall organize the "Joint measures council for nuclear disaster" which consists of a prefectural chief of local countermeasures headquarters, town chiefs of disaster countermeasures headquarters, nuclear business companies, etc.

- In the “Joint measures council for nuclear disaster”, an “emergency-state response policymaking meeting” to coordinate matters of the greatest importance including evacuations of local residents and dosing of iodine preparation and a “general meeting” with view to sharing information, etc. among the concerned parties should take place.

[2] System and roles of local public entities

- When a local public entity receives a notice of “Article 10 of Nuclear Measures Law” regarding nuclear disaster from any nuclear business companies, the corresponding prefectural governor shall set up a disaster countermeasures headquarters for which the governor assumes the post of chief under the directions of national government and establish a local countermeasures headquarters in the off-site center. Also, cities, towns and villages shall establish a disaster countermeasures headquarters in the same way as in the prefecture.
- A local countermeasures headquarters of local public entity shall organize "Joint measures council for nuclear disaster" along with the Nuclear-disaster local countermeasures headquarters of the central government, while examining any countermeasures from instructions, advice or monitoring results of any specialist in Japan.
- Local public entities shall perform the activities as shown below in emergency.
  - ⊙ Delivery of official announcement and instructions or the like to local residents
    Instructions were given on how local residents should behave via television, radio and other means.
  - ⊙ Performing environmental radiation monitoring in the event of an emergency
    In addition to the monitoring, impact forecast information should be obtained by the System for Prediction of Environmental Emergency Dose Information (SPEEDI) network system, and protection measures will be carried out.
  - ⊙ Specifying evacuation and indoor evacuation areas for local residents, and providing evacuation guidance
    Evacuation or indoor evacuation areas should be defined, while determining evacuation destinations and providing guidance.
  - ⊙ Intake limits of food and drink, etc.
    In order to avoid internal radiation exposure through intake of food and drink, limiting of eating and drinking should be notified and transmitted to the local residents in accordance with the monitoring results, etc., as required.
  - ⊙ Conducting medical procedures in case of an emergency
    Diagnosis and medical care should be provided for local residents and others.

[3] System and roles of nuclear business companies (For particulars, see 2.2 Details of our responsive arrangement.)

- A nuclear business company is supposed to elect a nuclear disaster prevention manager for each of their nuclear power operation sites. If any event that may lead to a nuclear disaster emergency state occurs where abnormal radiation quantity is detected and so forth, the nuclear disaster prevention manger should report it to the cabinet minister in charge, prefectural governor, or city, town and village mayor and others of the affected area.

[See Annex 1 for details.]

- A nuclear business company should establish its nuclear disaster countermeasures headquarters, dispatch its personnel to the off-site center and engage in activities in cooperation with the central government and local public entities or the like.

- Specifically, the company should provide support for urgent measures in a state of emergency to be taken by the designated administrative agency and local administrative agency or the like through the following services of off-site center, so that such measures will be carried out precisely and smoothly:

  ⊙ Matters regarding services provided by the off-site center
  - Extend a helping hand to set-up preparation of off-site center
  - Information exchange between a power plant and off-site center
  - Providing information to mass media
  - Mutual cooperation and coordination relevant to urgent measures in a state of emergency, and others

  ⊙ Matters regarding environmental radiation monitoring
  - Environmental radiation monitoring
  - Measurement of contamination level of radioactive material sticking to body and clothing
  - Decontamination of those radioactive materials that are found to be radioactive pollution sources, and others

(3) Overview of off-site center's equipment

- The off-site center is located in Okuma-cho, which is away from the Fukushima Daiichi Nuclear Power Plant by about 5 km and the Fukushima Daini Nuclear Power Plant by about 12 km.

- The off-site center has an area of about 1,500 m2, which is provided with booths to be used by relevant authorities and a special function team performing various activities as well as with a conference room to decide on urgent measures in a state of emergency in which video teleconference system to link it with the Prime Minister's Office, the Ministry of Economy, Trade and Industry, and the cities/towns/villages concerned.

- In the off-site center, there are radiation monitoring system, weather information system,

satellite communication system, the SPEEDI network system, decontamination room, body surface monitor and so on, in addition to the video teleconference system connected to the Prime Minister's Office and others.

- In collaboration with the central government, the local public entity shall improve and maintain the facility, equipment, materials and so on of the off-site center.

2.2 Details of Our Responsive Arrangement

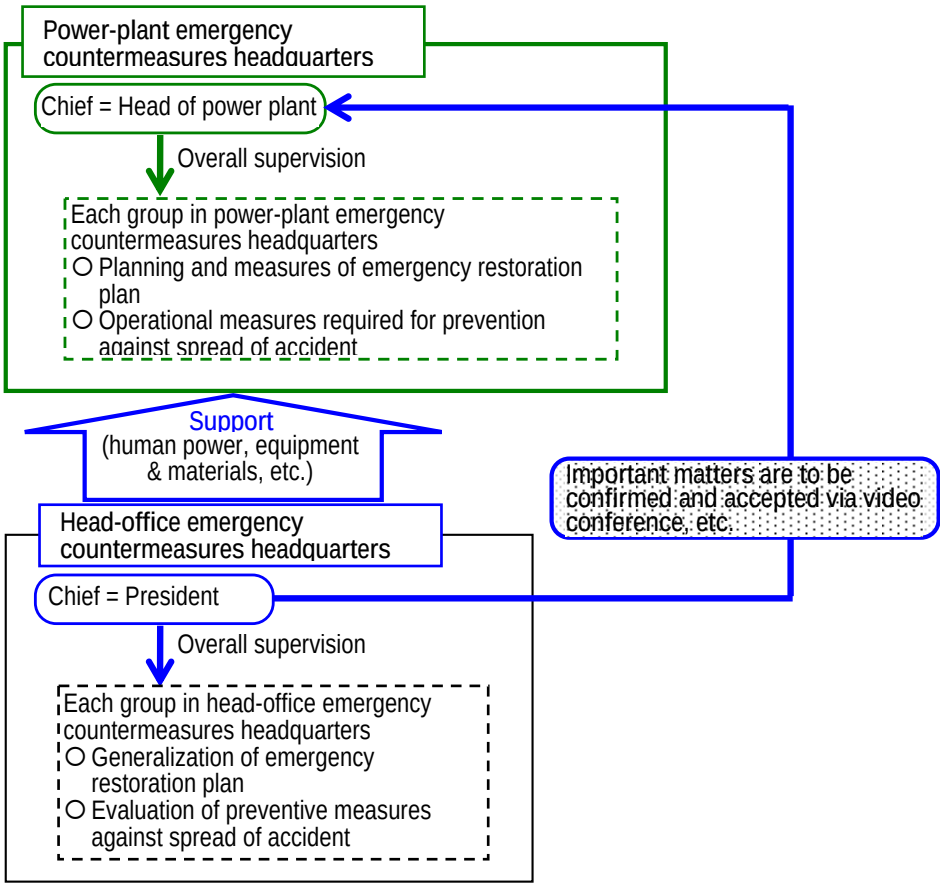
(1) Emergency preparations (general accident)

- Based on the Basic Act on Disaster Control Measures (Act No. 223 of 1961) and other relevant laws and regulations, we have drawn up disaster-prevention action plans for general disasters, and additionally, improve the in-house regulations so as to make preparations in case of an emergency for taking different measures from normal services quickly and accurately with respect to disaster and facility incident that interfere with the power supply due to such natural phenomena as earthquake, tsunami, typhoon, damage from salt and snow damage or terrorism and armed attack, or occurrence or prediction of an emergency disaster that makes it difficult for us to secure human body safety and power equipment function maintenance.
- As emergency preparations in general accident are classified into three levels by their degree of seriousness, heads of both the head office and power plants are supposed to declare such preparations respectively, who are designated in advance. The responses to big earthquake like this (intensity 6 lower and up on the 7-point Japanese intensity scale in our service areas) falls under the category of third emergency preparedness which is classified as the most serious case among the categories, and the post of a chief in charge is to be assumed by the president for head office and by the head for the affected power plant, whereas an executive vice president and a unit director must assume that post respectively, if such chief is absent.
- The chief (head) of power plant is authorized to deal with such scope of measures as disaster response operations and recovery efforts for a power plant, and both the head of power plant and general manager of head office should share common information with each other in inter-headquarters conference through TV meeting and the like to deal with post-disaster restoration of the affected power plant as well as reporting and communication and so on.

(2) Preparations in case of an emergency (nuclear disaster)

- The Nuclear Measures Law makes it mandatory to set up a power-plant emergency countermeasures headquarters by nuclear-disaster prevention organization for each nuclear business company as an organization to prevent any nuclear disaster from occurring and expanding, to appoint a nuclear-disaster prevention manager who supervises such headquarters, and to prepare and report a disaster-prevention action plan of nuclear business company.

- The duties of nuclear-disaster prevention manager are to issue a notification of any event that may lead to a nuclear disaster emergency state if any, announce preparations in case of an emergency, assemble required workforce, set up a power-plant emergency countermeasures headquarters promptly, take and instruct emergency steps required for prevention against occurrence or expansion of a nuclear disaster for preparations in case of an emergency, and report their outlines to the concerned parties.
- When issuing such notification, the affected power plant should use a facsimile terminal equipment to send the notification simultaneously, based on the disaster prevention operation plan of nuclear business company, to such relevant authorities as the central government (Cabinet Secretariat; Ministry of Economy, Trade and Industry; Ministry of Education, Culture, Sports, Science and Technology, etc.), Fukushima prefectural government; the concerned cities, towns and villages; a police station; fire fighting headquarters and the like. Furthermore, the Ministry of Economy, Trade and Industry (Nuclear Emergency Preparedness Division), Fukushima prefecture (nuclear safety measures section) and the town (living environment section) where the power plant is located must confirm the reception thereof. For other points of contact, information should be given to them to the effect that such notification was transmitted to them by means of a facsimile by telephone. The head office and electric power plant should take their share of confirming the notification. [See Annex 1 for details.]
- In the event that any abnormal conditions occur in a nuclear power station, operating conditions, etc. of its equipment should be checked, and a foreman on duty basically should make a decision as to whether the equipment will be put into operation based on the predetermined procedures. In addition, the disaster prevention operation plan of nuclear business company has stipulated that the head of a power plant who is also a nuclear disaster prevention manager has to acts as a chief of the power-plant countermeasures headquarters who assumes responsibility for overall supervision of the power plant's emergency countermeasures headquarters, and that the head office's president must serve as a chief of the head-office countermeasures headquarters which gives support for the power-plant emergency countermeasures headquarters to provide overall supervision. Also, according to the plan, the chief must be elected from the executive vice presidents or managing directors when the president is absent.
- As for the planning and measures of emergency restoration plan relative to a power plant's emergency situation and implementation of operational measures required for prevention against spread of accident, the head of power plant who is a nuclear disaster prevention manger has the authority over them, and the chief (president) of the head-office emergency countermeasures headquarters provides support for personal dispatchment and supply of equipment and materials to the power-plant emergency countermeasures headquarters. Additionally, the power plant and head office are always connected with each other via the video conference system, through which the head office will from time to time confirm and accept important matters while sharing information with the power plant.



- To take a concrete instance, prior to performing the venting for containment in response to the accident of Fukushima Daiichi power plant's Unit No.1, confirmation and consent from the president were obtained and judgment of the head of power plant was also made on it, because such action was of vital importance from the viewpoint that it will discharge radioactive materials outside the plant. Concurrently, the plant also made a proposal to do so to the national government for approval. Moreover, before the head of power plant made a decision to give instructions to change the water injection into the nuclear reactor of Unit No.1 from freshwater injection to seawater injection, the head-office president also confirmed and gave his consent to it.

- In the power-plant emergency countermeasures headquarters to be set up in a power plant, 12 groups will play their active role to suit their tasks, and under the direction of the chief (head of power plant), each group will engage in prevention against spread of accident, recovery efforts, issuance of necessary notifications as well as public relations activities, etc.

  [See Annex 2 for details.]

- In the head-office emergency countermeasures headquarters to be set up in the head office, nine groups will play their active role to suit their tasks, and under the overall supervision of the chief (head-office president), each group will engage in support activities for the power plant, information transmission to the central government office, other authorities concerned outside the company, etc. [See Annex 3 for details.]

- For preparations in case of an emergency, 233 staff members from the head office and 406 staff members from the Fukushima Daiichi Nuclear Power Plant, including chiefs of the head office and power plant, are required to gather together regardless of whether the time and date to summon are on holidays, national holidays or at midnight. Meanwhile, training is conducted every year to improve the staff education and operation programs.

2.3 Responses taken for the accident at that time

(1) Establishment of emergency preparations and preparations in case of an emergency

- As the intensity 6 lower and up on the 7-point Japanese intensity scale was measured in Ibaraki, Tochigi prefectures, including Fukushima prefecture, and other our service areas in response to the Tohoku Pacific Offshore Earthquake which occurred at 14:46 on March 11, 2011, the third emergency preparedness was automatically and simultaneously issued by the head office and other related offices in accordance with the disaster-prevention action plan for general disaster and our in-house regulations, following which emergency and disaster countermeasures offices were established.
- At this moment, the TEPCO's head office already shared information in real time with the Fukushima Daiichi and Daini Nuclear Power Plants through a video conference system, while the staff members at the power plants were taking appropriate responses, such as operation in an attempt to achieve a so-called "cold shutdown" of the crippled reactors which experienced emergency shutdown after the earthquake.
- In the Fukushima Daiichi Nuclear Power Plant, the staff members under emergency conditions in the seismically isolated important facility started to take actions just after the earthquake, whereas the general office employees confirmed the safety of the entire staff beforehand in the parking area, which is an evacuation site, next to the facility and entered the facility. This seismically isolated important facility was constructed based on the experience we had at the Kashiwazaki-Kariwa Nuclear Power Plant suffering from the Niigataken Chuetsu-Oki Earthquake in 2007, which has been designed to endure the intensity-7 level on the 7-point Japanese intensity scale and equipped with a gas turbine generator as self-generation facility, telecommunications system, video conference system, ventilation equipment with highly efficient filter and so on. The facility also served as a local base to deal with the disaster.

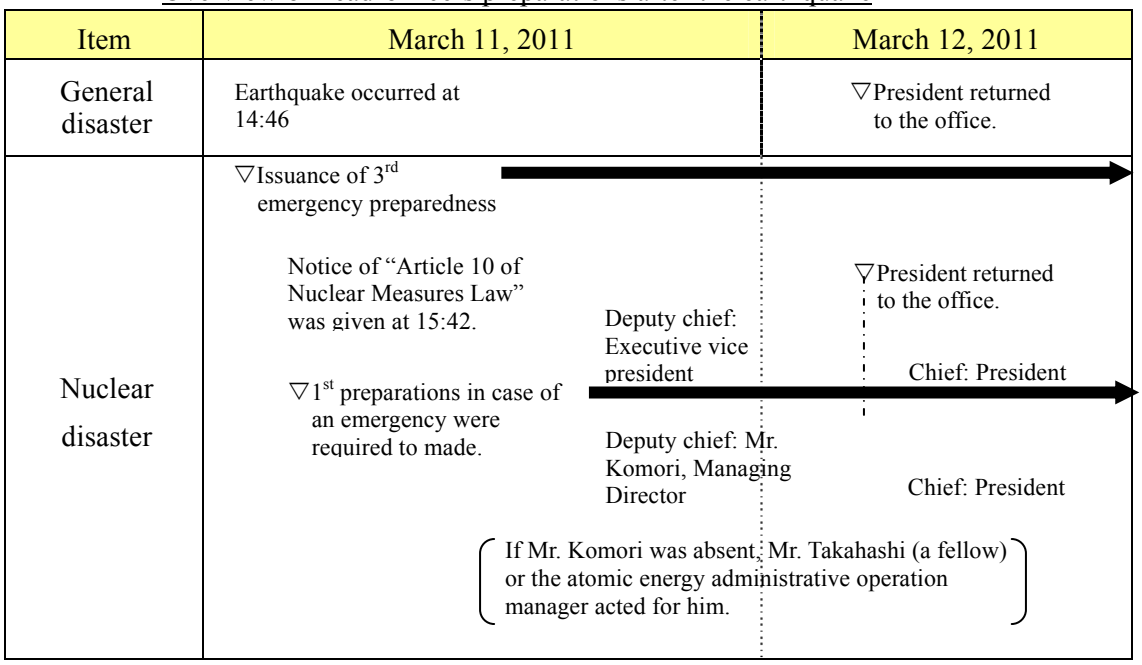

Seismically isolated important facility
(Left - Appearance, Right – Emergency countermeasures headquarters)

- Although the external power sources of each plant in the Fukushima Daiichi Nuclear Power Plant were lost immediately after the earthquake occurred, the power supply of safety system for a so-called cold shutdown remained active by means of emergency diesel generator, while a foreman and other operators on duty in each main control room were carrying out the operations toward the cold shutdown after the emergency shutdown (scram) succeeded.
- Because the disaster occurred in weekday working hours, each working group was organized promptly in the head office, the power plant and other sites in accordance with the company's preparedness for emergency situations, and was able to start making the corresponding preparations for recovery immediately. Although the president was supposed to act as a chief of the head-office disaster countermeasures office established on this occasion, Mr. Fujimoto, executive vice president, acted for the chief according to the in-house regulations, because the president traveled on business on that day, until he returned to the office.
- Actually, the president was on a business trip to Kansai region on that day, and therefore he was finally able to make contact with the head office at around 3 p.m. after the disaster, trying to return to the head office hastily. However, he only moved to a suburban area of Nagoya city on that day because of heavy traffic, and returned to the office at around 9 a.m. on the following day, March 12, 2011. Meanwhile, the chairman was on overseas business trip to China on the same day, and returned to the head office at around 4 p.m. on the next day, March 12, 2011, by the effect of emergency airport closedown, etc.
- Additionally, because the magnitude was extremely high, the Nuclear Plant/Location Director (executive vice president) and other parties left the head office for support of the electric power plant at about 15:30 as per the predetermined countermeasure procedures which were stipulated to reflect on the company's experience of the Niigataken Chuetsu-Oki Earthquake, started traveling to the Fukushima prefecture and arrived at the Fukushima Daini Nuclear Power Plant at about 18:00 on March 11, 2011. On the way to the destination, because the notice of "Article 10 of Nuclear Measures Law" was given at 15:42 in the wake of the occurrence of loss of all the AC power supplies, a joint-headquarters system consisting of the emergency and disaster countermeasures office (for general disaster) and the emergency countermeasures headquarters (for nuclear disaster) was adopted subsequently. Based on the in-house regulations, the Nuclear Plant/Location Director belonged to one of the staff

members of off-site center, and Mr. Komori, Managing Director, serving as the Deputy Nuclear Plant/Location Director, acted for the president at the head-office emergency countermeasures headquarters.

- In the meantime, when Mr. Komori was absent, Mr. Takahashi (a fellow) or the atomic energy administrative operation manager acted for him under his direction.
- In addition, for the Nuclear Plant/Location Director, a nuclear disaster emergency state declaration was announced in the course of his trip, and accordingly the central government's nuclear-disaster local countermeasures headquarters was established in the off-site center. However, because the center did not begin its operations until March 12, 2011, the Nuclear Plant/Location Director and others were placed in the wait state.

Overview of head-office's preparations after the earthquake



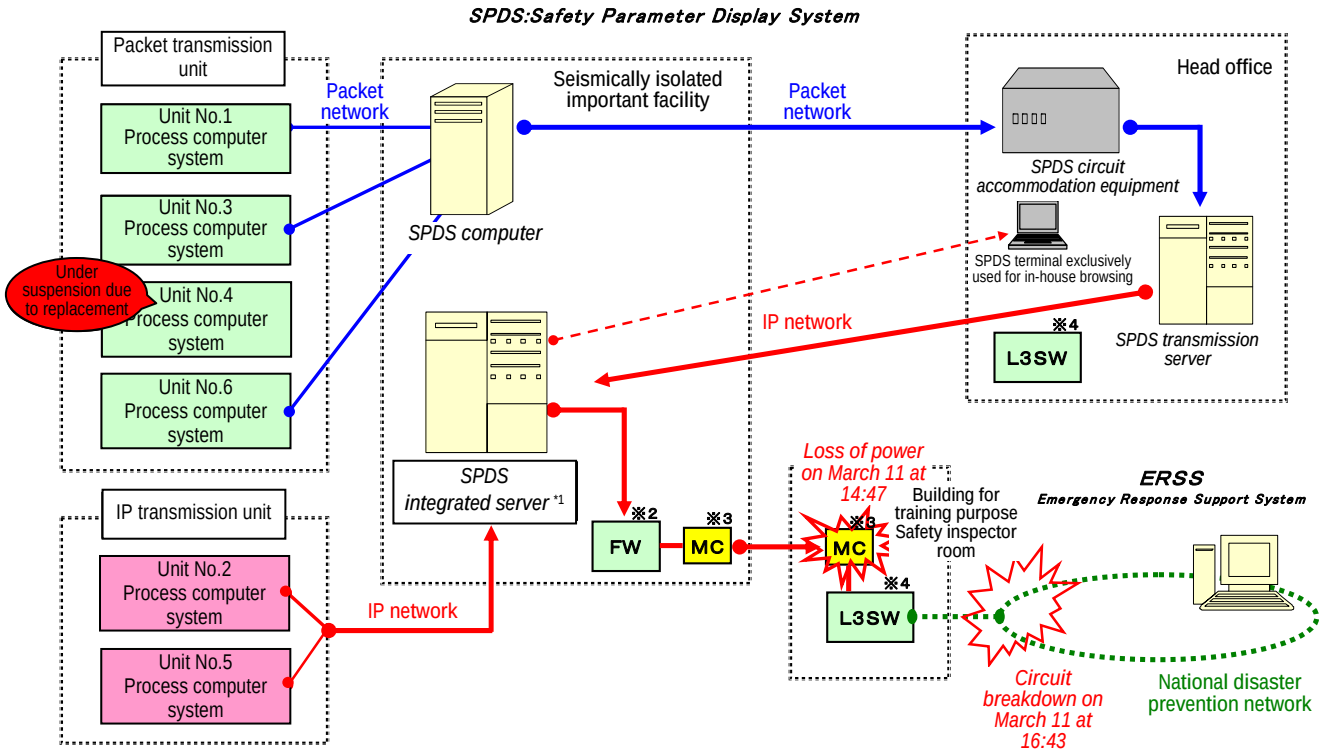
(2) Provision of information (reporting and communication)

- The tsunami which reached the Fukushima Daiichi Nuclear Power Plant at about 15:30 resulted in loss of all AC power sources. On this account, the Fukushima Daiichi Nuclear Power Plant issued the first notice of "Article 10 of Nuclear Measures Law" at 15:42 on March 11, 2011.
- At 16:36 on the same day, water level in the reactors of the Units No.1 and No.2 of Fukushima Daiichi Nuclear Power Plant became indeterminable, and water-injection situations remained uncertain. For this reason, it was determined that the event (emergency core cooling system's inability of water injection) based on the notice of "Article 15 of Nuclear Measures Law" occurred, then such notice was issued at 16:45.
- Subsequently, as the events evolved, the plant's information, an advance notice of venting of the reactor containment, and other information on evaluation of exposure to radioactivity at the time of venting were continuously provided from time to time to the national government, the prefectural government, other municipalities and the authorities concerned by fax and telephone. With regard to reporting and communication, we repeatedly tried to make contact with points of contact we knew then in different ways, but we failed to communicate with them due to communication failure, etc. Furthermore, we spent some time until communication with some municipalities became available, to which we were unable to notify their evacuation-destination information previously because of failure of communication conditions or the like for a while.
- As mentioned above, we originally decided to gather information, human resources, etc. at the off-site center to deal with the nuclear disaster. For the reasons as described below, however, as the off-site center failed to do what it was supposed to do at first, it was moved to the Fukushima prefectural government office. In addition, our head office finally became the central headquarters to deal with the disaster, whereas the municipalities were not incorporated into the headquarters. In addition, the safety inspectors of the national government were almost absent in the Fukushima Daiichi Nuclear Power Plant between March 12 to March 22, 2011, and the information given from the same plant standing at the forefront to the Ministry of Economy, Trade and Industry was limited to only such information that we could offer. [See Annex 4 for details.]
- Meanwhile, we were under the condition not to be able to use monitoring post due to loss of power sources for the effect of the earthquake, and needed time in data processing through the use of monitoring cars, while absence of measurement results occurred which caused a delay in the data submittal.
- Furthermore, for the transmission of the plant data to the central government, our system configuration that transmits the data to the country's Emergency Response Support system (ERSS) from our Safety Parameter Display System (SPDS) which is our plant data transmission system was put in place. However, the data transmission stopped for the reasons

as mentioned below before losing the plant data itself owing to the tsunami damage, etc.

- The communication equipment which transmits the plant data between ERSS (country's system) and SPDS (our system) was located in the safety inspector room in the building for training purpose inside the power plant, and AC power supply functioned as its main power supply. The battery owned by the country was planned to be used as a backup power supply in the event of loss of AC power supply. However, because our operation to make its connection was not completed, the data transmission stopped at about 14:47 when the external power source was lost which was caused by the earthquake.
- In addition, the data transmission from the Fukushima Daini Nuclear Power Plant was made without any problem, whereas the data transfer became impossible because of transmission shutdown of the dedicated network to nuclear disaster prevention (public communication service) owned by the Japanese government to which the ERSS (country's system) is connected, which occurred at about 16:43. (This dedicated network is provided for common use of the Fukushima Daiichi and Daini Nuclear Power Plants.)

Structure of Fukushima Daiichi Nuclear Power Plant' SPDS: Transmission conditions on March 11, 2011 when the earthquake occurred



*1 Backup power supply consists of gas turbine generator dedicated to seismically isolated important facility and equipment, and batteries.
*2 FW: Firewall
*3 MC (Media converter): It is the equipment that interconnects different transmission media, such as optical fiber and copper lines, of different standards and converts signals.
*4 L3SW (Layer-3 switch): It performs routing control based on IP address and transfers packets to the output port adapted to the desired IP address.

(3) Providing information to local residents

- Reflecting on the public relations activities based on our experience of the Niigataken Chuetsu-Oki Earthquake in July 2007, we provided information using radio broadcasting of a

radio broadcasting station and television telop of each commercial TV broadcasting station in Fukushima prefecture, and cruising of our public relations vehicles, as our reporting activities to the local residents, from the night on March 11, 2011 to make what was happening known to everyone involved. [See Annex 5 for details.]

- In the meantime, partly because no information can be transmitted to and from some of the local governments due to communication failure, etc. while on-site situations changed constantly, some of our employees went together to four towns in and around which the nuclear power stations are located from March 11, 2011 and described the circumstances (even on the days when some of our employees were not able to go together, other employees went there where appropriate). For the other peripheral local governments than them, some of our employees were accompanied by the responsible personnel or the latter directly visited them to explain the ongoing situations sequentially from March 13, 2001 onward as soon as our preparations were completed.
- Additionally, prior to performing the venting for the Fukushima Daiichi plant's Unit No.1 which was done on March 12, 2011, we were informed from one of our employees who went together to the operation site that "evacuation of part of areas on the south side in the vicinity of the power station was not conducted completely"; and thus we confirmed that the evacuation of the area was completed at 9:02.

(4) Personnel dispatchment

[1] Nuclear and Industrial Safety Agency

- After the earthquake-triggered scram occurred on March 11, 2011, we dispatched the liaison parties and other personnel responsible for communication between the head office and the authorities concerned in order to make close contact with the Nuclear and Industrial Safety Agency to the Agency's emergency countermeasures office, etc. In particular, such countermeasures have been usually taken in the event of any trouble at nuclear power plants; we dispatched the required personnel in such a way that five or so staff members will always reside in the emergency countermeasures office of the Nuclear and Industrial Safety Agency in this case as well, who fulfilled their duties by rotation.
- Because a fax traffic jam occurred in the facsimile communications of the emergency countermeasures office at the Nuclear and Industrial Safety Agency during the initial phase for the accident which resulted from common use with other companies, the dispatched personal obtained information from the head office by phone instead, and other data including radiation quantity, the reactor's water level and pressure, etc. of the monitoring post which were read aloud in the power plant regularly, all of which were obtained in real time from the head office. Then, they decided to tell them orally to the Agency's emergency countermeasures office. Meanwhile, e-mails making use of personal computers of the Nuclear and Industrial Safety Agency were also concurrently utilized partially.

[2] Prime Minister's Office

- The nuclear disaster countermeasures headquarters was established in the Prime Minister's Office at 19:03 on March 11, 2011, but there was a postulate to account for the ongoing situations before this establishment, while the four persons who were familiar with atomic energy or the like were dispatched there in haste as assistant engineers, and description of the situations was given. These persons were required to remain in the Prime Minister's Office, who always resided therein except some hours until March 15, 2011 and coped with inquiries sometimes in such a manner that they were called to come into the Office as required.
- Referring to the Prime Minister's Office, we were not supposed to dispatch our staff members there in the event of a nuclear disaster from us, but a request was made to us for dispatching other personnel in addition to the aforementioned four persons to the crisis management center in the Prime Minister's Office separately. In this connection, we were often asked to provide information directly to the center and Office without referral by the Ministry of Economy, Trade and Industry. On the subject of contents of information to be provided, it was determined that our answers were to be given to questions from the Prime Minister's Office and pieces of information, such as radiation quantity and the plant's parameters which are indicated by the monitoring posts, were also to be provided regularly and sequentially.
- In the meantime, the then Prime Minister Naoto Kan took off from his official residence in a helicopter with Haruki Madarame (Chairman of the Nuclear Standards Committee) and headed for the Fukushima Daiichi Nuclear Power Plant ground at 6:14 on March 12, 2011. They arrived there at 7:11. On their arrival at the ground, Mr. Muto (Nuclear Plant/Location Director) who awaited there as personnel of the off-site center welcomed them, then Mr. Yoshida, head of the power plant, explained the operational situations about the plant and the venting for the reactor containment in the power-plant emergency countermeasures headquarters, following which Kan and Madarame left the power plant at 8:04 in the helicopter.

(5) Activities at off-site center

- A nuclear disaster emergency state declaration was announced by the Prime Minister at 19:03 on March 11, 2011 about 2 hours after the notice of Article 15 of Nuclear Measures Law was issued at 16:45 on the same day, and at the same time, the nuclear disaster countermeasures headquarters was established in the Prime Minister's Office and the nuclear-disaster local countermeasures headquarters (Joint measures council for nuclear disaster) was also established in the off-site center which served as the local emergency countermeasures base.
- The off-site center collects information in the event of a nuclear disaster in an integrated fashion, and it is an important facility to decide on countermeasures to be taken in case of an emergency. For this reason, at the time of its establishment, the Nuclear Plant/Location Director and others, including the staff members dispatched from the Fukushima Daiichi and

Daini Nuclear Power Plants, were to be dispatched there from the head office, so that a quick decision will be made on the spot.

- As mentioned earlier, the Nuclear Plant/Location Director and others dispatched by the head office came in the Fukushima Daini Nuclear Power Plant at about 18:00, and the preparation for personnel dispatch to the off-site center was fully made at 19:03 when a nuclear disaster emergency state declaration was announced by the Prime Minister. However, the nuclear-disaster local countermeasures headquarters at the off-site center was in a condition under which it was unable to perform any activities during the initial phase by the effect of power failure of external power source which was caused by the earthquake and failure of emergency diesel power generation facility. So, except some staff members, other members entered a wait state at the off-site center until the next day, March 12, 2011, on which the center was set up. (Mr. Muto, Nuclear Plant/Location Director, visited Okuma-cho and Futaba-cho to explain the ongoing situations during such waiting period.)
- The off-site center was intended to function as a base at which public relations activities for local residents, their evacuation, setup of indoor shelters, evacuation guidance, etc. should be provided, whereas such evacuation measures, etc. were taken, before the off-site center was established, as evacuation directions for some of the local residents in the neighborhood of the Fukushima Daiichi Nuclear Power Plant were given by the Fukushima government at 20:50 on March 11, 2011, evacuation directions by the government were given to those residents living within a radius of 3-kilometer from the same power plant at 21:23 on the same day.
- Because the off-site center was not established at first, it put off the full-scale personnel dispatch, but, after receiving the information that activity began at 3:20 on March 12, 2011, 28 persons in total (max. 38 persons on March 14) started performing activity in the aforementioned place before the end of that day. Speaking of the five members including the Nuclear Plant/Location Director who came from the head-office emergency countermeasures headquarters for support of the power plant, they also entered the off-site center, after such activity began, before the end of March 12, 2011, and they were included in the aforementioned persons.
- The workers dispatched from us to the off-site center made use of the video conference system and security telephones whose functions remained active without being damaged by the earthquake, ensuing tsunami and so on, which were installed in our booth and connectable through our security line, being capable of sharing information in real time with the power plant, head office and countermeasures headquarters.
- Subsequently, as the nuclear disaster changed for worse owing to increase in radiation quantity around the off-site center as well as to food shortage, it was determined that continuous activities became difficult, and then the local countermeasures headquarters moved to the Fukushima prefectural office on March 15, 2011.
- The Nuclear Plant/Location Director dispatched to the off-site center from the head office

decided to return to the head office's countermeasures headquarters while giving due regard to the actual operation conditions of the center, and he was replaced with the Deputy Director dispatched from the head office on March 14, 2011. Additionally, with movement of the off-site center to the Fukushima prefectural office, the personnel dispatched from the Fukushima Daiichi and Daini Nuclear Power Plants who were involved in such movement also moved to the latter office after leaving those members who were in charge of radiation control operation at the plants in view of the plants' circumstances at that time, reorganizing the personnel organization.

3. Support for electric power plant

In the core damage accident which occurred at the Fukushima Daiichi Nuclear Power Plant this time, the external power source lost its function in the wake of the Tohoku Pacific Offshore Earthquake whose epicenters had wide-reaching impact on several regions that were struck by it, but the emergency diesel generator (emergency D/G) was activated and the required power source for ensuring safety of the nuclear reactors was secured. However, by the effect of a colossal tsunami which hit the coastal areas afterwards, the reactor's water-injection equipment of motor-driven type lost its function. In addition, the reactor core isolation cooling system of steam-driven type, etc. which functioned in the early stage also lost its function because its DC power supply needed for system control was lost, and eventually all of these reactor's water-injection means were rendered inoperative.

In this way, as this tsunami deprived the power plant of its all safety functions, the power plant was forced to take countermeasures without satisfactory facilities and equipment, and this made it impossible for the plant to catch up with progress of a series of events, resulting in the core damage.

On the part of power plant, recovery efforts were made to restore the main facilities and equipment through recovery of the power source or the like, and flexible actions were taken by utilizing fire-fighting vehicles, etc. which were not originally expected to be used as the plant's equipment. (For particulars about the recovery efforts, refer to our interim report and our responses attached hereto.) In order to provide support for these activities, physical-distribution and personnel supports were given not only from us but also from other electric power companies and cooperative corporations with us. Their details are discussed in the next section and later. Note, however, that these contents of the physical-distribution and personnel supports were limited to what we can confirm at this stage.

3.1 About personnel support for the Fukushima Daiichi Nuclear Power Plant

The details of personnel support for the Fukushima Daiichi Nuclear Power Plant, which was provided as our initial responses in the early stage (from March 11 to March 15, 2011) after the Tohoku Pacific Offshore Earthquake occurred are summarized as mentioned below. [See Annex

6 for details.]

(1) No. of supporting staff members for power plant

[1] Dispatchment from head-office emergency countermeasures headquarters

The actual details of the number of dispatched support workers from the head-office emergency countermeasures headquarters to the Fukushima Daiichi Nuclear Power Plant at the early stage of the disaster are shown in the following table:

Actual details of human-resource dispatchment from head-office emergency countermeasures headquarters to Fukushima Daiichi Nuclear Power Plant

Dispatching operators	March				
	11	12	13	14	15
TEPCO	152	257	304	346	253
Cooperative corporations and other electric power companies	104	197	153	194	147
No. of support workers dispatched in total	**256**	**454**	**457**	**540**	**400**

Support workers in the initial-countermeasure stage amount to about 400 or more on average. Of them, about 60% were dispatched from us urgently, and about 40% were the employees of cooperative corporations with us and the other electric power companies.

When it comes to the personnel support which is classified by group to make preparations in case of an emergency, there mainly exist power supply recovery and restoration of monitoring instruments as to a recovery group; water injection into reactor by means of fire engine, etc. as to a fire-fighting squad; in-plant radiation quantity control and radiation quantity control in the peripheral areas as to a security group; and physical distribution support as to a material-supply group.

The following table shows the breakdown (max. number of support workers per day at each support site and their average number between March 12 and March 15, 2011) of the aforementioned personnel support which is classified by each group for emergency preparations:

[TEPCO and Cooperative corporations]

Kashiwazaki-Kariwa Nuclear Power Plant

Groups for preparations in case of an emergency	Max. no. of daily support workers	Average no. of support workers	Remarks
Recovery group	36	21	Only our employees
Fire-fighting squad	6	6	Only cooperative corporations
Security group	42	34	Only our employees
Material-supply group	24	15	Our employees + cooperative corporations

As support from the Kashiwazaki-Kariwa Nuclear Power Plant, 20 diving investigation staff members (3 from us and 17 from cooperative corporations), in addition to the workers as mentioned above, were dispatched.

In addition, our five employees were sent to the Fukushima Daini Nuclear Power Plant for assistance.

TEPCO and departments in each office

Department in each office	Description of support	Max. no. of daily support workers	Average no. of support workers	Remarks
Power distribution dept.	Support provided by recovery group (power restoration)	376	303	Our employees + cooperative corporations + other electric power companies
Engineering dept.	Support provided by recovery group (power restoration)	52	31	Our employees + cooperative corporations
Thermal power dept.	Support provided by fire-fighting squad	25	11	Only cooperative corporations
Material supply dept.	Support provided by material-supply group	63	43	Our employees + cooperative corporations

In addition, after the initial responses to the disaster, various supporting activities were provided, such as debris removal, road maintenance (including areas around the power plant) and so on by the construction dept., and restoration of various types of communication equipment by the communication dept. including paging services, PHS, portable phones, etc.

[2] Each electric power company (based on cooperation agreement among nuclear business companies)

As we have concluded "cooperation agreement among nuclear business companies in nuclear disaster" with each of the electric power companies, supporting workers were dispatched from these electric power companies based on this agreement from March 13, 2011 onward, and about 120 such workers provided support as of March 15, 2011 (69 workers on average between March 12, 2011 and March 15, 2011). The main services for which the support was provided are the services related to the security group (radiation survey (surface contamination check) of people and vehicles evacuated from a 20-km range from the power plant, decontamination work and others].

Also, the supporting activities from each electric power company are still continuing until now after March 15, 2011, as shown in the table below.

Actual support from the electric power companies

Date	March				
	11	12	13	14	15
No. of persons	—	—	41	116	120

In conjunction with general recovery efforts, our group companies, manufacturers, local companies and others, including those people who provided support immediately after the earthquake, also provided support, and it is estimated that more than 250 employees of our cooperative corporations provided support at the power plant's site.

Furthermore, it has been confirmed from our hearing investigation that those companies which provided the support engaged in laying of cables, terminal treatment, debris removal, etc. which were required for electric power recovery operations.

In addition, in the Fukushima Daini Nuclear Power Plant, about 50 workers provided various supports, such as laying of cables, motor replacement operations, etc., and about 15 workers assisted in removing debris or the like.

(2) Details of supporting activities

As mentioned above, the main supporting activities provided by the workers dispatched to the Fukushima Daiichi Nuclear Power Plant include the supports provided by the recovery group, fire-fighting squad, security group and material-supply group. The primary details relevant to them are as follows:

Primary details of supports provided for the Fukushima Daiichi Nuclear Power Plant

Category	Primary details of supports provided
Support provided by recovery group	[1] Electric power recovery operations through high-voltage power supply vehicles • Transfer of high-voltage power supply vehicles and connection of them to power source panel • Restoration of central control room's lighting [2] Restoration of external power sources • Restoration of new Fukushima substation • System construction of power-supply lines from new Fukushima substation • System construction of power-supply lines inside the Fukushima Daiichi Nuclear Power Plant [3] Restoration of monitoring instruments • Battery transport, restoration of monitoring instruments, etc.
Support provided by fire-fighting squad	[4] Water injection into nuclear reactor by fire-fighting vehicles • Laying of hoses for water injection by fire-fighting vehicles • Placement of fire-fighting vehicles • Fuel supply for fire-fighting vehicles
Support provided by security group	[5] Entrance and exit control for and monitoring of seismically isolated important facility • Support for environmental radiation measurement at boundary zones • Support for entrance and exit control over seismically isolated important facility [6] Survey on people and vehicles evacuated from evacuation zones • Support for survey (surface contamination check) on people and vehicles evacuated from a 20-km range from the power plant as well as for decontamination work
Support provided by material-supply group	[7] Physical distribution support • Construction and operation of local physical distribution bases • Support for transport operations, etc.
Other	[8] Search for missing persons (our 2 employees) in No. 4 reactor's turbine plant

Based on the table as shown above, the supporting activities in each group can be summarized in the following table:

Category of supports provided by dispatched personnel

(aggregate calculation until March 15, 2011)

Category	No. of workers (employees) in the Fukushima Daiichi power plant	Main supporting activities	No. of supporting workers		Dispatching operators for support
			Daily max.	Average	
Recovery group	57	[1] Electric power recovery operations through power supply vehicles [2] Restoration of external power sources [3] Restoration of monitoring instruments, etc.	439	354	Engineering and Power distribution departments Recovery group of Kashiwazaki-Kariwa Nuclear Power Plant
Fire-fighting squad	33	[4] Water injection by fire-fighting vehicles into nuclear reactors	31	17	Fire-fighting squad of Kashiwazaki-Kariwa Nuclear Power Plant Fire-fighting squad of Thermal Power Plant
Security group	49	[5] Entrance and exit control for and monitoring of seismically isolated important facility [6] Survey on people and vehicles evacuated from evacuation zones, etc.	162	103	Security group of Kashiwazaki-Kariwa Nuclear Power Plant Each electric power company
Material-supply group	13	[7] Physical distribution support	87	58	Material supply dept. Material supply group of Kashiwazaki-Kariwa Nuclear Power Plant
Others	—	[8] Search for missing persons	20		Civil engineering and construction group of Kashiwazaki-Kariwa Nuclear Power Plant
		[9] Overall restoration	(250 persons or more)		Each cooperative corporation
Total			552*		—

* This is the grand total of the total number of supporting workers (on average) and the number of supporters for searching for missing persons.

(3) Actual details of supporting activities

[1] Electric power recovery operations through power supply vehicles

For restoration of the injection system of water mixed with boric acid pump, etc. of the Fukushima Daiichi plant's Unit No.1, the supporting workers of electric and mechanical systems of the Fukushima Daiichi Nuclear Power Plant and the other supporting workers of the power distribution dept. as well as of the Kashiwazaki-Kariwa Nuclear Power Plant made a cable connection of high-voltage power supply vehicles with the power center 2C of Unit Daini and conducted the connection and laying of cables to the load. These connections were completed at around 15:30 on March 12, 2011. (Eventually, the power receiving by the power center 2C stopped immediately after the connections due to the explosion of unit No.1. Although we tried to supply power to it subsequently, we failed to activate the injection system of water mixed with boric acid pump, etc. because of the damage to the high-voltage cable leading to the power center 2C.)

On the other hand, for electric power recovery operations of the Units No. 3 and 4, a cable connection was made between a power supply vehicle and the power center 4D of unit No.4. Then, the power was received by the power center 4D at 14:20 on March 13, 2011. However, the power supply to the power center 4D stopped because of the blasting of Unit No.3 which occurred on March 14, 2011.

[2] Restoration of external power sources

The Engineering and Power distribution departments as well as the Fukushima Daiichi Nuclear Power Plant cooperated with each other for restoration of external power sources.

While the explosion of Units No.1, 3 and 4 of the Fukushima Daiichi Nuclear Power Plant occurred and the radiation quantity increased on site, we carried out the restoration of new Fukushima substation, Okuma and Yonomori lines and power-receiving operation from TEPCO's nuclear-power line, and completed the power-charging operations of the TEPCO's line on March 15, 2011, of the temporal line from Yonomori line to Okuma line on March 18, 2011, of the power distribution lines inside the power plant's site on March 19, 2011 and of the Yonomori line on March 20, 2011.

On March 20, 2011, the power was supplied to the power center 2C and M/C of Units No.5 and 6. Then, the power center 4D received power for Units No.3 and 4 on March 22, 2011.

[3] Water injection by fire-fighting vehicles into nuclear reactors

The freshwater injection into the Unit No. 1 began in predawn hours on March 12, 2011 by the self-defense fire-fighting squad and other initial-stage fire extinguishing personnel (including those from our cooperative corporations) in the Fukushima Daiichi Nuclear Power Plant.

On the other hand, one chemical fire engine (3 persons) and one fire engine equipped with water tank (3 persons) were dispatched after 21:00 on March 11, 2011 from the Kashiwazaki-Kariwa

Nuclear Power Plant. They arrived at the Fukushima Daiichi Nuclear Power Plant at about 10:30 on March 12, 2011 and began performing the activities for water injection into the Units No.1 to No. 3 by means of fire-fighting vehicles. The activities continued even after the explosion of Units No.1 and 3, and until the first three persons and second three persons returned to the Kashiwazaki-Kariwa Nuclear Power Plant on March 17 and 18, 2011, respectively. The supporters from the Kashiwazaki-Kariwa Nuclear Power Plant assisted the hosing arrangement. With these supports, seawater injection into the Unit Daini, fresh water/seawater injection into the Unit No.3 were done.

In addition, the disaster-prevention personnel of our cooperative corporation who were dispatched from the Hirono thermal power plant on March 12, 2011 engaged in the water-injection activities together with the aforementioned supporters dispatched from the Kashiwazaki-Kariwa Nuclear Power Plant. However, they returned to the Hirono thermal power plant afterward because evacuation request was made in association with the explosion of Unit No.1. Concomitantly, the four fire-fighting vehicles and the disaster-prevention personnel who were dispatched from the Chiba, Anegasaki, Sodegaura and Yokohama South thermal power plants arrived at the Fukushima Daiichi Nuclear Power Plant on March 14, 2011, and provided support for the water injection activities until March 15, 2011. Additionally, although other disaster-prevention personnel were also dispatched, they were forced to withdraw owing to such explosion.

[4] Restoration of monitoring instruments, etc.

Supporting workers from the Kashiwazaki-Kariwa Nuclear Power Plant helped restoration of monitoring instruments between March 14 and March 15, 2011. The contents of their support were battery transport to the central control room and restoration work of measuring instruments. Meanwhile, these supporting workers from the Kashiwazaki-Kariwa Nuclear Power Plant also conducted battery transport which was included in the electric power recovery operations.

This allowed for the progress of restoration of various measuring instruments.

[5] Radiation quantity control inside the power plant

As for the radiation quantity control, the access control to and from the seismically isolated important facility was necessary before dawn on March 22, 2011 while the radiation quantity increased gradually in the power plant's site and at on-site boundary zones. As well as radiation control personnel of the Fukushima Daiichi Nuclear Power Plant, their counterparts were dispatched from the Kashiwazaki-Kariwa Nuclear Power Plant, and they exercised the access control over the seismically isolated important facility (confirmation of wearing of security equipment, assistance for attaching and removing of such equipment, and contamination check).

Moreover, monitoring of environmental radiation was conducted by a monitoring car which was transported from the Kashiwazaki-Kariwa Nuclear Power Plant.

[6] Survey on people and vehicles evacuated from evacuation zones

Our radiation control personnel (three persons from the head office, and one person from the Fukushima Daini Nuclear Power Plant) entered the J-Village on March 15, 2011 and began the access control (including preparations needed for such control) for J-Village from then onward. At such time, they did radiation survey, decontamination work and other operations with radiation control personnel from other electric power companies and supporting workers from the Kashiwazaki-Kariwa Nuclear Power Plant.

In addition, as support for radiation control personnel from the other electric power companies, a survey (Fukushima support) of evacuees was also conducted.

[7] Physical distribution support

The head office's material-supply group decided to make the Onahama Call Center function as a local physical distribution foothold at night on March 12, 2011 after coordination with the departments concerned.

Arrangements for heavy equipment operators, etc. were made, and the center's administration system consisting of 12 persons from our cooperative corporations began on the following day, March 13, 2011.

With this, transport of gasoline, radiation control supplies, generators, underwater pumps, batteries and so on was implemented.

In the meantime, because of the explosion of Units No.1 and 3, transportation by cooperative corporations became impossible on or about March 14, 2011. Then, the required transportation was carried out by the Fukushima Daiichi Nuclear Power Plant and power distribution dept., while transportation by cooperative corporations was resumed subsequently on March 16, 2011.

[8] Search for missing persons

On March 12, 2011, divers were dispatched for a search of the missing persons (two employees) in Unit No. 4 reactor's turbine building from the Kashiwazaki-Kariwa Nuclear Power Plant（20 persons in total: three employees, 17 divers of cooperative corporations and a cargo truck, drainage pumps (16), generators (9) for activating pumps, fuel for the generators, cables, etc. were transported.)

However, because of the hydrogen explosion of Unit No.3 building, no search activity was able to be made any longer at that point in time. (Afterwards, these two persons were found dead on March 30, 2011.)

3.2 About equipment-and-materials support for the Fukushima Daiichi Nuclear Power Plant

(1) Procurement of batteries [See Annex 7 for details.]

On this occasion, in the Units No.1 to No.4 of the Fukushima Daiichi Nuclear Power Plant, their AC power sources were lost in the wake of gigantic tsunami, and concurrently their DC power supplies lost their functions although there was time difference. Regarding the DC power supplies (batteries), they are used for operation and control of the High Pressure Coolant Injection (HPCI) system of steam-driven type and the Reactor Core Isolation Cooling (RCIC) system, and as power source or the like for monitoring instruments, etc. For this reason, it can be said that the batteries are indispensable for the monitoring, water injection, cooling and pressure reduction in dealing with an accident that may occur in a power plant. However, because the batteries always need to be charged, their performance and functions are maintained and controlled through periodical check and no extra parts or the like are available, the power plant's countermeasures headquarters itself was engaged earnestly in procurement of batteries from the early evening on March 11, 2011, whereas the head-office countermeasures headquarters tried to collect as many batteries as it could without limiting their specifications. The way the batteries can be procured is roughly classified into three ways; collection inside the power plant, purchase of them, and appropriation of equipment that we owns.

[1] Procuring batteries through in-plant collection

The power of monitoring instruments in Units No. 1 and 2 was lost after the power plant went through the tsunami on March 11, 2011, and thus the conditions of plant were unable to be confirmed. On this account, after the 11th, batteries were collected from vehicles kept on its premises and used as power sources for monitoring instruments, etc. The batteries which have been proved to be so collected at present are as follows:

Storage conditions of batteries collected on site

Procurement source	Collection date	Battery specification	Quantity
Removal from in-plant corporate buses	March 11	12 V (for vehicles)	2
Collection from in-plant corporations	March 11	6 V (for telecommunications and controls)	4
Removal from TEPCO's corporate vehicles	March 11	12 V (for vehicles)	3
Removal from private vehicles	March 13	12 V (for vehicles)	20

[Storage conditions and actual utilization of batteries]

- From in-plant corporate buses and others, the batteries (2 pcs. of 12 V and 4 pcs. of 6 V) were collected after the early evening on March 11, 2011 to secure the power supply promptly.

Then, they were transported to the central control room of Units No.1 and 2 and used as the power supply (24 V) for measuring instruments of the reactor water level gauge of which condition was almost unable to be confirmed after the plant was affected by the tsunami. With this approach, validation of the Unit No.1 and the system A's reactor water level of Unit No.2 was enabled at 21:19 and 21:50, respectively.

- Subsequently, by comprising circuitry with the same batteries in parallel, we became capable of confirming the system B's reactor water level gauge of Unit No.1 at about 2:00 on March 12, 2011, and the system B's reactor water level gauge of Unit No.2 at about 9:25 on March 13, 2011.
- Those batteries that were collected from TEPCO's corporate vehicles were also transported to the central control room of Units No. 1 and 2 and used as the power supplies for measuring instruments in predawn hours on March 12, 2011.
- Because a power source was required for pressure reduction in reactor by means of the main steam safety-relief valve of Units No.2 and 3 and the corporate vehicles were used for in-plant operations, the recovery group of the power-plant countermeasures headquarters requested the employees who were in power-plant countermeasures headquarters to lend out their private cars' batteries and collected 20 of them from about 7:00 on March 13, 2011.
- While ten batteries of the collected batteries were carried into the Unit No.3's central control room and the operation to connect them in series was being performed, the pressure reduction in the reactor began at 9:08 because the main steam safety-relief valve was opened at that time. Thereafter, at around 9:40, the operation to connect the ten batteries in series was completed, following which they were connected to the control board of main steam safety-relief valve. On the other hand, ten batteries for vehicles which were collected in tandem with another operation for Unit No.3 were also carried into the Unit No.2's central control room, and then preparations for electric power recovery operation began for Unit No.2's main steam safety-relief valve. Connecting such batteries with the control board of main steam safety-relief valve of Unit No.2 at 13:30 enabled us to open the valve manually using the operation switch.

[2] Procuring battery through purchase

Even the head office and Kashiwazaki-Kariwa Nuclear Power Plant were also active for procuring batteries from manufacturers and stores to give support for securing batteries at the power plant. In addition, the power plant's staff also went to Iwaki city for the purchase of batteries. The batteries which were so purchased are as follows:

Storage conditions of purchased batteries

Procurement source	Purchase date	Storage destination	Battery specification	Quantity
A. Head office's arrangement	March 14	Onahama Call Center	12 V (for vehicles)	1,000
	March 15	Onahama Call Center	12 V (for vehicles)	20
B. Power plant's arrangement	March 13	Power plant (purchased in Iwaki city)	12 V (for vehicles)	8
C. Kashiwazaki-Kariwa Nuclear Power Plant's arrangement	March 14	Power plant (purchased in Kashiwazaki city)	12 V (for vehicles)	20

* Of all the 1,000 batteries which were delivered to Onahama Call Center from the head office on March 14, 2011, 320 batteries were transported to the power plant on the same day, and other batteries (the quantity is unknown) were carried into the plant on March 15, 2011.

[Storage conditions and actual utilization of batteries]

A. Head office's arrangement

- From the midnight on March 11, 2011 to the morning on March 12, 2011, the nuclear-power recovery group of head-office countermeasures headquarters was informed from a plant maker that "arrangement can be made for procurement of 12-V batteries for vehicles", and the group ordered 1,000 pieces of them. These batteries were delivered to Onahama Call Center by land at about 0:00 on March 14, 2011.

  At around the time between 20:00 and 21:00 on March 14, 2011, the material-supply group of power-plant countermeasures headquarters used two large-capacity cargo trucks to transport about 320 batteries from Onahama Call Center to the power plant. In addition, a supporter from the power distribution dept. transported the other batteries from Onahama Call Center to the power plant at about 3:00 on March 15, 2011.

- The head office's material-supply group started transportation of the twenty 12-V batteries which were delivered to the material center to the power plant via Onahama Call Center on March 14, 2011. Although the batteries were transported to Onahama Call Center in that way, their transportation to the power plant was canceled on March 14 and 15, 2011 because of the explosion that occurred in the power plant.

B. Power plant's arrangement

- In the morning on March 13, 2011, members of the power plant who were stationed in the off-site center went to Iwaki city to buy batteries. Unfortunately, however, the members failed to find and purchase any batteries because they were out of stock, even after shopping around at several shops within the city. In the afternoon on the same day, the material-supply group of power-plant countermeasures headquarters went to Iwaki city to purchase batteries, purchased eight 12-V batteries for vehicles and brought them to the power plant. At about 22:00, the

recovery group of the power-plant countermeasures headquarters transported four batteries of the eight batteries it purchased separately to the central control room of Units No. 1 and 2, and to the central control room of Units No. 3 and 4.

- On the other hand, the recovery group of the power-plant countermeasures headquarters, for its part, made a request to an on-site plant maker in the power plant for procuring batteries (its date is unknown). Then, at around 0:00 on March 17, 2011, additional 1,000 batteries were delivered to Onahama Call Center. These batteries were transferred to the plant maker's warehouse at a later date, which are currently retained in a safe place for future use.

C. Kashiwazaki-Kariwa Nuclear Power Plant's arrangement

- The Kashiwazaki-Kariwa Nuclear Power Plant's material-supply group received a request from our employee dispatched from the off-site center in the morning on March 13, 2011, and purchased twenty 12-V batteries for vehicle use in Kashiwazaki city. The batteries which were so purchased were loaded onto a supporting personnel transport bus which left the Kashiwazaki-Kariwa Nuclear Power Plant at 12:30 on the same day. This bus arrived at Onahama Call Center on the same day at 22:20, and the batteries were transported to the power plant at about 1:40 on the following day.

[3] Procurement of batteries from TEPCO's equipment

After the head office encouraged each department of the TEPCO to procure batteries, various batteries which TEPCO owns in its equipment were procured with the collaboration of its thermal power plants and branch office. The batteries which were so procured are as follows:

Storage conditions of batteries procured from company's equipment

Procurement source	Procurement date	Storage destination	Battery specification	Quantity
A. Hirono thermal power plant	March 12	Power plant	2 V	50
B. Kawasaki thermal power plant	March 12	J-Village (16 pcs. were sent to power plant on March 13)	2 V	100
C. Tokyo branch office	March 12	J-Village	2 V	132
D. New Iwaki substation	March 12	J-Village	2 V	52

[Storage conditions and actual utilization of batteries]

A. No. of batteries procured by courtesy of Hirono thermal power plant: 50

- In the early evening on March 11, 2011, the recovery group of our thermal plants, in response to a request from the nuclear-power recovery group of head-office countermeasures headquarters, decided to transport the batteries from the Hirono thermal power plant which is located nearby the Fukushima Daiichi Nuclear Power Plant. Then, the group began making preparations for transport of the batteries, and completed removal of fifty 2-V batteries (12.5 kg in weight per piece) in the thermal plant at around 19:30 on the same day. Because we

received the information that the Nuclear and Industrial Safety Agency notified the head office of a cooperative offer to provide transport support using Japanese Self-Defense Force helicopters in the early evening, we decided to accept such offer.

- Consequently, 50 batteries were transported to the J-Village which was delivery location for the Japanese Self-Defense Force helicopters, following which they were loaded onto two Self-Defense Force helicopters at about 1:00 on March 12, 2011 and the helicopters left the J-Village for the power plant. They arrived at the plant at around 1:20, and in turn, the recovery group of the power-plant countermeasures headquarters loaded them onto a station wagon for safekeeping. At 6:34, twelve 2-V batteries were used for a replacement work of the battery to activate the Unit No.1's diesel-powered fire extinguishing pump which was installed in the Unit No.1's fire-extinguishing pump room.
- The power of Unit No.3's reactor water level gauge was lost at 20:36 on March 12, 2011, and the monitoring of the water level was made unavailable. For this reason, the recovery group of the power-plant countermeasures headquarters used twelve 2-V batteries for restoration of the Unit No.3's reactor water level gauge in the central control room of Units No. 3 and 4 in the middle of the night.
- Later on, twelve 2-V batteries from the Hirono thermal power plant were used for a replacement work of the battery to activate the Unit No.3's diesel-powered fire extinguishing pump for the restoration of the same fire extinguishing pump at about 9:00 on March 14, 2011.

B. No. of batteries procured by courtesy of Kawasaki thermal power plant: 100

- The recovery group of our thermal plants which accepted a request from the nuclear-power recovery group of head-office countermeasures headquarters decided to transport batteries from the Kawasaki thermal power plant under construction in the early evening on March 11, 2011. In the same early evening, the group determined to accept the transport support by Self-Defense Force helicopters which was offered from the Nuclear and Industrial Safety Agency as mentioned earlier, and began preparations for such transport.
- At 0:45 on the next day (March 12, 2011), a landing permission for the Self-Defense Force helicopters to land on the Higashi-Ohgishima Higashi park heliport where batteries from the Kawasaki thermal power plant were to be delivered was granted from the Kawasaki-city municipality and the Ministry of Land, Infrastructure and Transport. At 0:47 on the same day, a permission for public road usage was granted from the Kawasaki Rinko Police Station for forklifts to be used for loading the batteries onto the helicopters at the heliport. Then, the forklifts were transported to the heliport from the Higashi-Ohgishima thermal power plant.
- At around the time between 1:00 and 2:00, lighting preparations for the Higashi-Ohgishima-park heliport were completed (arranged by the Ministry of Land, Infrastructure and Transport). At 1:51, the first freight cargo in which hundred 2-V batteries

(143 kg per piece) were placed separately on truck-mounted cranes left the Kawasaki thermal power plant for the Higashi-Ohgishima Higashi park which was a delivery location to the Self-Defense Force helicopters.

- The last freight cargo loaded with batteries of the Kawasaki thermal power plant arrived at the Higashi-Ohgishima Higashi park at 3:47, and at 4:11, the unloading was completed (the cargoes were put on standby until the arrival of Self-Defense Force helicopters). At around 4:00, the head-office countermeasures headquarters was informed from the Ministry of Defense of the flight plan of three helicopters (their scheduled arrival time - 4:50, 5:20 and 5:50, their destination - J-Village) of three helicopters. Then, the first Self-Defense Force helicopter arrived at the Higashi-Ohgishima Higashi park at 5:12, and the delivery of 2-V batteries from the Kawasaki thermal power plant was completed.

- The actual details of the air transport (March 12, 2011) are as follows:

	Departure time	Arrival time
First helicopter	5:12 Arrived at Higashi-Ohgishima park and was loaded with 28 pcs. 6:17 Took off	It arrived at the J-Village at around 9:00.
Second helicopter	6:33 Arrived at Higashi-Ohgishima park and was loaded with 36 pcs. 7:36 Took off	It returned to the JASDF's Hyakuri Air Force Base with 36 batteries loaded with it because a trouble occurred that its propellers were not brought to a stop.
Third helicopter	8:13 Arrived at Higashi-Ohgishima park and was loaded with 36 pcs. 9:30 Took off	It arrived at the J-Village at around 11:00.

- As for the batteries that arrived already at the J-Village, they were in the preparatory stage for transport to the power plant. However, their transport had to be canceled because of the blasting that occurred in the Unit No.1 of Fukushima Daiichi Nuclear Power Plant. The material-supply group of power-plant countermeasures headquarters went to the J-Village to receive 16 batteries supplied from the Kawasaki thermal power plant in the morning on March 13, 2011. Nevertheless, they were unable to be utilized at the plant, because each of them weighed as much as 143 kg, arrangement for heavy equipment failed to be made, and they were unable to be carried into the plant without heavy equipment.

C. No. of batteries procured by courtesy of our Tokyo branch office: 132

- The head-office's engineering recovery group to which a request was made from the nuclear-power recovery group of head-office countermeasures headquarters in the early evening on March 11, 2011 decided on the transportation of 132 batteries in total from a

substation of the Tokyo branch office of which inventory was successfully confirmed in advance. In the early evening on the same day, the group determined to accept transport support offered by the Self-Defense Force helicopter team which was notified to it from the Nuclear and Industrial Safety Agency, as mentioned above, and began preparations for their transportation.

- All of the 2-V batteries (53 from Tsunohazu substation, 54 from Koto substation and 25 for telecommunication use; weight per piece is 12 to 33 kg) which were provided by the Tokyo branch office arrived at the Tokyo heliport at around 3:00 on March 12, 2011 where they were to be delivered to the Self-Defense Force helicopters, and were held on standby there until the arrival of helicopters. At about 7:00, the Self-Defense Force helicopters arrived at the Tokyo heliport, then all the batteries were loaded onto them and transferred to the J-Village. The helicopters arrived at the J-Village in the morning on the same day.
- As for the batteries from the Tokyo branch office that arrived already at the J-Village, they were in the preparatory stage for transport to the power plant. However, their transport had to be canceled because of the explosion that occurred in the Unit No.1 of Fukushima Daiichi Nuclear Power Plant at 15:36.

D. No. of batteries procured by courtesy of New Iwaki substation: 52

- On March 11, 2011, the head-office's engineering recovery group decided on the battery transportation from the New Iwaki substation which is not far from the power plant, in response a request from nuclear-power recovery group of head-office countermeasures headquarters. Preparations for the transportation were started at about 17:00, but an entry point at the New Iwaki substation was frozen up, and therefore large-sized transportation vehicles were not allowed to have access to the substation. In addition, as there was no transportation company available for transportation to the power plant, arrangements were being made for land transportation at that time.
- Because arrangements for land transportation from the New Iwaki substation to J-Village were made in the early morning on March 12, 2011, transport of 52 2-V batteries (21 kg/piece) of the substation began. Because the substation’s entrance was frozen up, the loading of batteries onto a cargo truck had to be done manually. For this reason, the loading took a long time to perform, and thus the batteries finally arrived at the J-Village in the afternoon.

  For the batteries of the New Iwaki substation which arrived at the J-Village, they were in preparatory stage for transportation to the power plant. However, their transport had to be canceled because of the blasting that occurred in the Unit No.1 of Fukushima Daiichi Nuclear Power Plant at 15:36. In this connection, the batteries were stored in the J-Village.

(2) Securing power generation vehicles [See Annex 8 for details.]

Because the power plant fell victim to the tsunami, loss of all of its AC power sources occurred after the emergency diesel generator tripped. As a result of our on-site investigations on the in-plant power supplies and external power sources, the emergency diesel generator, 6.9-kV high-voltage power supply panel and the like were found to be inundated and flooded, and thus it was determined that early recovery of them, including the external power sources, was difficult. For this reason, we aimed at realizing the electric power recovery through the use of the then available in-plant power supply equipment as well as power generation vehicles.

The sources from which the power generation vehicles were secured can be roughly classified into three sources; a source from inside the company, a source from other electric power companies, and a source from the Japanese Self-Defense Force.

Changes in no. of power generation vehicles that arrived at the power plant (The figures shown in the table indicate no. of power generation vehicles that were stationed in the plant at each time.)

Date & time		Classification of power generation vehicles	High-voltage power supply vehicle				Low-voltage power supply vehicle			
		Final place of arrival	1F			2F	1F			2F
		Owner of power generation vehicles	A TEPCO	B Other EPCs	Total	Total	A TEPCO	C JSDF	Total	Total
March 11	At around 22:00	Arrival of high-voltage power supply vehicle of Tohoku Electric Power Co., Inc. was confirmed.	0	1	1	—	0	0	0	—
	At around 23:30	Arrival of low-voltage power supply vehicles[*1] of JSDF was confirmed.	0	1	1	—	0	2	2	—
March 12	At around 0:00	Arrival of high-voltage power supply vehicles of Tohoku Electric Power Co., Inc. was confirmed.	0	2	2	—	0	2	2	—
	At around 1:20	Arrival of four high-voltage power supply vehicles of Tohoku Electric Power Co., Inc. was confirmed. Arrival of our high-voltage power supply vehicle was confirmed.	1	4	5	—	0	2	2	—
	At around 3:00	Arrival of eight our high-voltage power supply vehicles was confirmed.	8	4	12	—	7	2	9	—
	At around 7:00	Arrival of three power generation vehicles[*2] of JSDF was confirmed.	8	4	12	—	7	5	12	—
	At around 10:15	Arrival of all of our power generation vehicles at the plant was confirmed.	9	3	12	42	7	5	12	11

*1: It was also informed that the number of JSDF's low-voltage power supply vehicles is one.

*2: The JSDF's power generation vehicles were included in the low-voltage power supply vehicles (because no eyewitness accounts were given to prove that they were the high-voltage power supply vehicles).

[Storage conditions and actual utilization of power generation vehicles]

A. Our power generation vehicles

- Based on instructions given by the head-office countermeasures headquarters, the head office's power-distribution recovery group ordered the power distribution departments of all the branch offices to secure high-voltage and low-voltage power supply vehicles and to confirm their transport paths to the power plant at around 16:10. At around 16:30, the information was given that 48 high-voltage power supply vehicles and 79 low-voltage power supply vehicles were being made available. Then, all of the power supply vehicles from all the branch offices left for Fukushima prefecture one by one from about 16:50.
- Because these power supply vehicles did not move forward to their satisfaction owing to road damages and traffic jam en route to their destination, the head office's power-distribution recovery group asked for consideration of their air transport of the power generation vehicles by means of Japanese Self-Defense Force helicopters and US-Military helicopters at about 17:50. However, such air transport using the helicopters was given up at 20:50 because the weight of each power supply vehicle was too heavy. Subsequently, the information that 51 high-voltage power supply vehicles were moving toward the Fukushima area at about 22:00 was given to us.
- On the other hand, in the power plant, confirmations of the actual soundness of its power supply equipment after the earthquake and ensuing tsunami, such as validation of on-site situations and measurements of insulation resistance of power source panels, were started from about 16:30. As a result, examinations of cable laying route, cable layout arrangements, debris removal and so forth were conducted for the purpose of connecting a high-voltage power supply vehicle to the P/C (2C) of Unit No.2's 480-V low-voltage power supply panel (hereinafter called "P/C") and the Unit No.4's P/C (4D) which were considered to be available.
- At around 1:20 on March 12, 2011, it was confirmed that the first high-voltage power supply vehicle arrived at the power plant as one of the in-house rescue missions. The recovery group of power-plant emergency countermeasures headquarters used the in-house power generation vehicles for the power connection between them and the crippled power plant. By the time at around 3:00, it was confirmed that eight high-voltage power supply vehicles and seven low-voltage power supply vehicles arrived at the power plant, which were dispatched by us.
- At around 8:30 on March 13, 2011, after cable laying and cable connection and other operations with powers supply vehicles were completed, the MCC terminals of the Unit No.2's P/C (2C) and the Unit No.1's P/C was unable to get the power, even after we tried to supply the power once again to the terminals, because of the damage of a high-voltage cable connected to the Unit No.2's P/C (2C).
- One high-voltage power supply vehicle was operated at about 14:20 on March 13, 2011, and the unit No.4's P/C (4D) succeeded in receiving the power from it. However, the power

reception of the unit No.4's P/C (4D) stopped because the Unit No.3 nuclear reactor building exploded at 11:01 on March 14, 2011.

B. Power generation vehicles provided by other electric power companies

- At around 16:30 on March 11, 2011, the other electric power companies were requested from the head-office countermeasures headquarters for relief efforts to procure any power generation vehicles, and information that three power generation vehicles could be lent out to us from the Tohoku Electric Power Co., Inc. was provided at about 18:15. At about 22:00 on the same day, it was confirmed that one high-voltage power supply vehicle arrived at the power plant as one of the first batch of troops for relief power generation vehicles from the Tohoku Electric Power Co., Inc. Then, at around 0:00 on the following day (March 12, 2011), the second power generation vehicle arrived from the Tohoku Electric Power Co., Inc.
- While it was confirmed that four high-voltage power supply vehicle of Tohoku Electric Power Co., Inc. were placed in the wait state inside the power plant at around 1:20 on March 12, 2011, we used our power generation vehicles for the electric power recovery operations because they arrived at the scene before cable connections to be established by the former vehicles were made.

C. Power generation vehicles provided by JSDF

- At around 18:15 on March 11, 2011, we were informed that power generation vehicles of the Self-Defense Force headed for the power plant. Subsequently, we asked for additional relief efforts in the wake of the information given to us that three more power generation vehicles of the Self-Defense Force could be lent out to us at about 22:48. At about 23:30, two power generation vehicles of the Self-Defense Force arrived at the power plant, then three power generation vehicles of the same arrived at around 7:18 on March 12, 2011.
- For actual electric power recovery operations, the power-supply sockets of power generation vehicles of the Self-Defense Force were of terminal-connection type, for which manual adjustments for wiring on the load side were required; and our power generation vehicles (their sockets are of plug-in power outlet type) arrived at the power plant soon after the former vehicles came in. For this reason, we used our power generation vehicles.

(3) Securing fire-fighting vehicles [See Annex 9 for details.]

At around 17:12 on March 11, 2011, the head of power plant gave a direction to begin examination on possibility of any water injection method into the nuclear reactor using the fire-extinguishing piping which was put in place as one of the accident management measures and fire-fighting vehicles, because the main facilities and equipment were unavailable due to loss of all AC power sources. In the power-plant countermeasures headquarters, coordination with the parties concerned

was started to make some arrangement for additional fire-fighting vehicles because such fire-fighting vehicles could be used for water injection into the reactor. The way these fire-fighting vehicles can be procured is roughly classified into the three ways; in-house procurement, procurement from other electric power companies, and procurement provided by the national government and others, as mentioned below.

Procurement conditions of fire-fighting vehicles
(No. of them that provided support until March 15, 2011)

Procurement source	Details of procurement source	No. of them that were actually procured
A. TEPCO	Kashiwazaki-Kariwa Nuclear Power Plant	2
	Fukushima Daini Nuclear Power Plant	1
	Thermal power plants	4
B. Other EPCs	The Japan Atomic Power Company	1
	Tohoku Electric Power Co., Inc.	1
	Kansai Electric Power Co., Inc.	1
C. National government and others	Ministry of Defense (Japan Self-Defense Force)	2
	Fire fighting squads of each local entity	12

[Procurement conditions and actual utilization of fire-fighting vehicles]

A. Fire-fighting vehicles which were procured in-house

- Immediately after the earthquake occurred, the Kashiwazaki-Kariwa Nuclear Power Plant embarked on discussions to verify how many fire-fighting vehicles could be dispatched from there for support of the Fukushima Daiichi Nuclear Power Plant, etc., and came to the conclusion that the plant was able to dispatch two fire-fighting vehicles at around 19:00 on March 11, 2011.
- As a result, dispatch of the two fire-fighting vehicles was requested to the Kashiwazaki-Kariwa Nuclear Power Plant from the Fukushima Daiichi Nuclear Power Plant, and, at about 21:44, one chemical fire engine left the Kashiwazaki-Kariwa Nuclear Power Plant, which was steered by an employee from cooperative corporation of the Kashiwazaki-Kariwa Nuclear Power Plant. Furthermore, at about 22:11, one fire engine equipped with water tank left the Kashiwazaki-Kariwa Nuclear Power Plant.
- These chemical fire engine and fire engine equipped with water tank which were so dispatched from the Kashiwazaki-Kariwa Nuclear Power Plant arrived at the Fukushima Daini Nuclear Power Plant at around 8:00 on March 12, 2011. Then, the fire engine equipped with water tank left for the Fukushima Daiichi Nuclear Power Plant. This fire engine equipped with water tank from the Kashiwazaki-Kariwa Nuclear Power Plant arrived at the power plant at about 10:30, and fresh water was supplied to the fire prevention cistern for a water-injection

operation into the Unit No.1's reactor.

- At about 11:30 on March 12, 2011, one chemical fire engine which was placed in the Fukushima Daini Nuclear Power Plant for shared use with the Fukushima Daiichi Nuclear Power Plant headed for the Fukushima Daiichi Nuclear Power Plant which was driven by an employee from our cooperative corporation. It arrived there at about 13:30, but it was not used eventually because it was outmoded in terms of its model year.
- At around 5:30 on March 13, 2011, the chemical fire engine of the Kashiwazaki-Kariwa Nuclear Power Plant which was put on standby at the Fukushima Daini Nuclear Power Plant left there, and arrived at the Fukushima Daiichi Nuclear Power Plant at about 6:30.
- Because recovery operations for the in-plant roads, etc. were under way and the traffic to/from the Unit No.5 and Unit No.6 side was available after the disaster occurred, we found a fire-fighting vehicle which was left unused in the site of Units No.5 and 6 to be available without being affected by the tsunami, and made it available for use.
- At a teleconference, we were informed from the thermal-power recovery group of head-office countermeasures headquarters that the group already arranged four fire-fighting vehicles of our thermal plants located along the Tokyo Bay area at around 10:15 on March 13, 2011. These fire-fighting vehicles left each of the thermal power plants one after another as mentioned below.
  - ⊙ At 11:55, one fire-fighting vehicle of Minami-Yokohama thermal power plant left the plant.
  - ⊙ At 12:26, one fire-fighting vehicle of Anegasaki thermal power plant left the plant.
  - ⊙ At 13:58, one fire-fighting vehicle of Sodegaura thermal power plant left the plant.
  - ⊙ At 14:03, one fire-fighting vehicle of Chiba thermal power plant left the plant.
- One fire-fighting vehicle from the Sodegaura thermal plant, and three of them from the Minami-Yokohama, Anegasaki and Chiba thermal power plants (4 in total) arrived at the Fukushima Daini Nuclear Power Plant at around 22:50 and 23:30, respectively.
- At around 4:32 on March 14, 2011, four fire-fighting vehicles coming from the Minami-Yokohama, Anegasaki, Chiba and Sodegaura thermal power plants, together with a lead car acting as a guide to the power plant which came from the off-site center, headed for the plant, and arrived there at around 5:03. The two fire-fighting vehicles of Minami-Yokohama and Chiba thermal power plants which arrived at the power plant at about 9:05 started pumping up seawater from the shallow draft quay, and transferred the seawater to the back-wash-valve pit used as a cistern in a seawater injection operation in the plant.

B. Fire-fighting vehicles which were provided by other electric power companies

- At around 21:20 on March 13, 2011, one fire-fighting vehicle of the Tsuruga Nuclear Power Plant of the Japan Atomic Energy Agency left the power plant for Fukushima prefecture.

- At around 22:30 on the same day, one fire-fighting vehicle of the Kansai Electric Power Co.'s Mihama Nuclear Power Plant left the power plant for Fukushima prefecture.
- At around 13:40 on March 14, 2011, two fire-fighting vehicles from the Tsuruga and Mihama Nuclear Power Plants arrived at the Tohoku Electric Power Co.'s Aizu Technology Center.
- One fire-fighting vehicle of the Tohoku Electric Power Co.'s Higashidori Nuclear Power Plant left the plant for our Onahama Call Center at about 8:30 on March 16, 2011 and arrived there at about 19:10.
- At around 9:15 on the same day, two fire-fighting vehicles of the Mihama and Tsuruga Nuclear Power Plants which were stationed in the Tohoku Electric Power Co.'s Aizu technology center and steered by employees of our cooperative corporations headed for the Onahama Call Center, and arrived there at about 13:20 on March 16, 2011.
- One fire-fighting vehicle of the Tsuruga Nuclear Power Plant left the Onahama Call Center which was driven by an employee of our cooperative corporation (with a guide from a Fukushima power plant's employee) at about 9:00 on March 18, 2011, and arrived just before noon.
- At about 10:45 on the same day, one fire-fighting vehicle of the Higashidori Nuclear Power Plant left the Onahama Call Center which was steered by our head office's employee, and arrived around noon.

C. Fire-fighting vehicles which were provided by the central government and others

- During the morning on March 12, 2011, two fire-fighting vehicles of the Self-Defense Forces arrived at the Fukushima Daiichi Nuclear Power Plant, and one of them was used to set up a water-supply line between the Unit No.3's fire prevention cistern and the Unit No.1's fire prevention cistern for water-injection operations to the Unit No.1.
- Two fire-fighting vehicles which were lent out to us and procured from the Koriyama fire fighting headquarters arrived at the off-site center at 20:45 on March 13, 2011, which were steered by one employee from our Inawashiro electric power office and another employee of our cooperative corporation. Later on, one more vehicle and another vehicle arrived by March 18 and March 22, 2011, respectively.
- At 0:45 on March 14, 2011, two fire-fighting vehicles which were lent out to us and procured from the Iwaki and Sukagawa fire fighting headquarters arrived at the off-site center, which were steered by one employee from our Inawashiro electric power office and another employee of our cooperative corporation. Thereafter, one more vehicle from the Iwaki fire fighting headquarters and another vehicle from the Sukagawa fire fighting headquarters arrived there by March 18 and April 8, 2011, respectively.
- Two fire-fighting vehicles from a public fire-fighting squad arrived at the Fukushima Daiichi Nuclear Power Plant before dawn on March 14, 2011.

- At 19:10 on the same day, one fire-fighting vehicle which were lent out to us and procured from the Aizu-Wakamatsu fire fighting headquarters arrived at the J-Village, which was steered by one employee from our Inawashiro electric power office, and then arrived at the Fukushima Daiichi Nuclear Power Plant by March 18, 2011.
- At 21:45 on the same day, one fire-fighting vehicle which was lent out to us and procured from the Yonezawa fire fighting headquarters arrived at our Inawashiro electric power office, which was steered by the office's employee. On March 15, 2011, it moved to the Onahama Call Center, and arrived at the Fukushima Daiichi Nuclear Power Plant by April 24, 2011.
- At 21:50 on the same day, two fire-fighting vehicles which were lent out to us and procured from the Utsunomiya fire fighting headquarters arrived at the J-Village, which were steered by employees from our Tochigi branch office, and then arrived at the Fukushima Daiichi Nuclear Power Plant by March 18, 2011.
- At 23:45 on the same day, two fire-fighting vehicles which were lent out to us and procured from the Niigata Prefectural Fire Department arrived at the J-Village, which were steered by one employee from our Kashiwazaki-Kariwa Nuclear Power Plant. One of them arrived at the Fukushima Daini Nuclear Power Plant, being driven by one employee of our corporative corporation on March 15, 2011. Another one arrived at the Fukushima Daiichi Nuclear Power Plant by March 18, 2011.
- At 1:15 on March 15, 2011, two fire-fighting vehicles which were lent out to us and procured from the Saitama Prefectural Fire Department arrived at the J-Village, which were steered by employees from our associated company with our employee from Saitama branch office riding together. On the same day, the vehicles arrived at the Fukushima Daini Nuclear Power Plant, being steered by employees of our corporative corporations.
- A Kashiwazaki-Kariwa Nuclear Power Plant employee took delivery of a high-pressure water cannon truck from the riot police at Miharu tollgate at around 17:00 on March 15, 2011, then the employee drove it and arrived at the Fukushima Daini Nuclear Power Plant later on. At about 20:00 on the same day, this riot police's high-pressure water cannon truck left for the Fukushima Daiichi Nuclear Power Plant from the Fukushima Daini Nuclear Power Plant, which was driven by our employee of the Fukushima Daiichi Nuclear Power Plant.
- In addition, it was decided to borrow fire-fighting vehicles from U.S. military forces on March 14, 2011, and two such vehicles were delivered to us at the Funehiki-Miharu tollgate on March 15, 2011.

(4) Securing equipment to prevent against hydrogen hazards

- From the early stages after the explosion of Unit No.1 which occurred on March 12, 2011, the nuclear-power recovery group of head-office countermeasures headquarters started

examinations of how to release hydrogen which tends to accumulates inside the nuclear reactor building, including such hydrogen-releasing methods as "release of the blowout panel", "puncturing holes in the ceiling of nuclear reactor building", and "perforating the nuclear reactor building's wall by water jet", on suspicion that hydrogen was doubtful as a possible cause of the explosion.

- In the course of the examinations, the greatest possible care was taken in selection of the required work operations in order not to ignite such accumulated hydrogen, if any. As for the perforation using a mechanical drill, it was highly likely that it may emit sparks and ignite the hydrogen and it was difficult for us to perform the operations in the immediate area of the reactor because of its high level of radiation quantity. Accordingly, we conducted further examinations by considering using the "water jet" approach mainly, following which we placed an order for a water jet device with a plant maker at about 0:00 on March 14, 2011.
- At first, we were scheduled to deliver such water jet device from a maker factory to Yotsukura factory in Iwaki city of a company associated with that maker, and in turn to the power plant via Onahama Call Center on March 14, 2011. Because the explosion occurred in the Unit No.3 at 11:01, however, transportation of the device was suspended at the Yotsukura factory, and it was not delivered to the power plant.

4. Epilog

The main actual relations of establishment of our responsive arrangements, information provision and the supports for the electric power plants in our initial responses to the core damage accident which occurred at the Fukushima Daiichi Nuclear Power Plant are summarized as mentioned above.

For this accident, such supports as maintenance of preparations made under the situations which were deviated greatly from preconditions, personnel support and equipment and material support were provided. In reference to such supports, it is considered that there are lots of potential problems, such as inability to secure human resources to be dispatched in transporting equipment and materials due to the explosion and radioactive contamination, no choice but to procure equipment and materials from the power plant for reasons attributable to such facts, difficulty in telecommunications in adjacent areas of the plant when personnel supports were provided and equipment and materials were transported and so on.

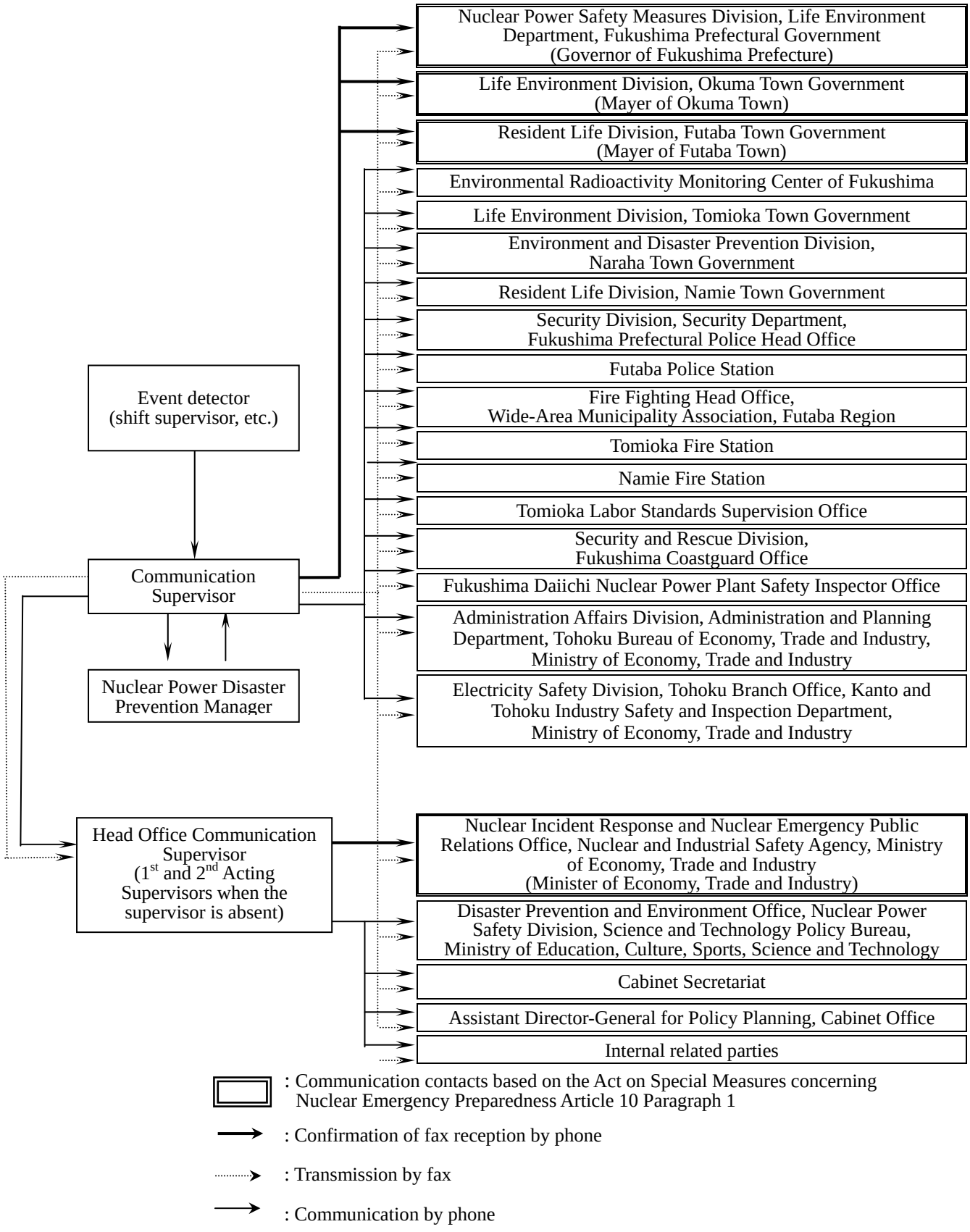
In the future, we will continue evaluating and examining these problems to be picked out in connection with countermeasures against any accident, while making use of such problems for our lesson to be gleaned from them as well as for our corrective action.

With regard to these examination results, we are scheduled to announce them once again to the public after having deliberations at the in-house investigative committee on the accident and the Investigation Committee on the Accidents at the Fukushima Nuclear Power Station of Tokyo

Electric Power Company set up by the government.

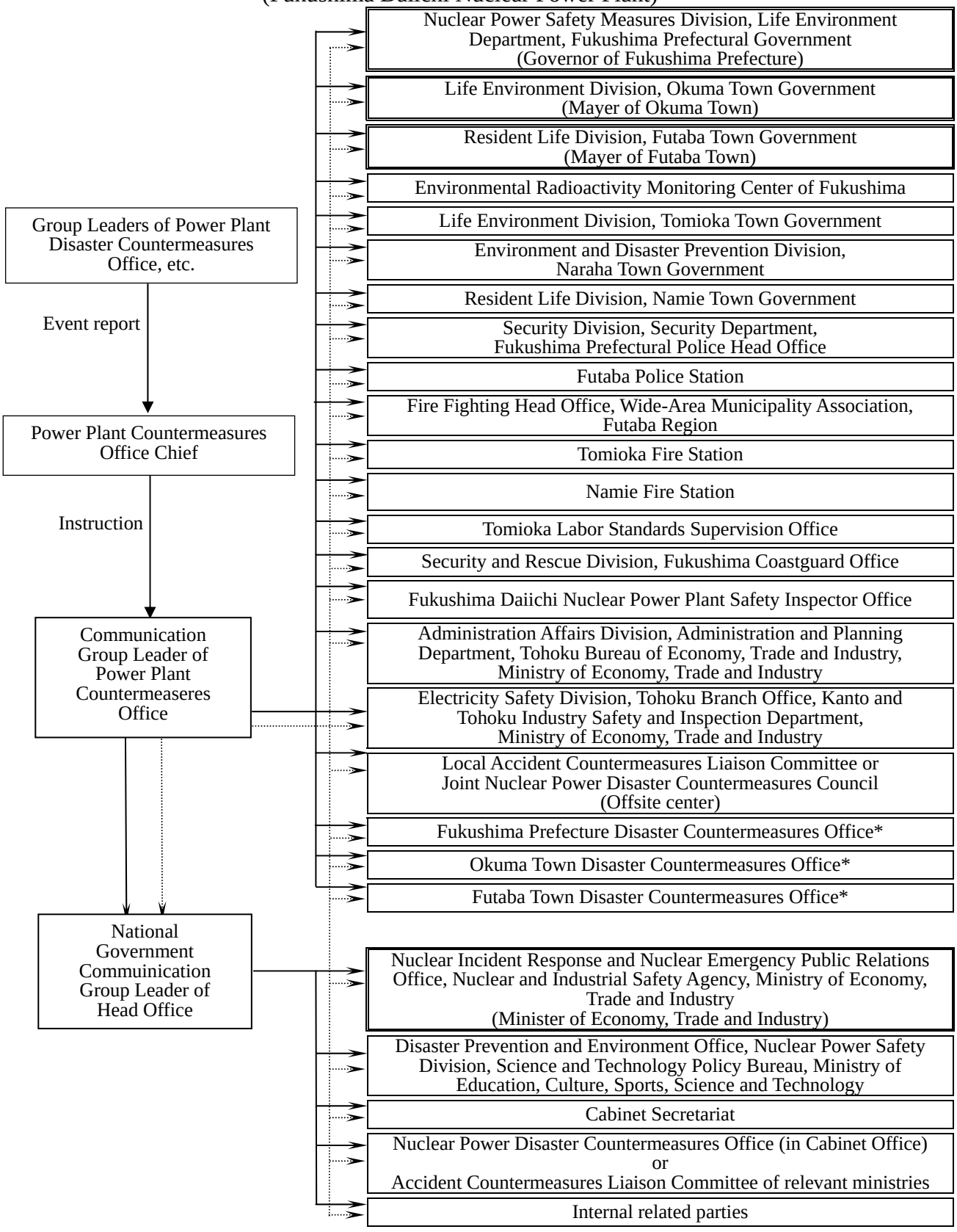
Communication contacts based on The Act on Special Measures concerning Nuclear Emergency Preparedness Article 10

(Fukushima Daiichi Nuclear Power Plant)



Contacts after communication based on The Act on Special Measures concerning Nuclear Emergency Preparedness Article 10

(Fukushima Daiichi Nuclear Power Plant)



: Communication contacts based on the Act on Special Measures concerning Nuclear Emergency Preparedness Article 25 Paragraph 2

: Transmission by fax

: Communication by phone

* : Only in the case where the Disaster Countermeasures Office or equivalent organization is established.

Nuclear Power Disaster Prevention Organization of the Power Plant and responsibilities

Countermeasures Office
(Supervision)
Chief: Nuclear Power Disaster Prevention Manager
(Director of the power plant)

Information Group	1. Information receipt and transfer with Head Office's Countermeasures Office 2. Collection of group information
Communication Group	1. Communication and contact to external related organizations
PR Group	1. Accommodation of the press
Technical Group	1. Identification and assessment of accident status 2. Estimation of the accident impact range 3. Development of accident expansion prevention measures
Security Group	1. Identification of radiation and radioactivity status in/outside the power plant 2. Management of exposure and contamination 3. Estimation of radioactivity impact range
Recovery Group	1. Planning and implementation of emergency recovery measures 2. Development of accident recovery plan 3. Fire fighting activities
Power Generation Group	1. Identification of accident status 2. Operational measures required to prevent accident expansion 3. Security maintenance of power plant facilities
Material Group	1. Procurement and transportation of materials 2. Procurement of mobility
Welfare Group	1. Procurement of food and clothes 2. Arrangement of accommodation
Medical Group	1. Medical activities
General Affairs Group	1. Communication within the power plant 2. Establishment and operation of the countermeasures office 3. Mobilization and transportation of human resources 4. Matters not included in other groups
Security and Evacuation Group	1. Guard within the power plant 2. Evacuation and guidance of general workers 3. Operation of physical protection facilities

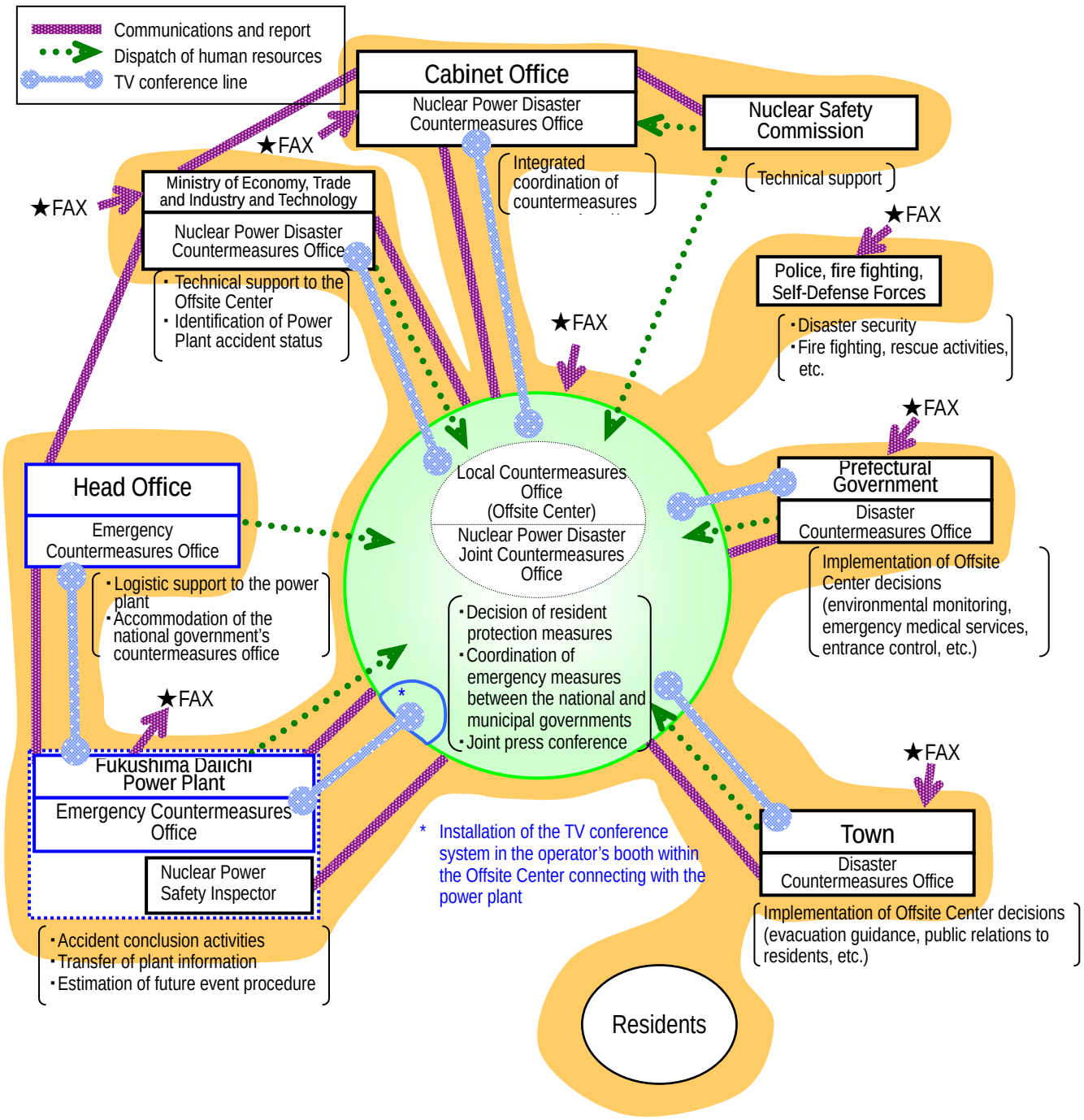
Nuclear Power Disaster Prevention Organization of the Head Office and responsibilities

Countermeasures Office (Supervision)
Chief: President

Information Group	1.Transfer of Headquarters directives 2. Information collection and communication with Power Plant Countermeasures Office
National Government Communication Group	1. Report and communications to the national government
PR Group	1. Accommodation of the press 2. Accommodation of customers
Power Supply Group	1. Operation of power systems 2. Supply and demand adjustment
Security Group	1. Identification of damage status of the power plant 2. Supervision of radiation control
Technical and Recovery Group	1. Identification of accident status 2. Assessment of the accident impact range 3. Supervision of emergency recovery 4. Assessment of accident expansion prevention measures 5. Dispatch of expert engineers to the local site
Material Group	1. Procurement of recovery materials 2. Emergency transportation of recovery materials, doctors, etc.
Welfare Group	1. Procurement of food and clothes 2. Arrangement of accommodation 3. Arrangement of doctors and hospitals in specific fields 4. Supervision of medical activities
General Affairs Group	1. Establishment and operation of the countermeasures office 2. Emergency mobilization of human resources 3. Guard of Head Office building 4. Request for assistance of other nuclear power operators

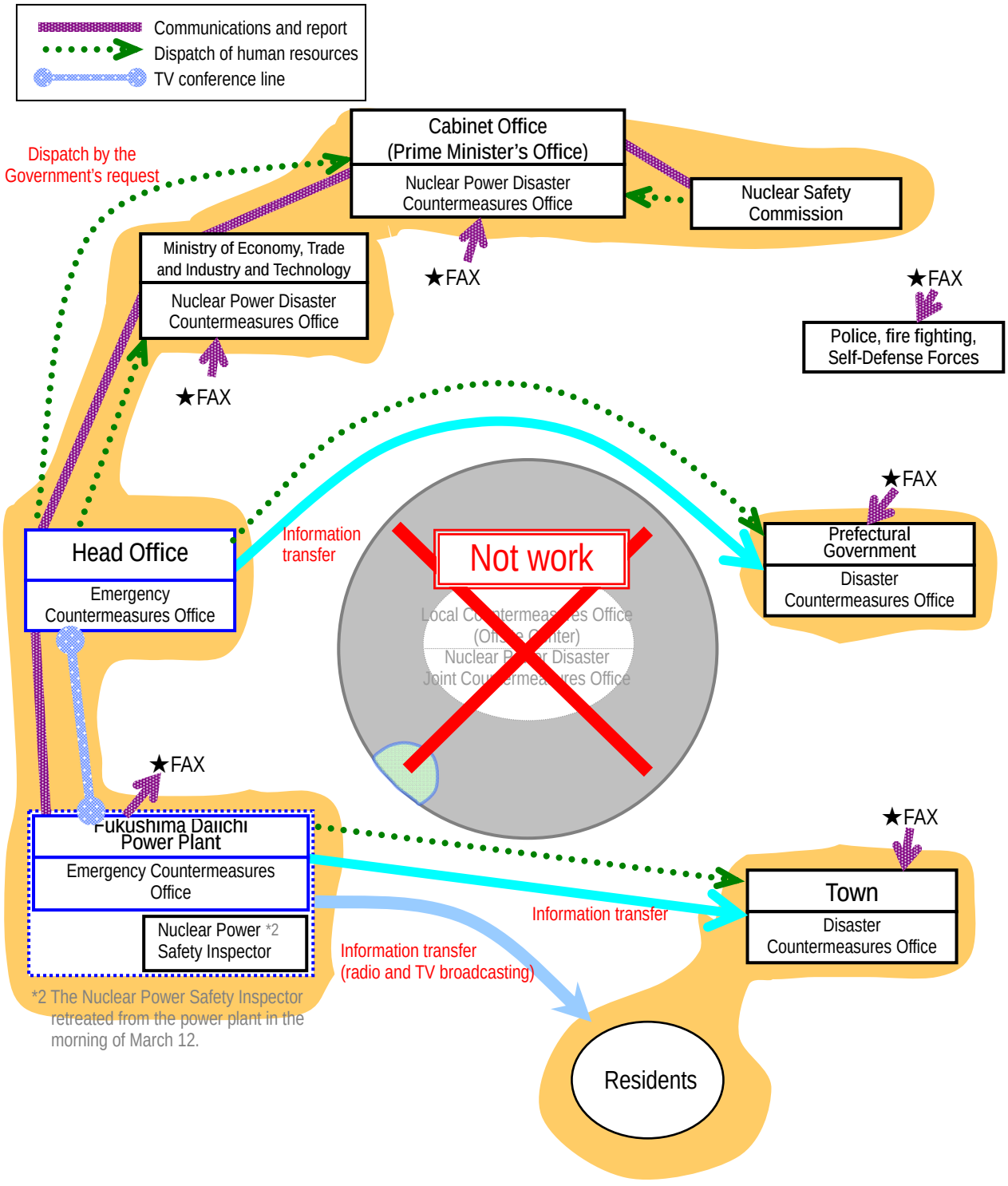
Original Countermeasures

Most of the authority of the Nuclear Power Disaster Countermeasures Office is delegated to the Local Countermeasures Office, and the **Offsite Center** centrally manage the countermeasures



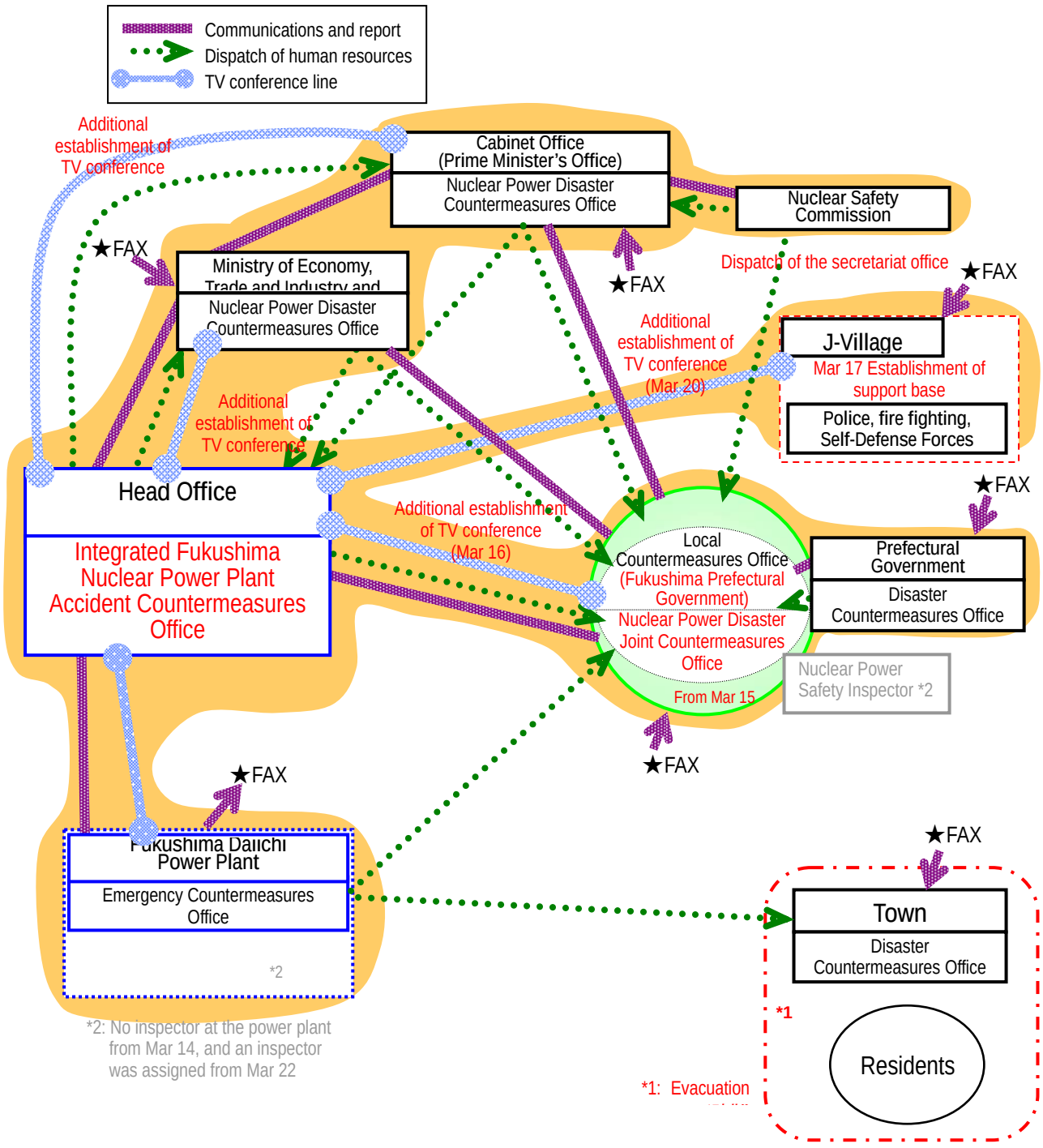
March 11 19:03 – March 12 early morning

The Nuclear Power Disaster Countermeasures Office was established in the Prime Minister's Office. However, the Offsite Center could not operate due to blackout and other aftermath.



After March 15 17:35

The Government announced establishment of the Integrated Fukushima Nuclear Power Plant Accident Countermeasures Office (currently, the Integrated Government and TEPCO Countermeasures Office). The Integrated Countermeasures Office was closed on December 16.



Actions by the local group in response to the Great East Japan Earthquake

<Information transfer to the region (excluding the press)>

(1) Radio broadcasting

* Requested to private radio stations within the prefecture (actual broadcasting = Radio Fukushima: total of 13 times, FM Fukushima: 39 times)

№	Date and time			Contents (excerpt)
	Date	Request for broadcasting	Request to finish the broadcast	
1	Mar 11 (Fri)	21:44	—	The national government issued an emergent evacuation order to residents living within less than 3km from the Fukushima Daiichi Nuclear Power Plant because the emergency power generator for cooling the Fukushima Daiichi Unit 2 reactor can not operate. Please act with calmness according to instructions by the national and municipal governments. At present, no external radioactivity impact is detected.
2		22:40	Mar 12, 2011 2:38	(In addition to the above evacuation order) at present, no change from normal values was detected in the investigation data from the air stack monitor and the monitoring car of radioactivity in both Fukushima Daiichi and Daini Nuclear Power Plants.
3	Mar 12 (Sat)	7:07	-	The national government issued an emergent evacuation order to residents living within less than 10km from the Fukushima Daiichi and Daini Nuclear Power Plants. Please continuously act with calmness according to instructions by the national and municipal governments.
4	Mar 13 (Sun)	13:15	15:50	The national government issued an emergent evacuation order to residents living within less than 20km from the Fukushima Daiichi Nuclear Power Plant and within less than 10km from the Fukushima Daini Nuclear Power Plant. Please continuously act with calmness according to instructions by the national and municipal governments.
5	Mar 14 (Mon)	12:05	17:28	Around 11:01am, a big noise was heard and white smoke was detected from the Fukushima Daiichi Unit 3 reactor building, which indicates a possible hydrogen explosion. Based on the parameters, the soundness of the reactor storage container is supposed to be maintained. However, status of the plant, external impact of radioactivity, and other critical factors are now under investigation. The residents are asked to act with calmness according to instructions by the national and municipal governments.
6	Mar 15 (Tue)	9:39	10:56	Around 6:14am, a noise was heard near the pressure control room of the Fukushima Daiichi Unit 2 reactor, and the pressure decreased. which was judged as some possible abnormality occurrence. However, no significant change was detected in parameters of the reactor pressure and storage containers. The residents are asked to act with calmness according to instructions by the national and municipal governments.

(2) TV telop

* Requested to private TV stations within the prefecture (Fukushima Chuo TV. Fukushima TV, Teleview Fukushima, Fukushima Broadcasting).
  № 1 was broadcasted by Fukushima Broadcasting. Whether others were broadcast by above TV stations or not was not confirmed.

№	Date and time			Contents (excerpt)
	Date	Request for broadcasting	Request to finish the broadcast	
1	Mar 11 (Fri)	23:10	-	At present, no change from normal values was detected in the investigation data from the air stack monitor and the monitoring car of radioactivity in both Fukushima Daiichi and Daini Nuclear Power Plants.
2	Mar 14 (Mon)	13:10	18:01	An explosion occurred at the Fukushima Daiichi Unit 3 reactor building, The soundness of the reactor storage container is supposed to be maintained. However, the residents are asked to act with calmness according to instructions by the national and municipal governments.
3	Mar 15 (Tue)	9:40	10:56	A noise was heard near the pressure control room of the Fukushima Daiichi Unit 2, and the pressure decreased. which was judged as some possible abnormality occurrence. However, no significant change was detected in parameters of the reactor pressure and storage containers. The residents are asked to act with calmness according to instructions by the national and municipal governments.

(3) PR car (2F only)

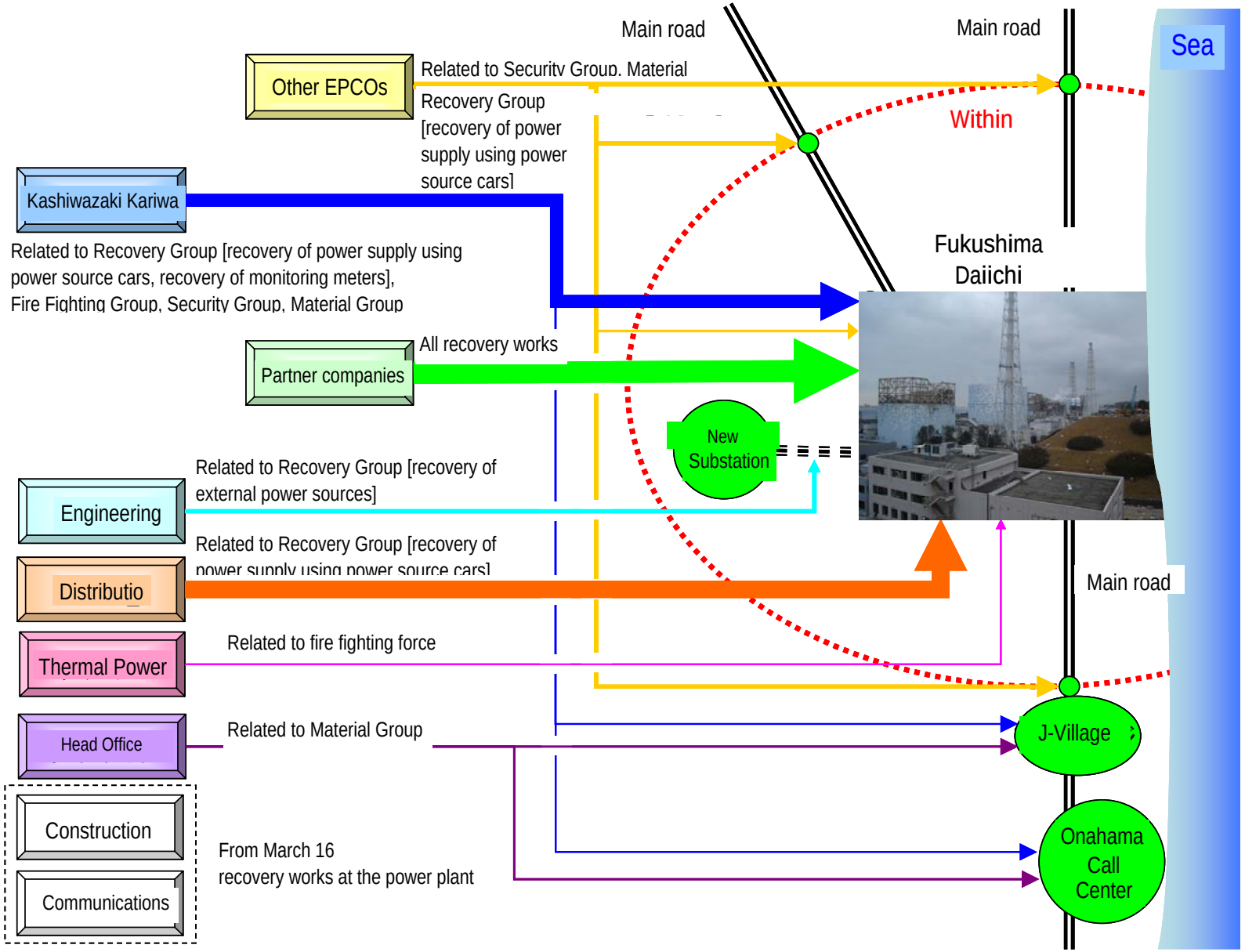
№	Date and time			Mobilization detail
	Date	Start	End	
1	Mar 11 (Fri)	-	-	Simultaneous mobilization start with the radio broadcasting start was considered, but both cars of 1F and 2F could not be mobilized due to the road damage around the area.
2	Mar 12 (Sat)	9:50	11:00	2F planned vent work (Tomioka Town)
3	Mar 12 (Sat)	9:50	11:20	2F planned vent work (Naraha Town)
4	Mar 12 (Sat)	20:15	22:00	2F An emergent evacuation order was issued to residents living within less than 10km from the Fukushima Daiichi Nuclear Power Plant.. Request for evacuation in accordance with the government order.. (Hirono Town)

Dispatch of support resources to Fukushima Daiichi Nuclear Power Plant from March 11-15

Support location				Mar 11	Mar 12	Mar 13	Mar 14	Mar 15
TEPCO	Kashiwazaki Kariwa	Employees	Security	0	25	25	42	42
			Recovery	0	1	11	36	34
			Fire fighting	0	0	0	0	0
			Transportation	0	7	3	5	8
		Subtotal		0	33	39	83	84
		Partner companies	Security	0	0	0	0	0
			Recovery	0	0	0	0	0
			Fire fighting	0	6	6	6	6
			Transportation	0	17	17	2	0
		Subtotal		0	23	23	8	6
		Employees ＋ Partner companies	Security	0	25	25	42	42
			Recovery	0	1	11	36	34
			Fire fighting	0	6	6	6	6
			Transportation	0	24	20	7	8
		Total		0	56	62	91	90
	Branch Offices	Distribution Group	Employees	142	215	265	261	152
			Partner companies	35	64	98	115	40
			Other EPCOs	58	0	0	0	0
			Subtotal	235	279	363	376	192
		Engineering Group	Employees	10	9	0	0	15
			Partner companies	0	43	0	27	31
			Subtotal	10	52	0	27	46
		Thermal Recovery Group	Employees	0	0	0	0	0
			Partner companies	0	4	0	15	25
			Subtotal	0	4	0	15	25
		Head Office Material Group	Employees	0	0	0	2	2
			Partner companies	11	63	32	29	45
			Subtotal	11	63	32	31	47
		Total	Employees	152	224	265	263	169
			Partner companies	46	174	130	186	141
			Other EPCOs	58	0	0	0	0
			Employees＋Parner companies ＋Other EPCOs	256	398	395	449	310
	Total		Employees	152	257	304	346	253
			Partner companies	46	197	153	194	147
			Other EPCOs	58	0	0	0	0
			Employees＋Parner companies ＋Other EPCOs	256	454	457	540	400
Other EPCOs	Survey, decontamination, material transportation, etc. (dispatch based on the cooperation agreement among nuclear power operators during nuclear power accidents)			0	0	41	116	120

Work support fields of dispatched resources	Recovery	245	332	374	439	272
	Fire fighting	0	10	6	21	31
	Security	0	25	66	158	162
	Material	11	87	52	38	55

Overview of human resource support to the Fukushima Daiichi Nuclear Power



Appendix 6-2

				Mar 11	Mar 12	Mar 13	Mar 14	Mar 15	Max per day	Average of 12-15	Remarks
Kashiwazaki Kariwa		Employees	Security	0	25	25	42	42	42	33.5	
			Recovery	0	1	11	36	34	36	20.5	Not including 5 employees (electric equipment) for 2F support
			Fire fighting	0	0	0	0	0	0	0.0	
			Transportation	0	7	3	5	8	8	5.8	
		Subtotal		0	33	39	83	84	84	59.8	
		Partner companies	Security	0	0	0	0	0	0	0.0	
			Recovery	0	0	0	0	0	0	0.0	
			Fire fighting	0	6	6	6	6	6	6.0	
			Transportation	0	17	17	2	0	17	9.0	
		Subtotal		0	23	23	8	6	23	15.0	
		Employees ＋ Partner companies	Security	0	25	25	42	42	42	33.5	
			Recovery	0	1	11	36	34	36	20.5	
			Fire fighting	0	6	6	6	6	6	6.0	
			Transportation	0	24	20	7	8	24	14.8	
		Total		0	56	62	91	90	91	74.8	
Head Office	Distribution Group	Employees		142	215	265	261	152	265	223.3	Head Office ＋Branch Offices
		Partner companies		35	64	98	115	40	115	79.3	Kandenko
		Other EPCOs	Power source cars, etc.	58	0	0	0	0	58	0.0	Tohoku Electric Power Company
		Subtotal		235	279	363	376	192	376	302.5	
	Engineering Group	Employees	Hydro	0	0	0	0	0		0.0	
			Civil engineering	0	0	0	0	0		0.0	
			Aerial	0	0	0	0	1		0.3	
			Ground	0	0	0	0	0		0.0	
			Transformation	0	0	0	0	5		1.3	
			Inawashiro	10	9	0	0	9		4.5	Dec 15 Inawashiro (adding Hama-dori Power Plant)
		Subtotal		10	9	0	0	15	15	6.0	
		Partner companies	Hydro	0	0	0	0	0		0.0	
			Civil engineering	0	0	0	0	0		0.0	
			Aerial	0	43	0	24	31		24.5	
			Ground	0	0	0	3	0		0.8	
			Transformation	0	0	0	0	0		0.0	
		Subtotal		0	43	0	27	31	43	25.3	
		Employees ＋ Partner companies	Hydro	0	0	0	0	0		0.0	
			Civil engineering	0	0	0	0	0		0.0	
			Aerial	0	43	0	24	32		24.8	
			Ground	0	0	0	3	0		0.8	
			Transformation	0	0	0	0	5		1.3	
			Inawashiro	10	9	0	0	9		4.5	
		Total		10	52	0	27	46	52	31.3	
	Thermal Power Recovery Group	Employees		0	0	0	0	0	0	0.0	
		Partner companies	Fire fighting	0	4	0	15	25	25	11.0	Nanso Service
		Total		0	4	0	15	25	25	11.0	
	Head Office Material Group	Employees		0	0	0	2	2	2	1.0	Onahama (2)＋JV (0)
		Partner companies		11	63	32	29	45	63	42.3	Total of Onahama＋JV＋Transportation team
		Total		11	63	32	31	47	63	43.3	
	Total	Employees		152	224	265	263	169	265	230.3	
		Partner companies		46	174	130	186	141	186	157.8	
		Other EPCOs		58	0	0	0	0	58	0.0	
		Employees＋Partner companies＋Other EPCOs		256	398	395	449	310	449	388.0	
Total		Employees		152	257	304	346	253	346	290.0	
		Partner companies		46	197	153	194	147	197	172.8	
		Other EPCOs		58	0	0	0	0	58	0.0	
		Employees＋Partner companies＋Other EPCOs		256	454	457	540	400	540	462.8	
			Recovery	245	332	374	439	272	439	354	
			Fire fighting	0	10	6	21	31	31	17	
			Security	0	25	66	158	162	162	103	
			Material	11	87	52	38	55	87	58	

Recovery

	1F	2F
Electric equipment	5	5
Measurement control	10	
Reactor	7	
Turbine	8	
Environmental facilities	3	
Maintenance plan	1	
Maintenance innovation	2	
Total	36	

Support by other electric power companies

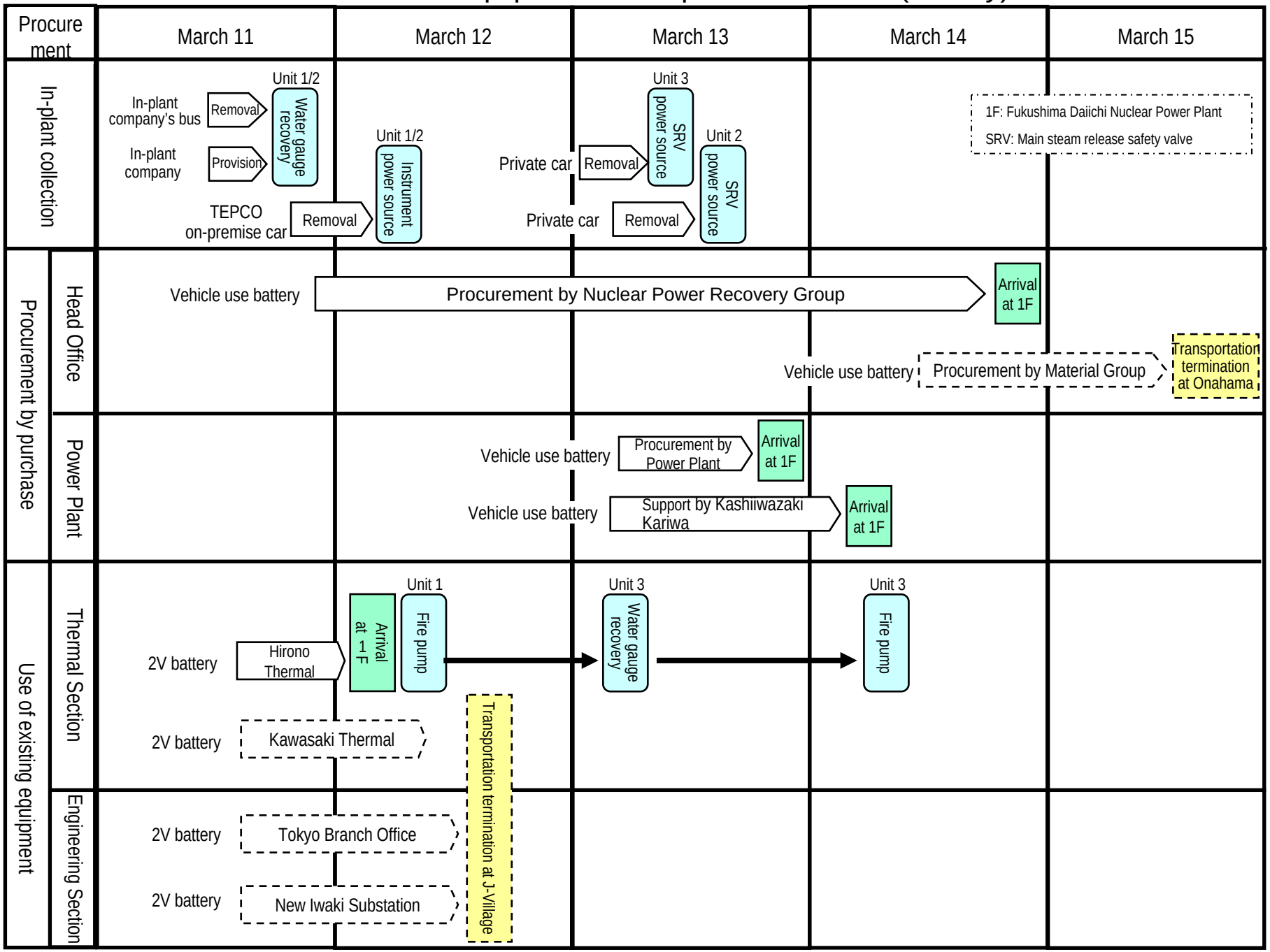
	Mar 11	Mar 12	Mar 13	Mar 14	Mar 15
Number of persons	0	0	41	116	120
				Average	69

Battery Procurement Status List

Source	Procured date (Arrival date at Fukushima Daiichi)	Specification	Weight (kg)	Quantity	Transportation method
In-plant company's bus	March 11 After evening	12V (for vehicle use)	About 40	2	Acquired by Power Plant Recovery Group
In-plant company	March 11 After evening	6V (for communications and control)	About 20	4	Acquired by Power Plant Recovery Group
TEPCO on-premise car	March 11 Around 23:00	12V (for vehicle use)	About 20	3	Removed by Power Plant Recovery Group
Private car	March 14 Around 0:00	12V (for vehicle use)	About 20	20	Removed by the owner
Plant manufacturer	March 14 Around 0:00*1 (Arrived at Onahama Call Center)	12V (for vehicle use)	17-41.5	1000	Surface transportation arranged by the manufacturer (To Onahama Call Center)
Plant manufacturer	March 17 Around 0:00 (Arrived at Onahama Call Center)	12V (for vehicle use)	17-41.5	1000	Surface transportation arranged by the manufacturer (To Onahama Call Center)
Head Office Material Group	March 15 (Arrived at J-Village)	12V (for vehicle use)	About 20	20	Surface transportation arranged by Head Office Material Group (To J-Village)
Power Plant Material Group	March 13 During daytime	12V (for vehicle use)	About 10	8	Surface transportation by Power Plant Material Group
Kashiwazaki Kariwa Material Group	March 14 Around 1:40	12V (for vehicle use)	About 10	20	Surface transportation by Kashiwazaki Kariwa supporter
Hirono Thermal Power Plant	March 12 Around 1:20	2V (existing equipment)	12.5	50	Air transportation by Self-Defense Forces
Kawasaki Thermal Power Plant	March 12 9:00-11:00 (Arrived at J-Village)	2V (existing equipment)	14.3	100	Air transportation by Self-Defense Forces (To J-Village)
Tokyo Branch Office	March 12 During daytime (Arrived at J-Village)	2V (existing equipment)	12-33	132	Air transportation by Self-Defense Forces (To J-Village)
New Iwaki Substation	March 12 Afternoon (Arrived at J-Village)	2V (existing equipment)	21	52	Surface transportation by Kandenko (To J-Village)

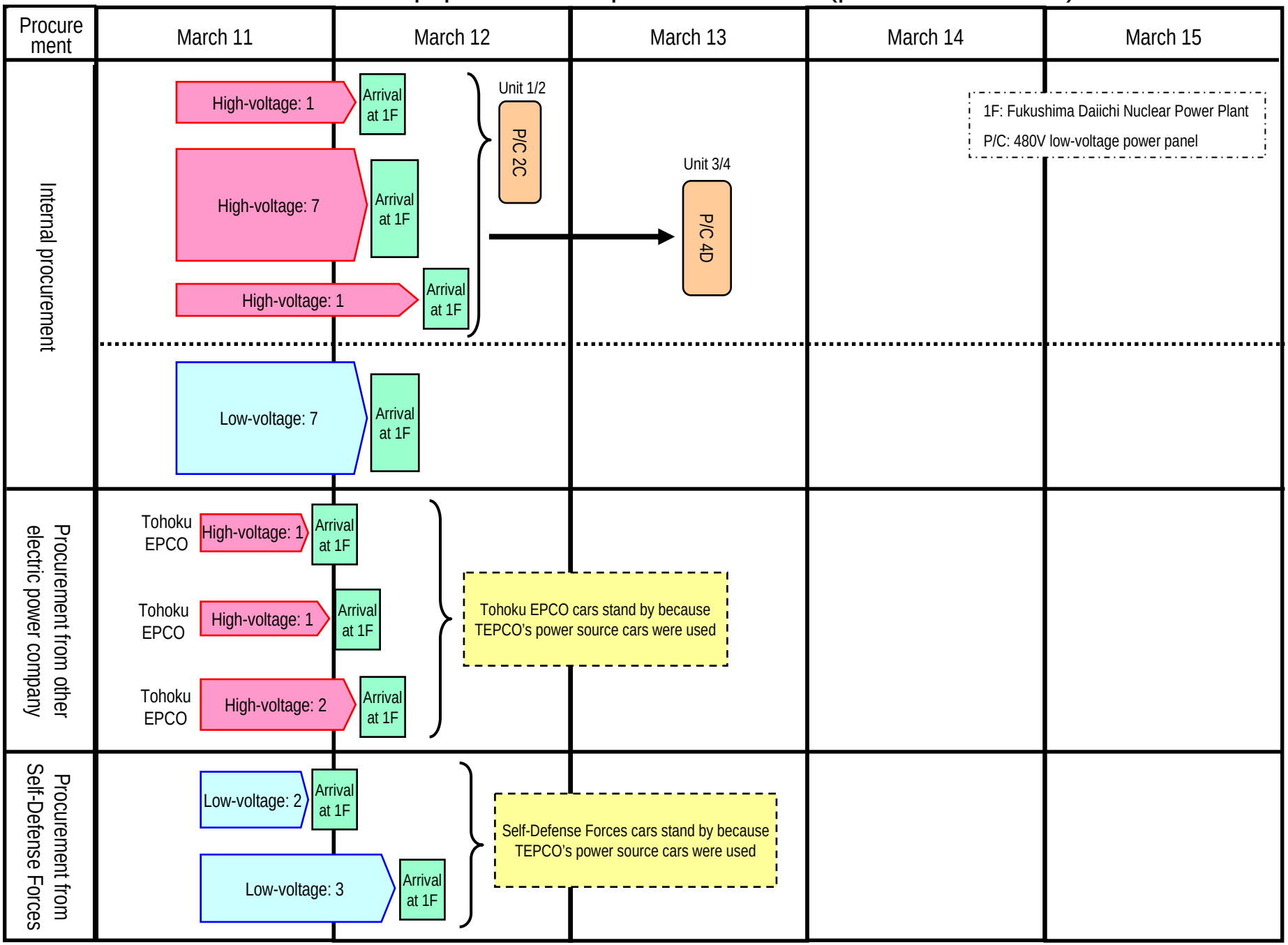
* 1 After arrival at Onahama Call Center, surface transportation by TEPCO employees, and sequential arrival at the Power Plant after March 14 20:00.

Materials and Equipment Transportation Status (battery)



Appendix 7-2

Materials and Equipment Transportation Status (power source car)



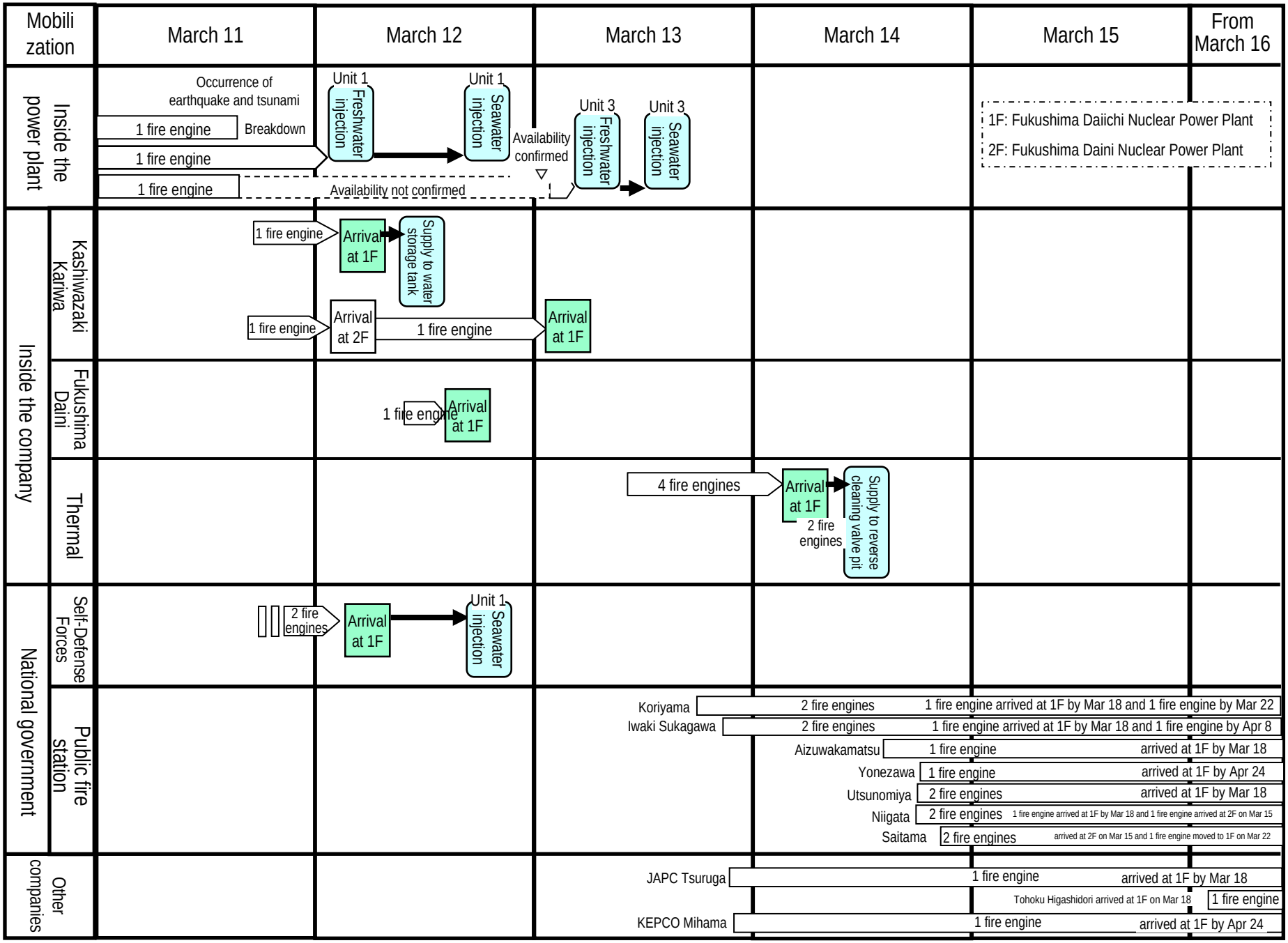
Appendix 8

Fire Engines Procurement Status List

Source	Procured date (Arrival date at Fukushima Daiichi)	Quantity	Transportation method
Ministry of Defense (Self-Defense Forces)	March 12 Before noon	2	Self-Defense Forces (estimated)
Kashiwazaki Kariwa (1)	March 12 Around 10:30	1	The Japan Atomic Power Company safeguard system at Kashiwazaki Kariwa
Fukushima Daini	March 12 Around 13:30	1	Nanmei Kosan of Fukushima Daini
Kashiwazaki Kariwa (2)	March 13 Around 630	1	Nanmei Kosan at Kashiwazaki Kariwa and Fukushima Daini
Thermal Power Plants (Chiba, Minami Yokohama, Sodegaura, Anegasaki)	March 14 Around 5:03	4	Nanmei Kosan at Thermal Power Plant
The Japan Atomic Power Company (JAPC) Tsuruga Nuclear Power Plant	March 18 Around before noon	1	The Japan Atomic Power Company employees and partner companies
Tohoku EPCO Higashidori Nuclear Power Plant	March 18 Around noon	1	Partner company (transportation contractor of Tohoku EPCO) and Head Office employees
Kansai EPCO Mihama Nuclear Power Plant	Arrived before April 24	1*1	Kansai EPCO employees and partner companies
Iwaki Fire Fighting Head Office Uchigo Fire Station	Arrived before March 18	1*1	Inawashiro Power Plant employees from Fire Station to Offsite Center
Koriyama Fire Fighting Head Office Tamura Fire Station	Arrived before March 18	1*1	Inawashiro Power Plant employees from Fire Station to Offsite Center
Koriyama Fire Fighting Head Office Koriyama Fire Station	Arrived before March 22	1*1	Partner companies from Fire Station to Offsite Center
Niigata Fire Bureau Nishi Fire Station	Arrived before March 18	2*1	Kashiwazaki Kariwa employees from Branch of Nishi Fire Station to J-Village 1 fire engine arrived at Fukushima Daini on March 15 15:43 (transported by Nanmei Kosan of Fukushima Daini)
Saitama Fire Bureau Chuo Fire Station	March 15 Around 15:43 (arrived at Fukushima Daini)	2	TEPCO Logistics from Fire Station to J-Village (Saitama Branch Office employees on-board) Transported by Nanmei Kosan of Fukushima Daini to Fukushima Daini On March 22, 1 fire engine moved to Fukushima Daiichi
Utsunomiya Fire Fighting Head Office Chuo Fire Station	Arrived before March 18	2*1	Tochigi Branch Office employees from Fire Station to J-Village
Aizuwakamatsu Fire Fighting Head Office Aizuwakamatsu Fire Station	Arrived before March 18	1*1	Inawashirao Power Plant employees from Fire Station to J-Village
Sukagawa Fire Fighting Head Office Ishikawa Fire Station Furudono Branch Station	Arrived before April 8	1*1	Partner companies from Fire Station to Offsite Center
Yonezawa Fire Fighting Head Office	Arrived before April 24	1*1	Inawashirao Power Plant employees from Fire Station to Onahama Call Center

* 1 We assume that the transportation from Offsite Center, J-Village and Onahama Call Center to Fukushima Daiichi were conducted by TEPCO employees or partner companies.

Materials and Equipment Transportation Status (fire engine)



Outline of Water Injection to Reactors by Fire Engines

<Legend>

: Water supply

: Hose installation only (no water supply)

: Water pumping to fire engine tank

: Move of fire engine

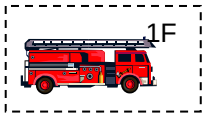
: Fire engine of ○○

R/B: Reactor building

T/B: Turbine building

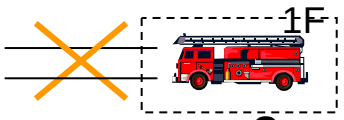
1F: Fukushima Daiichi Nuclear Power Plant
2F: Fukushima Daiini Nuclear Power Plant
KK: Kashiwazaki Kariwa Nuclear Power Plant
SD: Self-Defense Forces PF: Public Fire Station

(1) Status after Tsunami (Mar 11 around 15:40)



Fire engine house

Unit 5/6



Impassable due to road damage and debris carried by tsunami

Water storage tank

#4

Water storage tank

#3

R/B

R/B

T/B

T/B

Water supply inlet

Water supply inlet

Reverse cleaning valve pit

No seawater

Reverse cleaning valve pit

Seawater exist

#2

#1

Water storage tank

R/B

R/B

T/B

T/B

Water supply inlet

Water supply inlet

Reverse cleaning valve pit

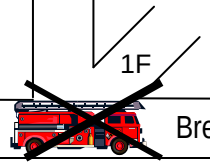
No seawater

Reverse cleaning valve pit

No seawater

Impassable because the tanks carried by tsunami blocked the way

1F



Breakdown due to tsunami

Water storage tank

Water storage tank

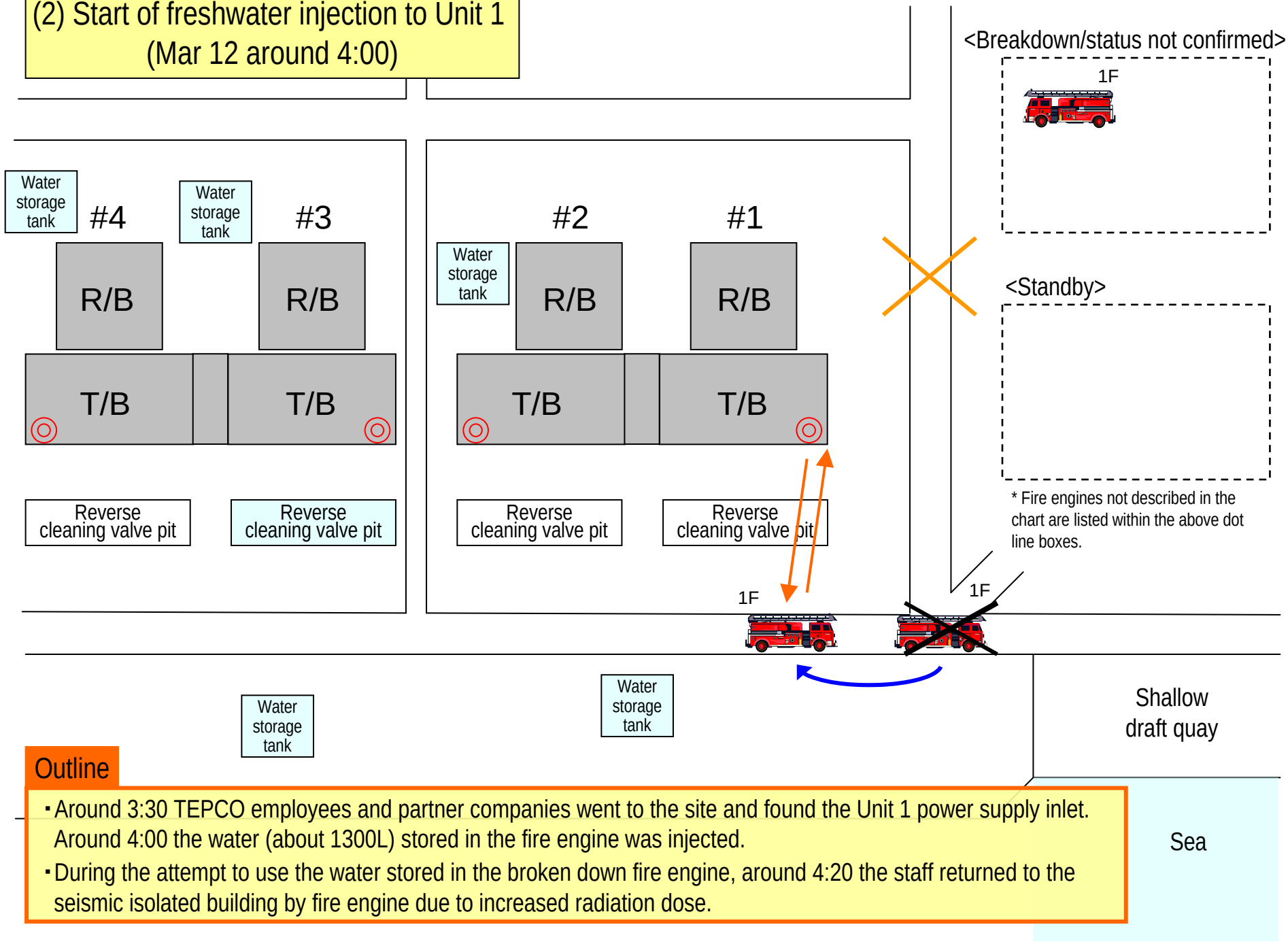
Shallow draft quay

Sea

Outline

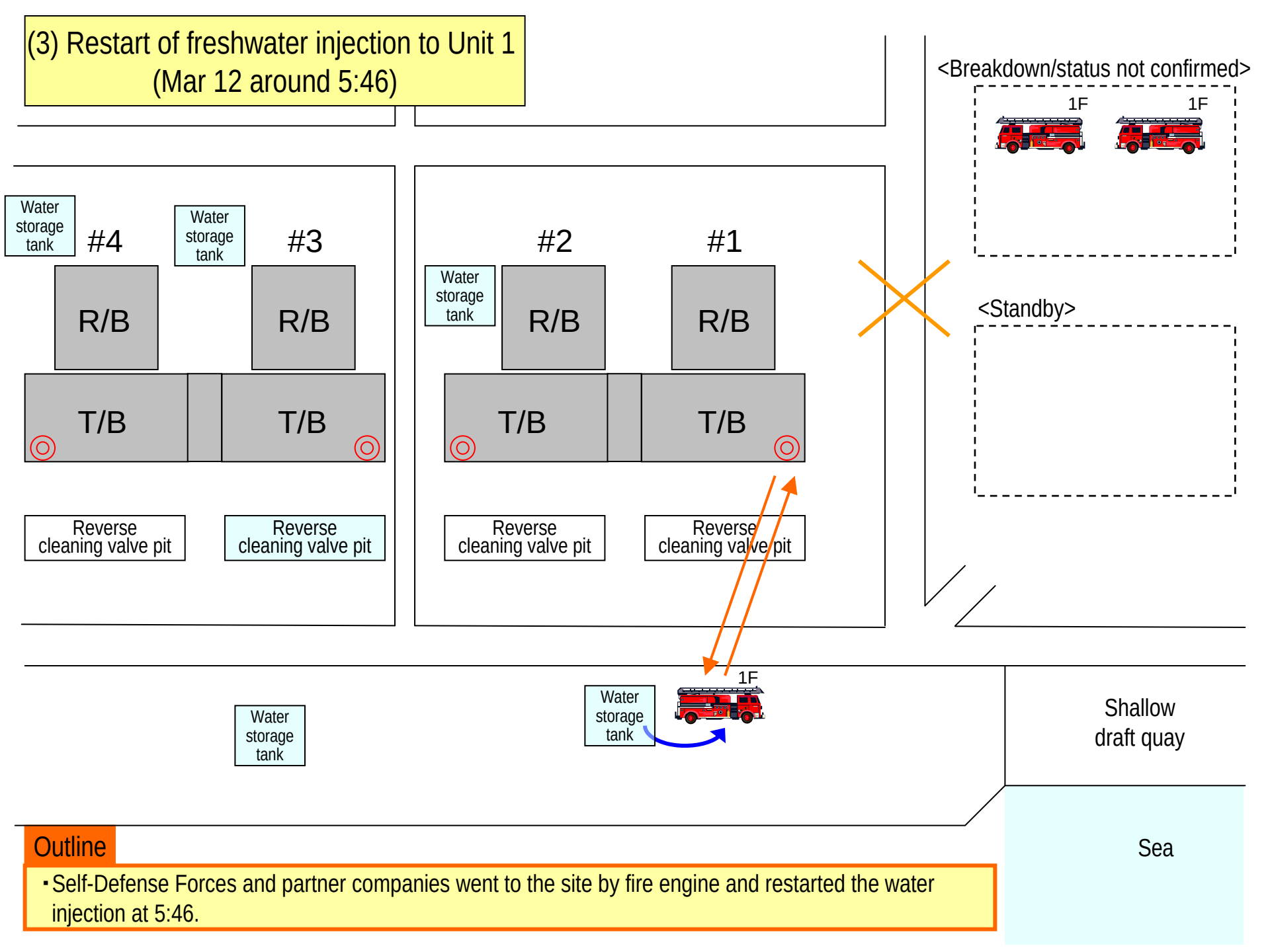
- Status of 3 fire engines deployed at the power plant:
  - One fire engine deployed in the fire engine house on a hill was usable.
  - One fire engine deployed near the safeguard headquarters on the Units 1-4 side was broken down due to tsunami.
  - One fire engine deployed on the Units 5/6 side was not usable because the passage to the Units 5/6 side was interrupted due to road damage and debris carried by tsunami, and there was information that the fire engine was swept up by tsunami.

(2) Start of freshwater injection to Unit 1 (Mar 12 around 4:00)



Outline

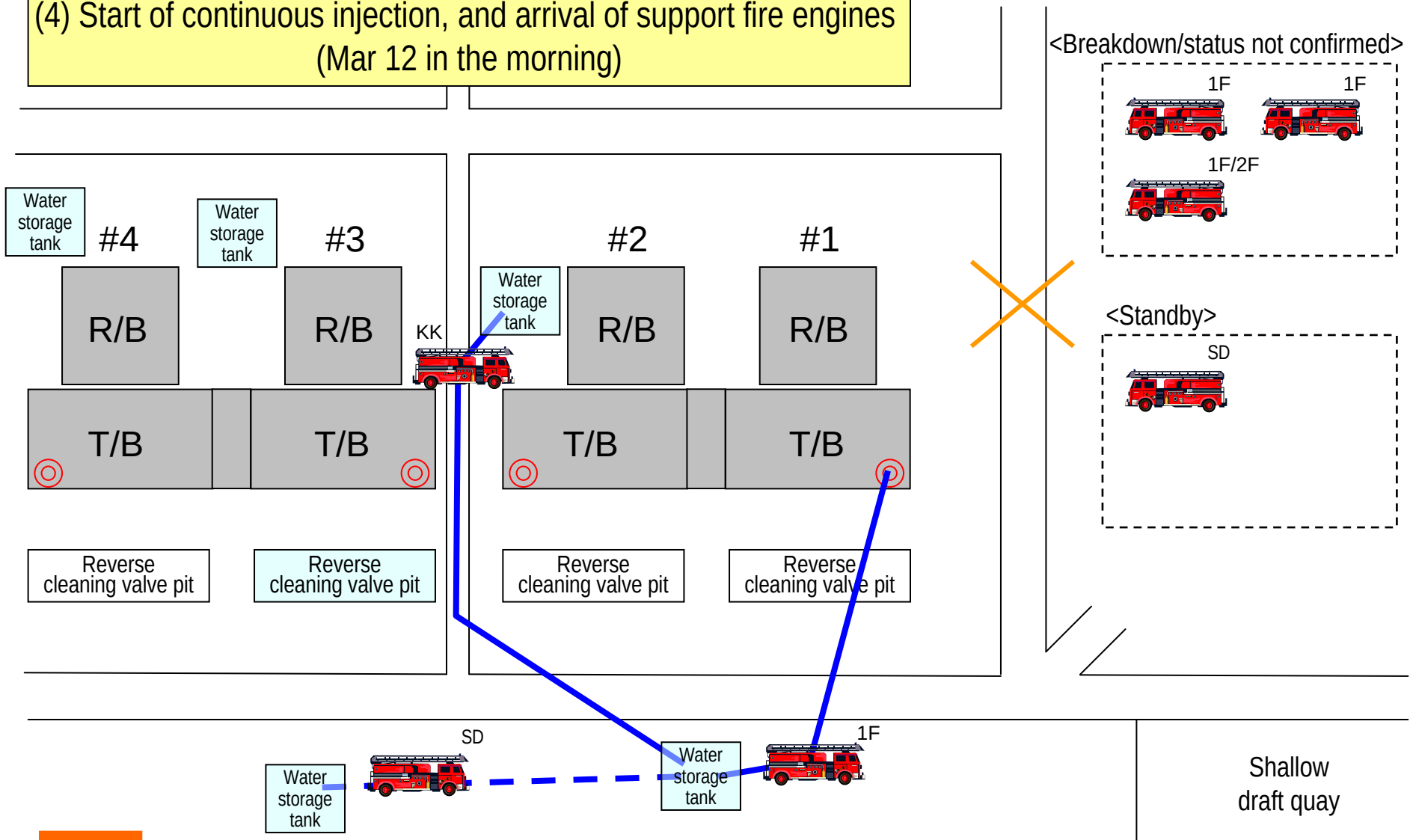
- Around 3:30 TEPCO employees and partner companies went to the site and found the Unit 1 power supply inlet. Around 4:00 the water (about 1300L) stored in the fire engine was injected.
- During the attempt to use the water stored in the broken down fire engine, around 4:20 the staff returned to the seismic isolated building by fire engine due to increased radiation dose.



Outline

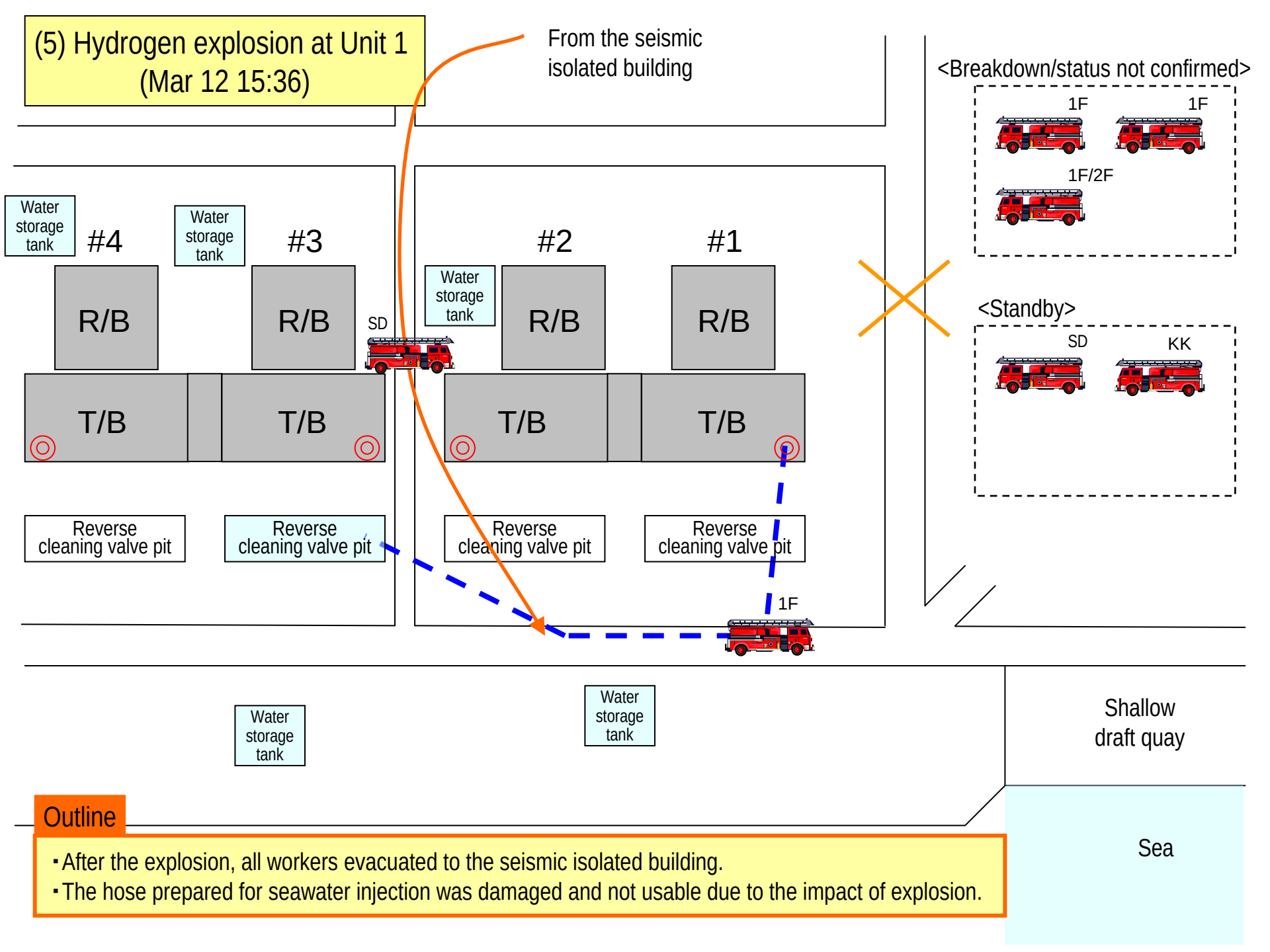
- Self-Defense Forces and partner companies went to the site by fire engine and restarted the water injection at 5:46.

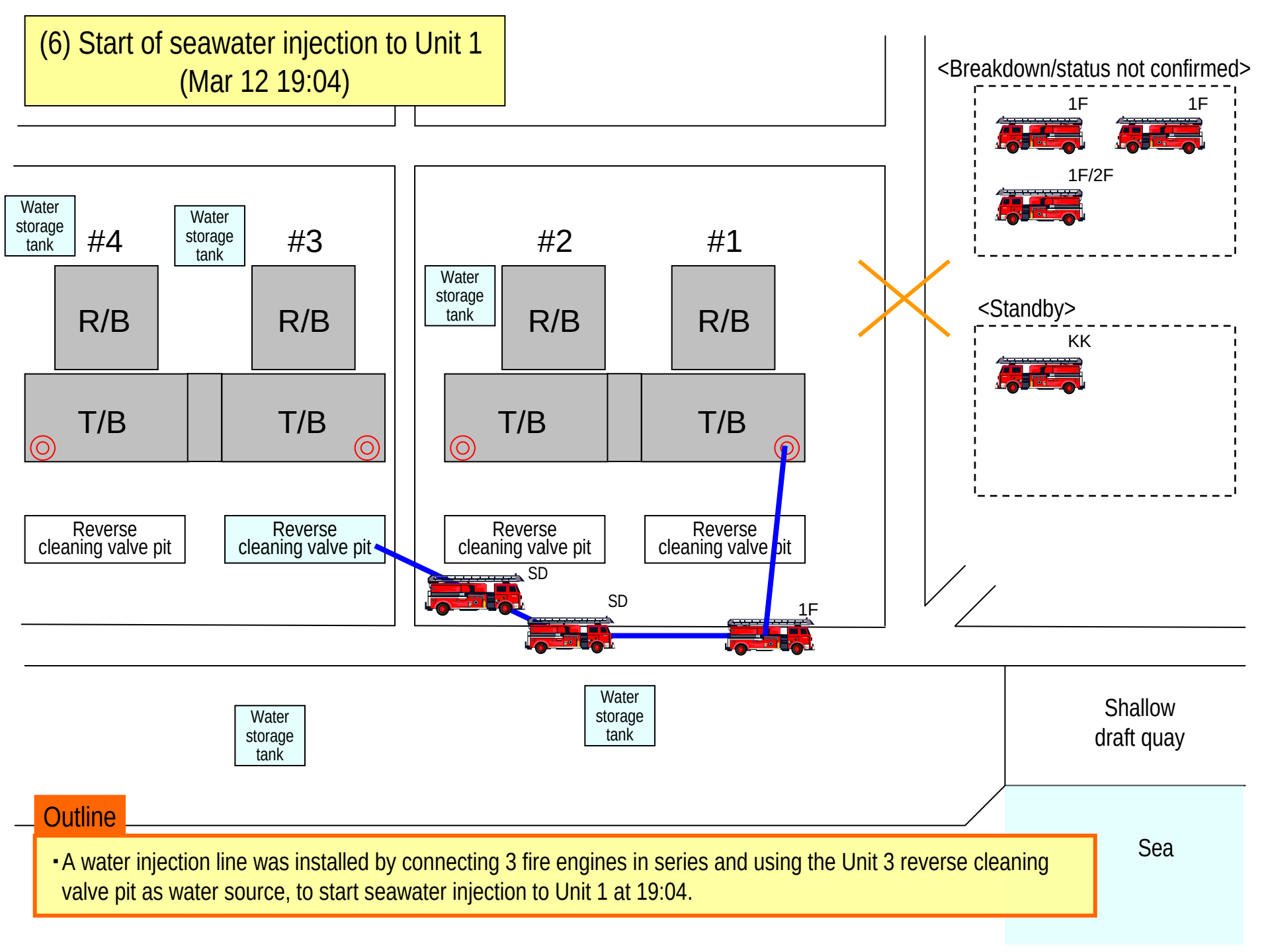
(4) Start of continuous injection, and arrival of support fire engines (Mar 12 in the morning)



Outline

- Continuous water injection line from the water storage tank to water supply inlet was installed to inject water.
- KK arrived at the site around 10:30, and the fire engine of Self-Defense Forces arrived before noon. Water was supplied from water storage tanks around the site to the water storage tanks to the Unit 1 side.
- In addition, 1 chemical fire engine shared by 1F and 2F was moved from 2F. (The fire engine was not used actually because of its old model.)

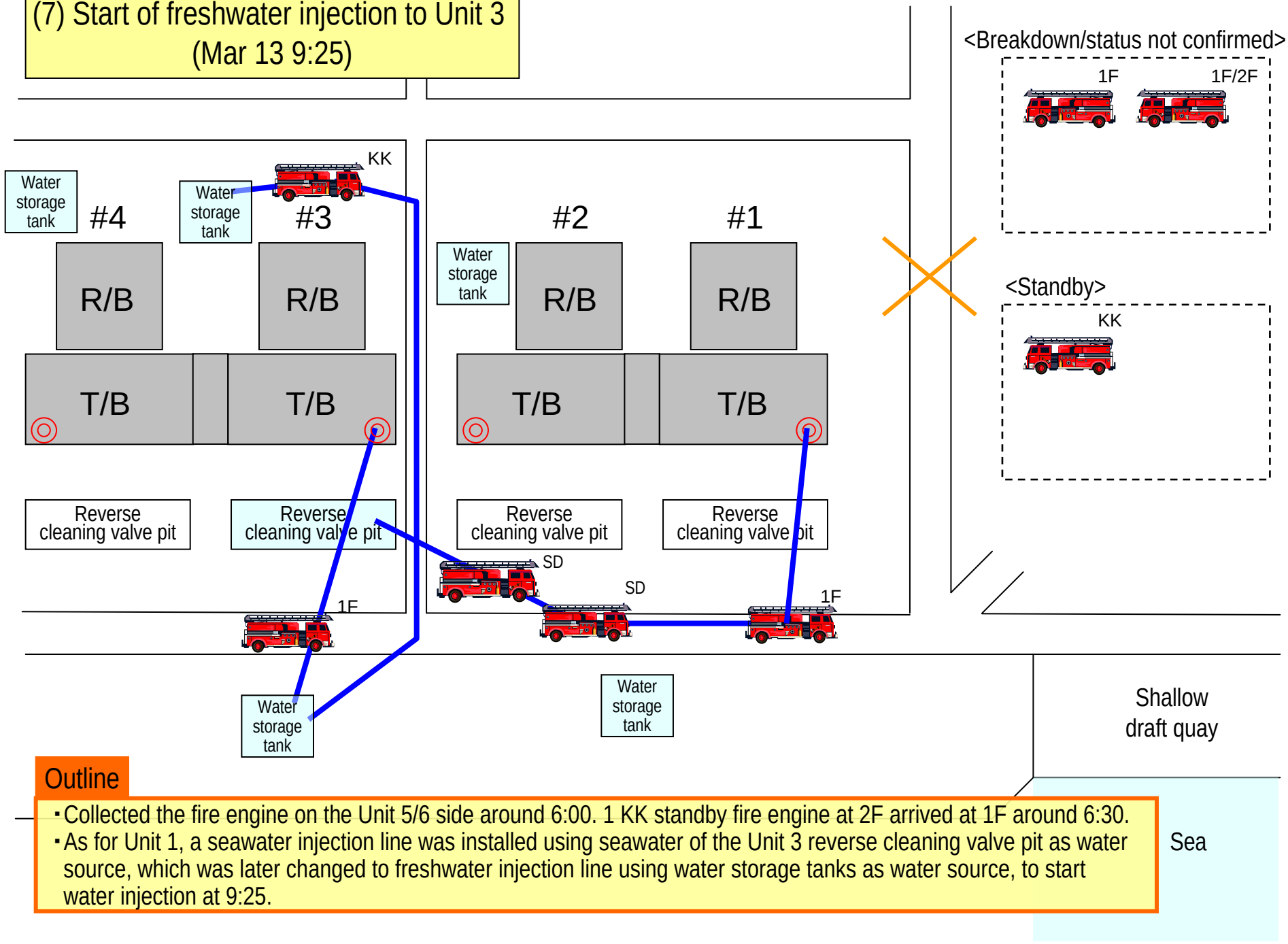

(5) Hydrogen explosion at Unit 1
(Mar 12 15:36)
From the seismic
isolated building
<Breakdown/status not confirmed>
1F
1F
1F/2F
<Standby>
SD
KK
Water
storage
tank
#4
#3
#2
#1
R/B
T/B
SD
1F
Reverse
cleaning valve pit
Shallow
draft quay
Sea
Outline
・After the explosion, all workers evacuated to the seismic isolated building.
・The hose prepared for seawater injection was damaged and not usable due to the impact of explosion.



Outline

- A water injection line was installed by connecting 3 fire engines in series and using the Unit 3 reverse cleaning valve pit as water source, to start seawater injection to Unit 1 at 19:04.

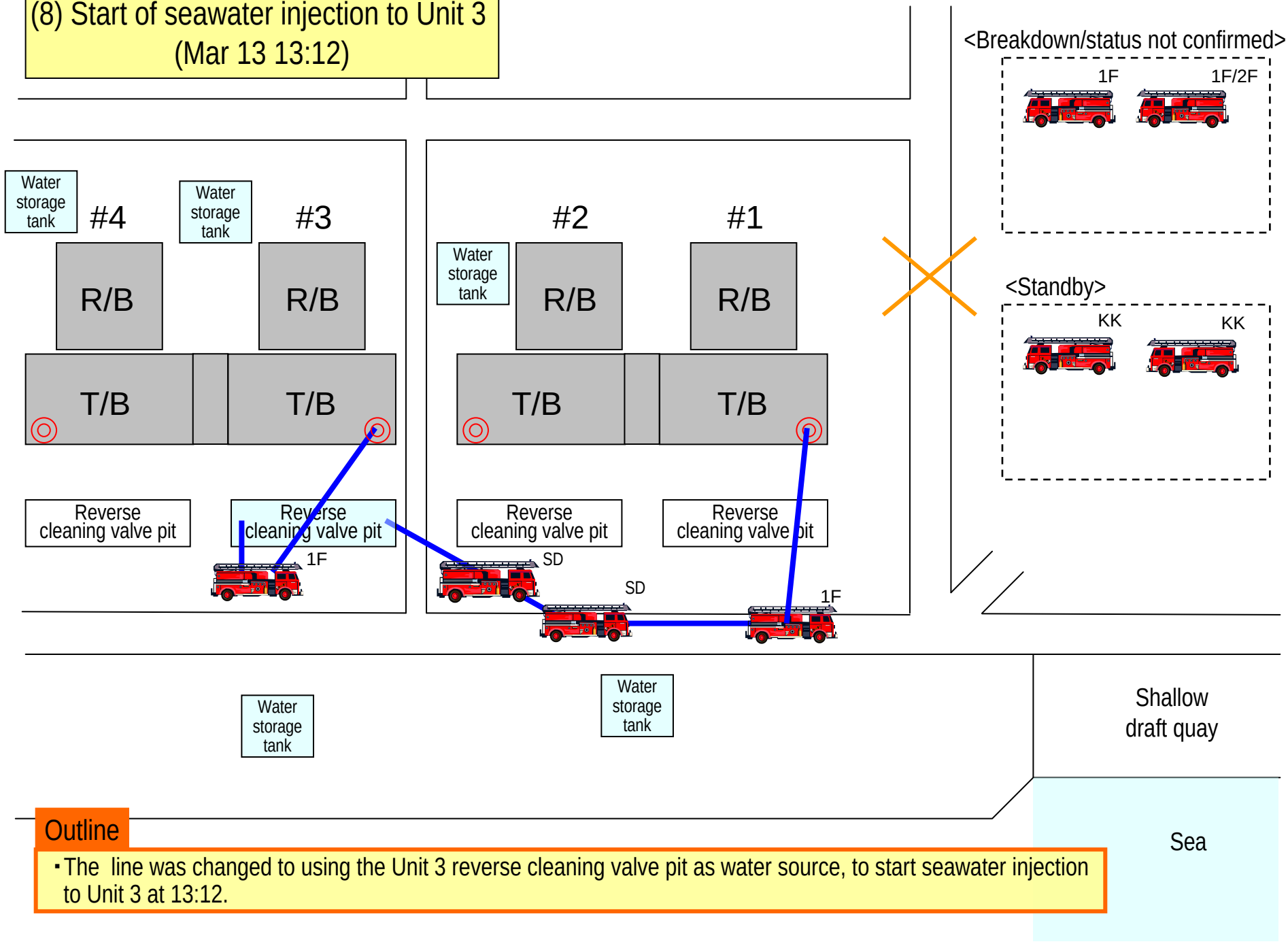
(7) Start of freshwater injection to Unit 3 (Mar 13 9:25)



Outline

- Collected the fire engine on the Unit 5/6 side around 6:00. 1 KK standby fire engine at 2F arrived at 1F around 6:30.
- As for Unit 1, a seawater injection line was installed using seawater of the Unit 3 reverse cleaning valve pit as water source, which was later changed to freshwater injection line using water storage tanks as water source, to start water injection at 9:25.

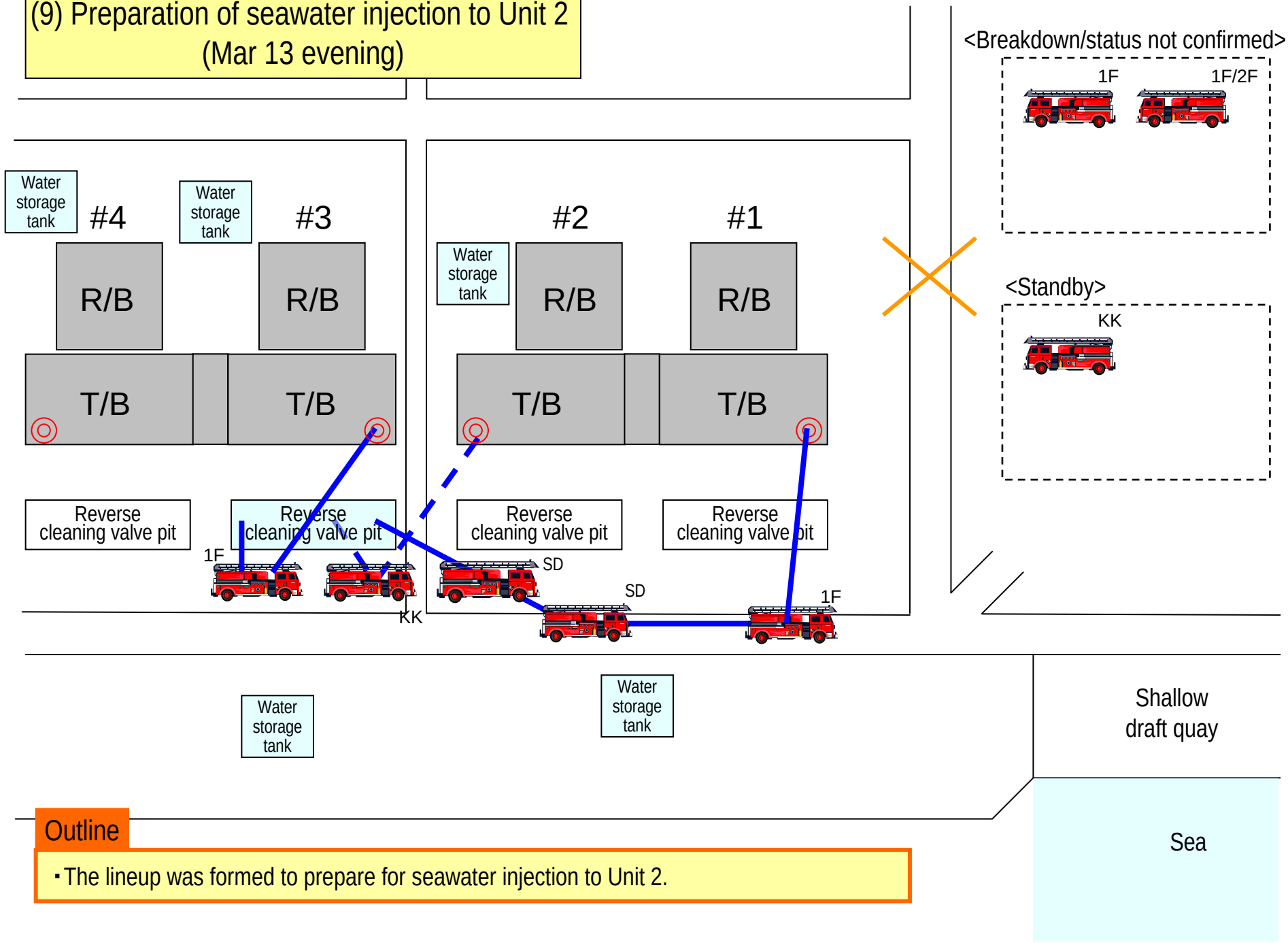
(8) Start of seawater injection to Unit 3 (Mar 13 13:12)



Outline

- The line was changed to using the Unit 3 reverse cleaning valve pit as water source, to start seawater injection to Unit 3 at 13:12.

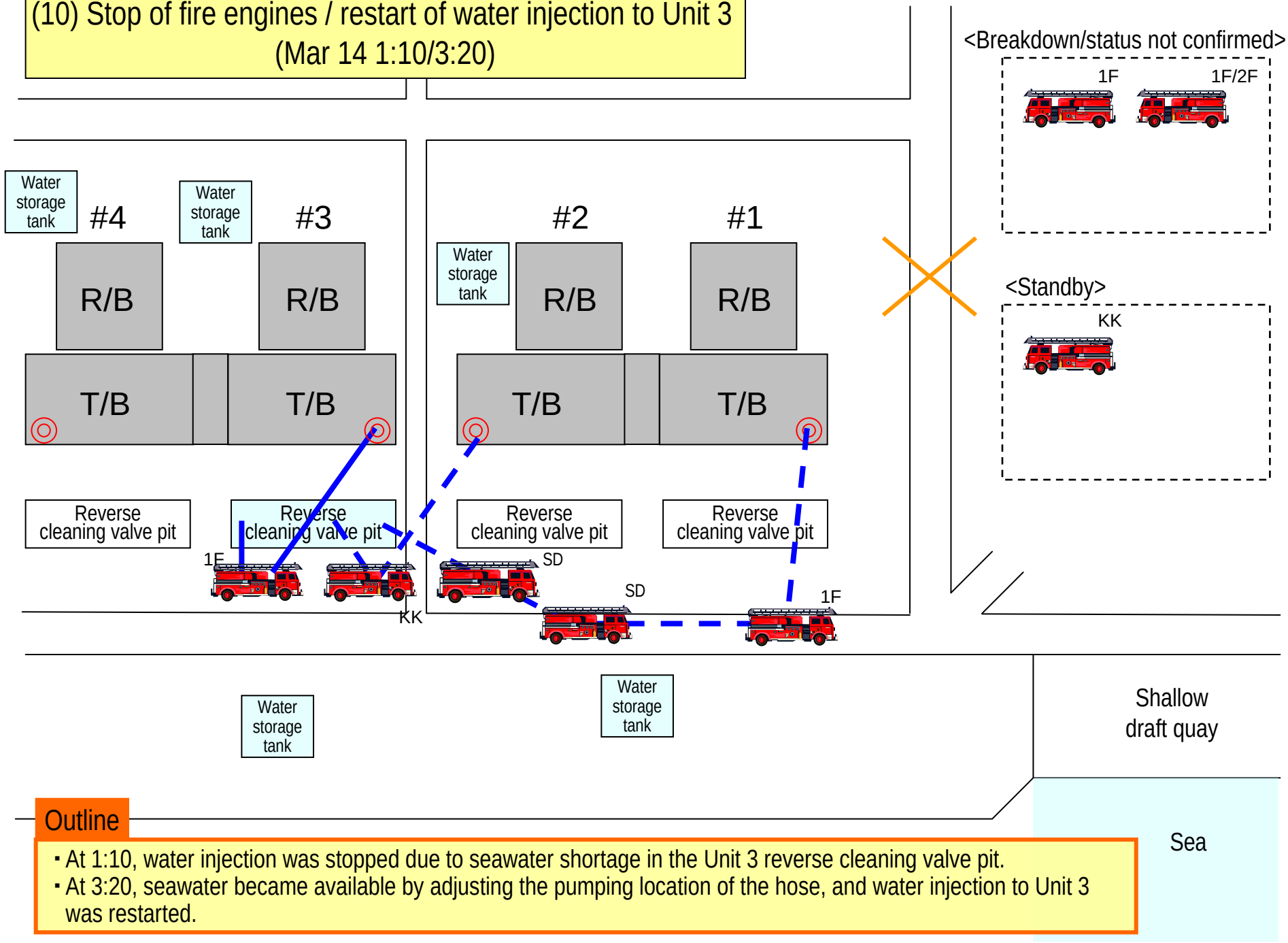
(9) Preparation of seawater injection to Unit 2 (Mar 13 evening)



Outline

- The lineup was formed to prepare for seawater injection to Unit 2.

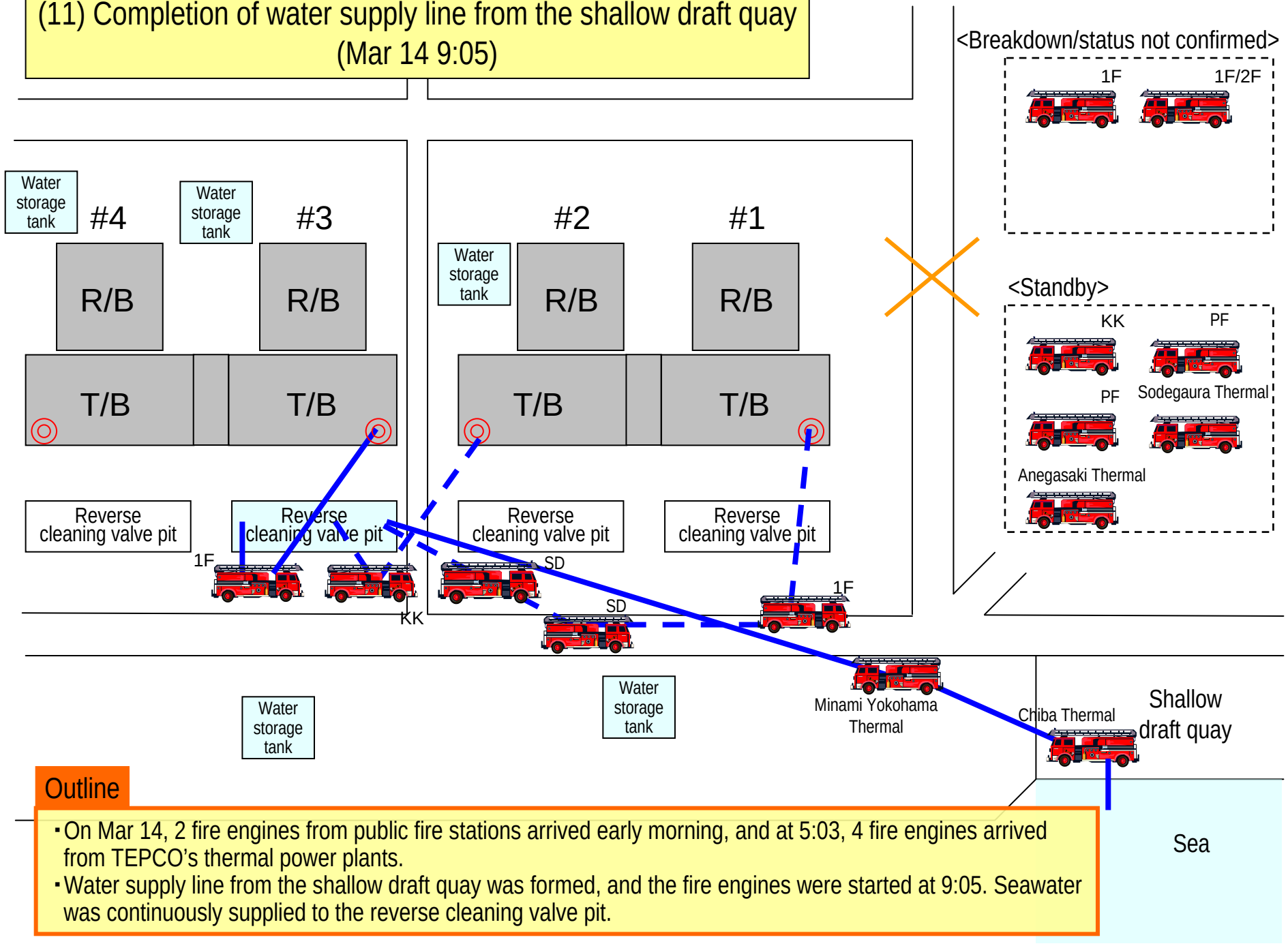
(10) Stop of fire engines / restart of water injection to Unit 3 (Mar 14 1:10/3:20)



Outline

- At 1:10, water injection was stopped due to seawater shortage in the Unit 3 reverse cleaning valve pit.
- At 3:20, seawater became available by adjusting the pumping location of the hose, and water injection to Unit 3 was restarted.

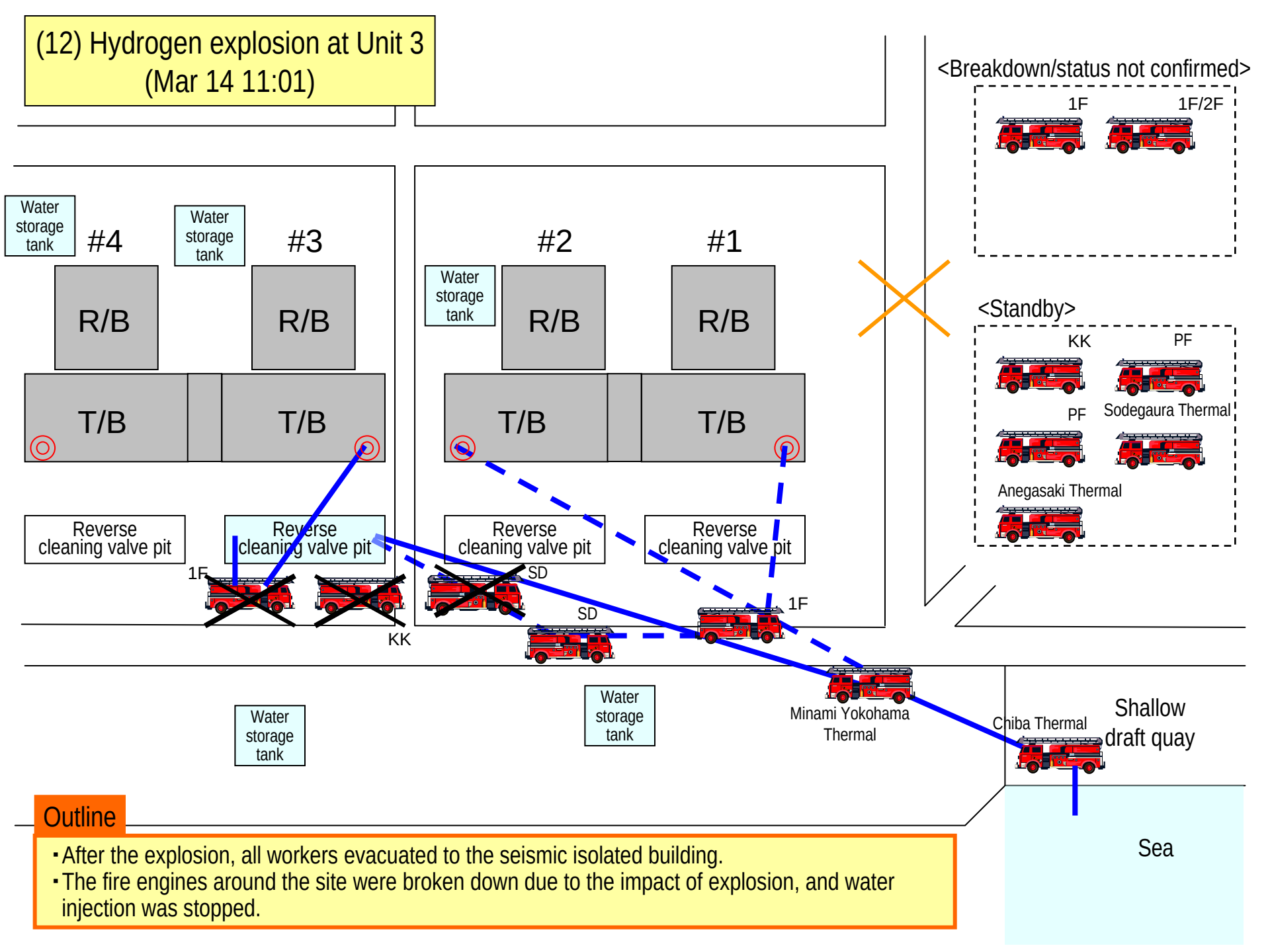
(11) Completion of water supply line from the shallow draft quay (Mar 14 9:05)



Outline

- On Mar 14, 2 fire engines from public fire stations arrived early morning, and at 5:03, 4 fire engines arrived from TEPCO's thermal power plants.
- Water supply line from the shallow draft quay was formed, and the fire engines were started at 9:05. Seawater was continuously supplied to the reverse cleaning valve pit.

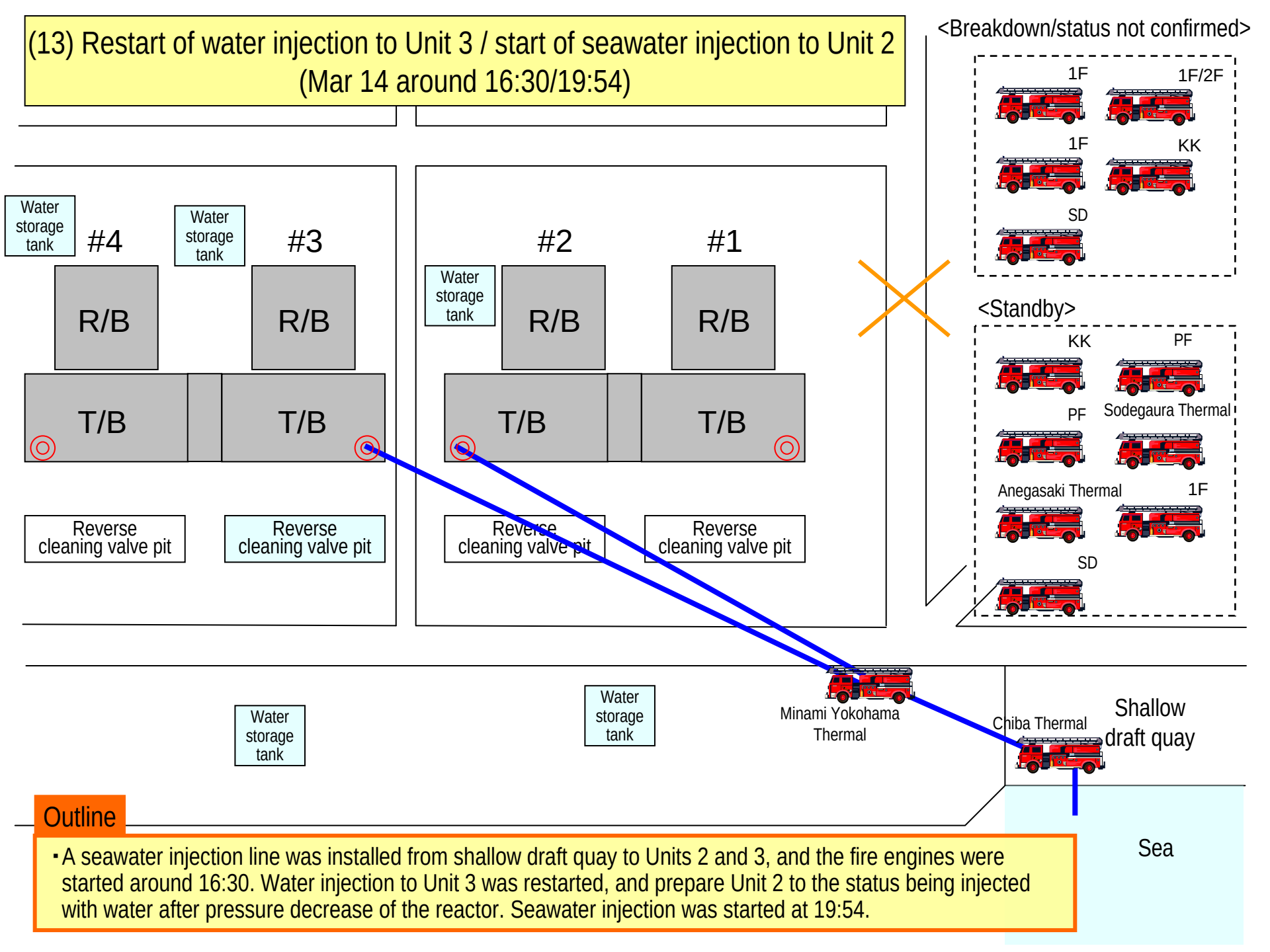
(12) Hydrogen explosion at Unit 3 (Mar 14 11:01)



Outline

- After the explosion, all workers evacuated to the seismic isolated building.
- The fire engines around the site were broken down due to the impact of explosion, and water injection was stopped.

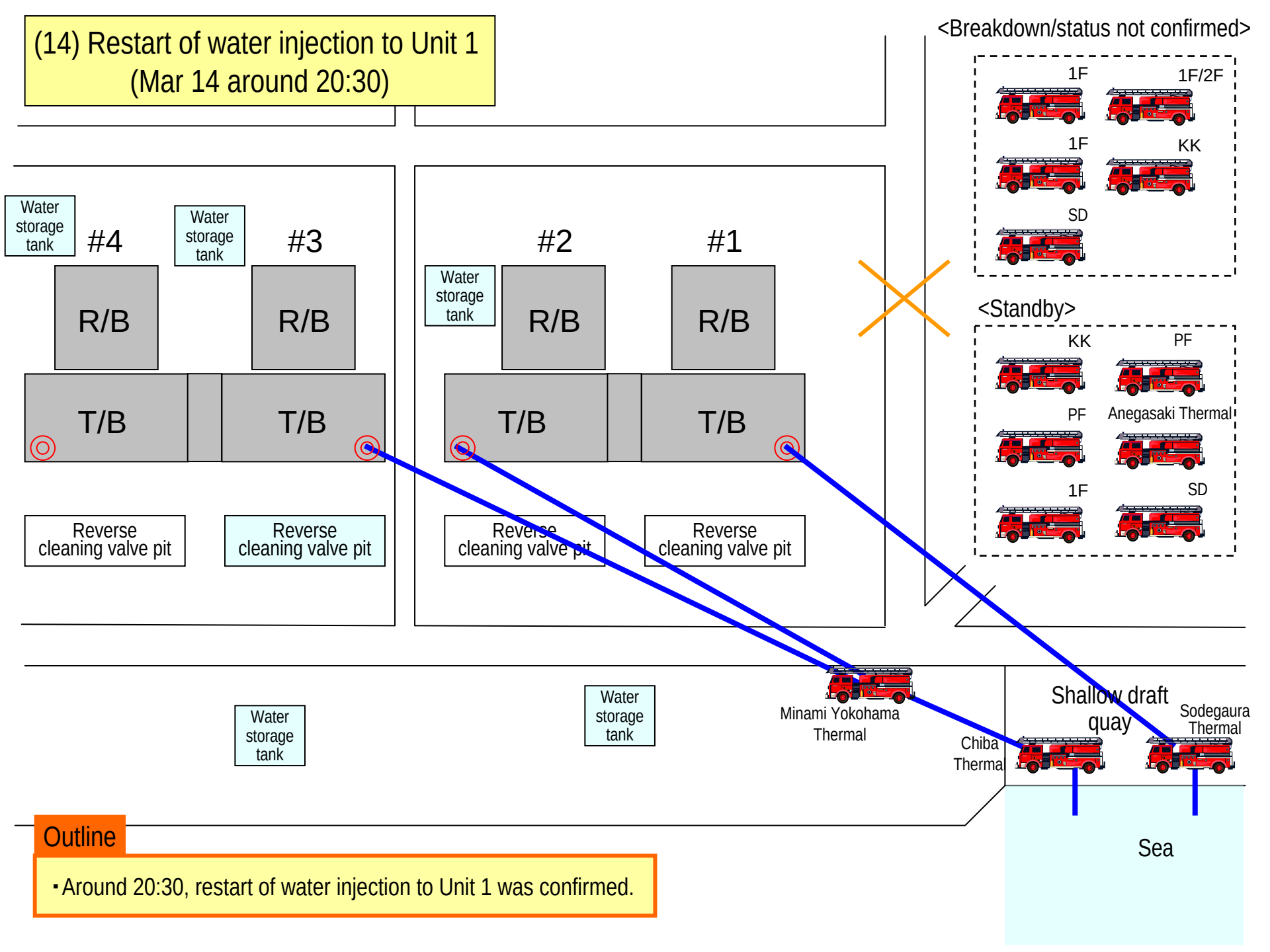
(13) Restart of water injection to Unit 3 / start of seawater injection to Unit 2 (Mar 14 around 16:30/19:54)



Outline

- A seawater injection line was installed from shallow draft quay to Units 2 and 3, and the fire engines were started around 16:30. Water injection to Unit 3 was restarted, and prepare Unit 2 to the status being injected with water after pressure decrease of the reactor. Seawater injection was started at 19:54.

(14) Restart of water injection to Unit 1 (Mar 14 around 20:30)



Outline

- Around 20:30, restart of water injection to Unit 1 was confirmed.

Glossary

Onahama Call Center

A coal storage facility located at the Onahama Port in Iwaki City, Fukushima Prefecture. During the Fukushima nuclear power accident, the center played a role as a central base of collected materials and equipment for the nuclear power plant.

Offsite Center (Local Emergency Countermeasures Office)

A base facility where related parties such as the national, prefectural and municipal governments gather, coordinate and smoothly promote the nuclear power disaster countermeasures activities when such a nuclear power accident occurs. Established to reflect the lessons of JCO criticality accident, the center was generally called Offsite Center or Nuclear Power Disaster Prevention Center.

Risk Management Center (Cabinet Information Aggregation Center)

An organization that collects information on large disasters and accidents from the Prime Minister's Office for 24 hours per day.

Safety Parameter Display System (SPDS)

A system of TEPCO that displays safety related parameters of the plant.

Emergency Response Support System (ERSS)

A national system that based on the information transmitted from electric power companies during an emergency such as an unexpected accident in a nuclear power plant, monitors equipment status of the relevant nuclear power plant, judges present status of the facilities using the professional knowledge database, and then calculates and forecasts the later accident progress by computer.

Cooperation Agreement among Nuclear Power Operators during Nuclear Power Accidents

An agreement that specifies the collective response of the whole electric power industry to an unexpected accidents, including mobilization of cooperative human resources/material supply for monitoring of environmental radiations around the surrounding area during a nuclear power disaster, contamination tests, and decontamination.

Act on Special Measures concerning Nuclear Emergency Preparedness

An act aiming at developing more effective disaster countermeasures based on lessons from the JCO criticality accident, which considers the uniqueness of nuclear power disasters, complements insufficient requirements of the Nuclear Reactor Regulation Act and the Disaster Countermeasure Basic Act, to enhance the countermeasures to nuclear power disasters.

Nuclear Power Disaster Prevention Organization

An organization nuclear power operators establish for each nuclear power plant based on the Act on Special Measures concerning Nuclear Emergency Preparedness Article 8. The organization conducts necessary works to prevent occurrence and expansion of nuclear disasters according to the nuclear power operators disaster prevention measures plan.

Disaster Countermeasure Basic Act

An act that specifies responsibilities of the national government, municipal governments, and other public institutions related to disaster prevention, and basic matters such as preparation of disaster prevention plan, and financial and monetary measures for disaster prevention, emergency disaster countermeasures, recovery from disaster, and disaster prevention.

J-Village

A national training center for soccer located in Naraha and Hirono Towns, Futaba County, Fukushima. During the Fukushima nuclear power accident, the center played as a base location for accident response support.

Designated Administrative Agencies

Administrative agencies designated by Prime Minister based on relevant laws. Agencies related to nuclear power disaster prevention include National Police Agency, Defense Agency, Health, Labour and Welfare Ministry, Ministry of Agriculture, Forestry and Fisheries of Japan, Japan Coast Guard, Japan Meteorological Agency, and Fire and Disaster Management Agency. (based on the Act on Special Measures concerning Nuclear Emergency Preparedness Article 2 Paragraph 8)

Article 15 Report

Report submitted when the event reaches the criteria specified in the Act on Special Measures concerning Nuclear Emergency Preparedness Article 15.

The criteria on emergency (Article 15 emergency) include:

- When 500μSv/h or higher radiation is detected by radiation measurement equipment of the nuclear power plant or relevant municipality governments around boundary of the power plant
- When 100 times more radiation than notification events is detected at each point of regular release points such as air stacks, locations other than controlled areas, and 1m away from the transportation container
- When a criticality accident occurs
- When failing to start all emergency core cooling systems at the occurrence of nuclear reactor coolant loss that requires to start emergency core cooling systems during operation of the reactor, etc.

Article 10 Notification

Notification submitted from nuclear power operators to the national and municipal governments when any event occurs specified in the Act on Special Measures concerning Nuclear Emergency Preparedness Article 10. The specified events include:

- When 5μSv/h or higher radiation is detected by radiation measurement equipment around boundary of the power plant
- When 5μSv/h or equivalent radiation after considering diffusion is detected at any regular release point such as air stack
- When 500μSv/h or higher radiation or 5μSv/h or equivalent radioactive substances is detected at any location other than controlled areas
- When 100μSv/h or higher radiation is detected 1m away from the transportation container
- Situation where a criticality accident occurs or is likely to occur
- At the occurrence of nuclear reactor coolant loss that requires to start emergency core cooling systems during operation of the reactor, etc.

SPEEDI (System for Prediction of Environment Emergency Dose Information) Network System

A system to rapidly calculate estimated exposure dose of atmospheric concentrations of radioactive substances and exposure dose in the surrounding environment with consideration of geographical features and meteorological data. The so-called SPEEDI Network System is used to examine safeguarding measures such as residents evacuation, when an accident that releases or likely to release large amounts of radioactive substances.

Disaster Prevention Measures Plan

A measures plan for disaster prevention prepared by related ministries and agencies, nuclear power operators, designated public institutions, and designated municipal public institutions based on the Disaster Countermeasure Basic Act.

End