

# Monitoring Support Activities by Electric Utilities

This was presented by M. Yamada at the  
2012 Annual Meeting of the Atomic Energy  
Society of Japan held in Fukui.

March 21, 2012

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# Outline of Support

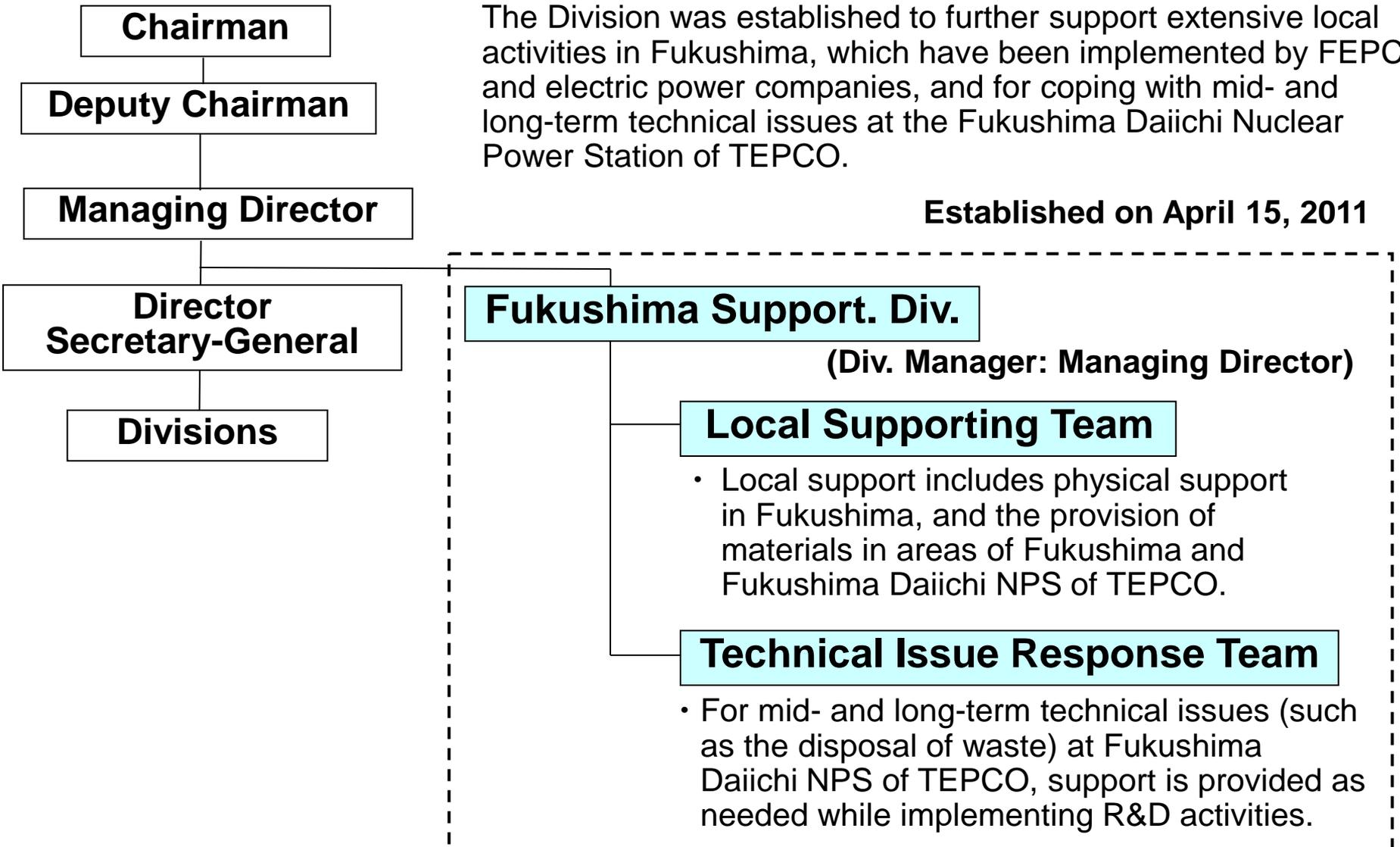
## (Support Framework by Electric Utilities)

- After the JCO accident in 1999, the Act on Special Measures Concerning Nuclear Emergency Preparedness was enacted and the nuclear utilities (incl. 9 electric power companies, Japan Atomic Power Co., J-Power) concluded the “Cooperative Agreement among Nuclear Utilities for Nuclear Emergencies” (the Cooperative Agreement) in 2000.
- Support activities included personnel dispatch and provision of materials and equipment necessary for environmental monitoring, etc.
- For this current accident, in response to the request from Tokyo Electric Power Co. based on the Cooperative Agreement among utilities, 11 companies including Hokkaido Electric Power Co., Tohoku Electric Power Co., Chubu Electric Power Co., Hokuriku Electric Power Co., Kansai Electric Power Co., Chugoku Electric Power Co., Shikoku Electric Power Co., Kyushu Electric Power Co., Japan Atomic Power Co., J-Power, and Japan Nuclear Fuel Ltd. (which are the supporting companies) have implemented support activities such as environmental monitoring and screening of residents.
- Individual operations were done based on a request from the following route: the Government/Fukushima Pref. → TEPCO → Supporting electric power company (managing company) → Individual companies.

# Outline of Support (Outline of FEPC, Fukushima Supporting Div.)

The Division was established to further support extensive local activities in Fukushima, which have been implemented by FEPC and electric power companies, and for coping with mid- and long-term technical issues at the Fukushima Daiichi Nuclear Power Station of TEPCO.

**Established on April 15, 2011**



## Local Supporting Team

- Local support includes physical support in Fukushima, and the provision of materials in areas of Fukushima and Fukushima Daiichi NPS of TEPCO.

## Technical Issue Response Team

- For mid- and long-term technical issues (such as the disposal of waste) at Fukushima Daiichi NPS of TEPCO, support is provided as needed while implementing R&D activities.

# Outline of Support (Main Background 1/2)

Date	Major Events
March 11, 2011	The occurrence of the earthquake and subsequent tsunami that descended upon the Fukushima Daiichi NPS, caused the total loss of AC power and the loss of Emergency Core Cooling System functions (“Occurrence of Specific Events” according to the Act on Special Measures Concerning Nuclear Emergency Preparedness).
The same date	Given the “Declaration of Nuclear Emergency Situation,” TEPCO issued a request to the supporting electric power companies, based on the Cooperative Agreement. Support personnel were dispatched to Fukushima from each company.
March 12	Supporting companies entered Fukushima. A hydrogen explosion occurred at Fukushima Daiichi NPS. A hotel in Koriyama City acquired for accommodation was selected to be the base.
March 13	Start of support activities, including delivery of emergency materials and equipment (Thai Beck suits, full-face masks, etc.) to TEPCO.
March 15	Start of screening of residents and vehicles.
March 17	Start of fixed-point monitoring outside the 20 km-radius area (six points) (requested by MEXT).
March 22	Supplemental operations of nuclear management for vehicle decontamination, etc. were started at J Village.
April 12	Fukushima environmental radioactive monitoring mesh survey (4-km mesh) was started (requested by Fukushima Pref. Thereafter, separate monitoring was sequentially conducted based on the request from Off-site Center or Fukushima Pref.).

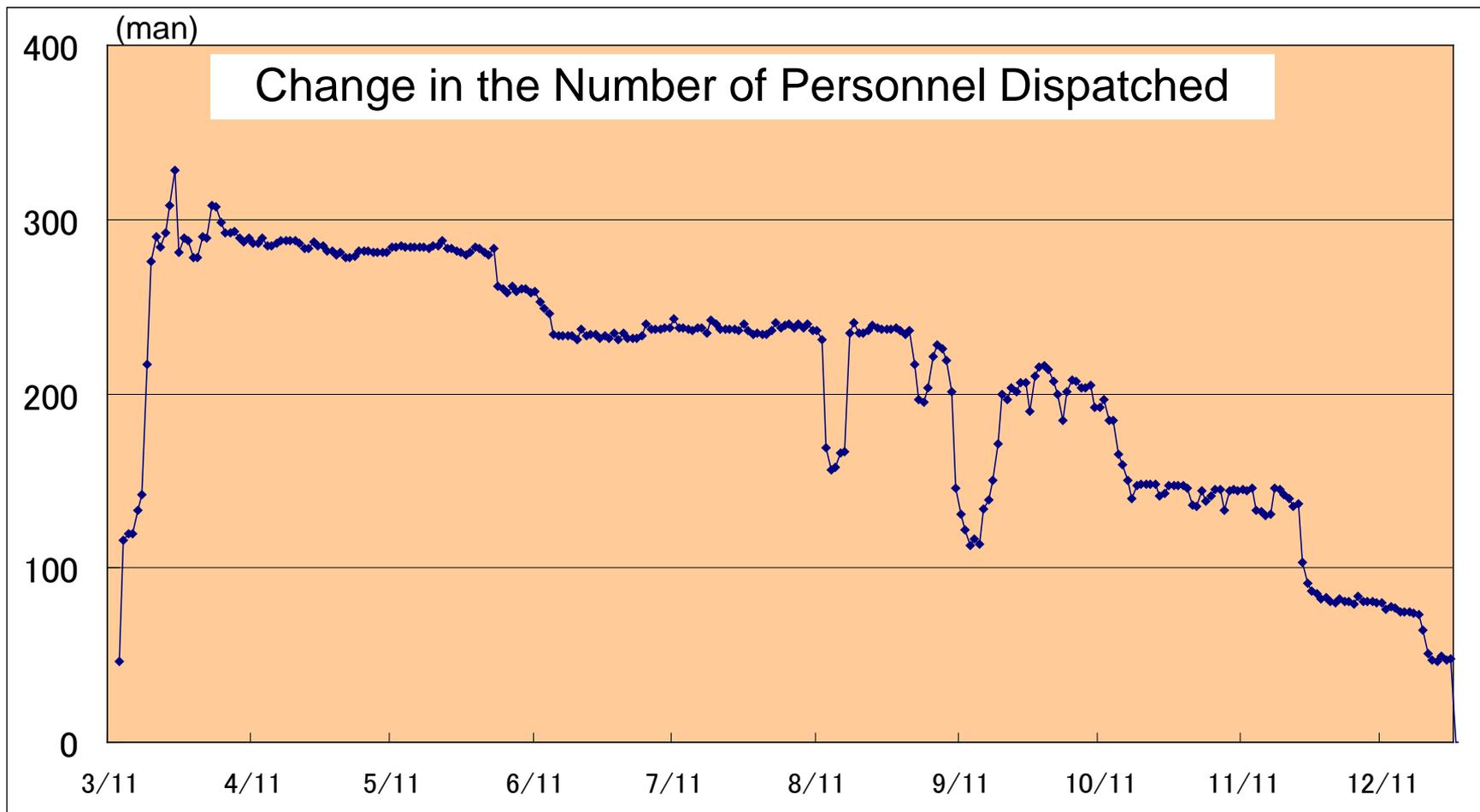
# Outline of Support (Main Background 2/2)

Date	Major Events
April 18	Start of fixed-point monitoring inside the 20 km-radius area (50 points) (requested by MEXT).
May 10	Residents allowed to temporarily return home. Residents temporarily returning home are screened (requested by the Off-site Center).
June 10	Start of 2-km mesh monitoring. Supporting electric power companies covered the inside 20 km-radius area (requested by MEXT).
June 15	Supplemental operations of nuclear management at J Village were relegated to TEPCO.
September 8	TEPCO personnel joined with the supporting companies. Thereafter, operations were gradually relegated to TEPCO.
September 9	First round of residents temporarily returning home completed.
September 19	Second round of residents temporarily returning home started.
September 30	Emergency evacuation preparedness area cancelled.
December 24	Second round of residents temporarily returning home completed.
December 26	All operations completely relegated to TEPCO. The system of on-call gathering when needed was established (Tohoku Electric Power Co. continued support activities).

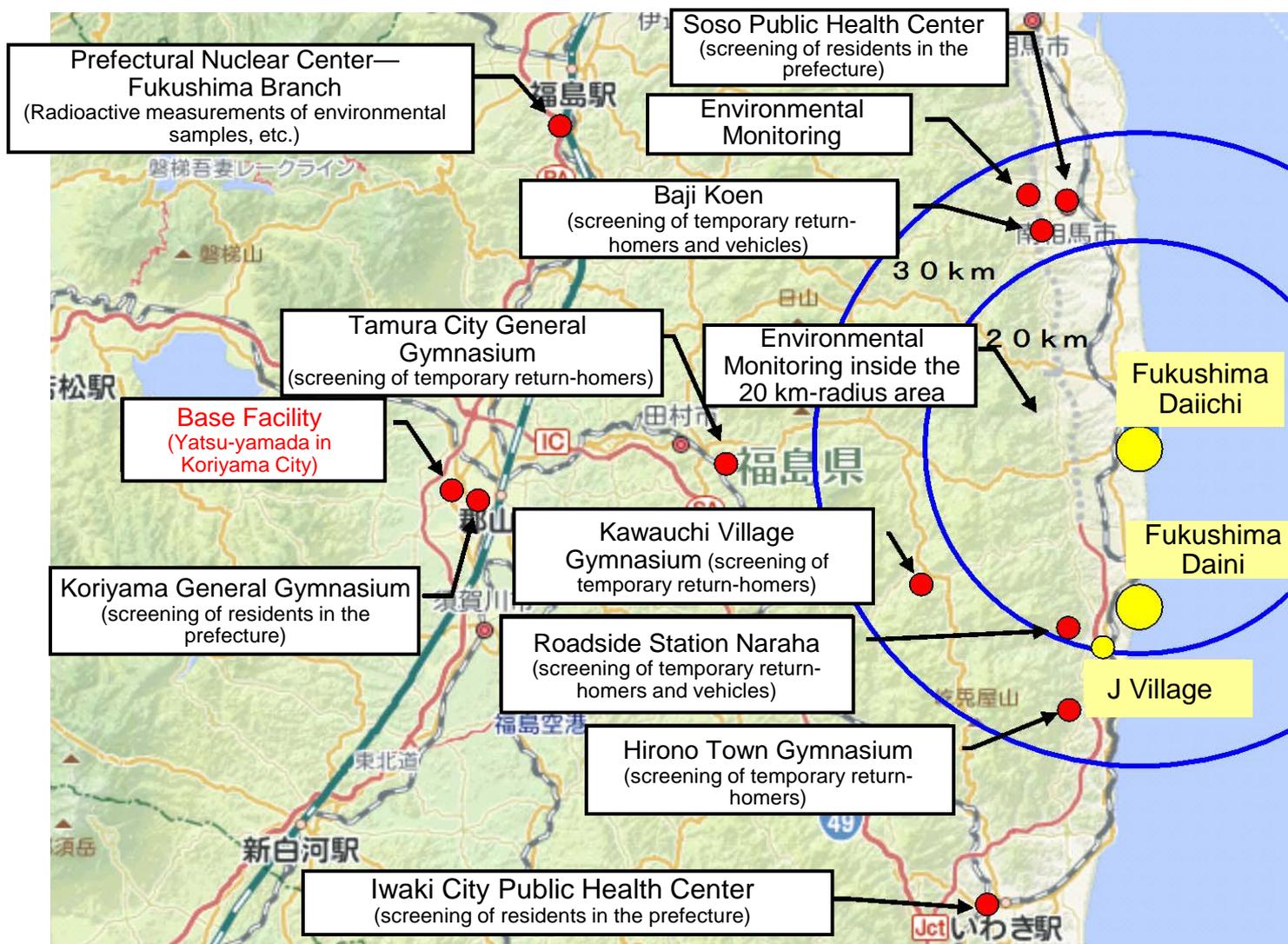
# Outline of Support

## (Change in the Number of Personnel Dispatched)

Number of Personnel Dispatched: Approx. 60,000 man-days in total  
(March to the End of December)



# Outline of Support (Major Activity Areas)



# Outline of Support (Actual Performance 1/2)

## 1. Monitoring: approx. 13,000 points in total

Operation Name	Amount
Fixed-point monitoring outside the 20 km-radius area (since March)	approx. 1,700 points in total
Fixed-point monitoring inside the 20 km-radius area (since April)	approx. 1,800 points in total
4-km mesh monitoring in Fukushima Pref. (April)	approx. 2,800 points
Monitoring of schools and parks in Fukushima Pref. (April)	47 facilities
Monitoring of sport facilities, etc. in Fukushima Pref. (May)	approx. 100 facilities
2-km mesh monitoring inside the 20 km-radius area (June)	approx. 130 points
Monitoring of school yards, kindergarten yards, etc. (June)	approx. 900 schools
Monitoring of Date City (June)	approx. 650 points
Monitoring by the model business for dose reduction of school roads (June to July)	3 schools
Monitoring of emergency evacuation preparedness areas, etc. (July)	approx. 1,350 points
Monitoring of Date City (July)	approx. 490 points
Monitoring of Date City (August)	approx. 490 points
Monitoring of Watari Area of Fukushima City (August)	approx. 790 points

# Outline of Support (Actual Performance 2/2)

Operation Name	Amount (approx.)
Monitoring of Nankodai in Fukushima City (August)	360 points
Monitoring of Nihonmatsu City (August)	280 points
Monitoring of Minami-Soma City (September)	830 points

## 2. Screening

Operation Name	Amount (approx.)
Screening of residents (since March)	120,000 people
Screening related to temporary returns (residents) (May to December)	72,000 people
Screening related to temporary returns (vehicles) (May to December)	25,000 cars

## 3. Supplemental analysis at Fukushima Nuclear Center

Operation Name	Amount (approx.)
Supplemental analysis at Fukushima Nuclear Center (since March)	10,300 samples

- Vehicle surveys at J Village and radioactive management, etc. were performed.

# Outline of Support (Local Bases)

Bandai Atami Spa  
Hana-no-Yu (March to July)

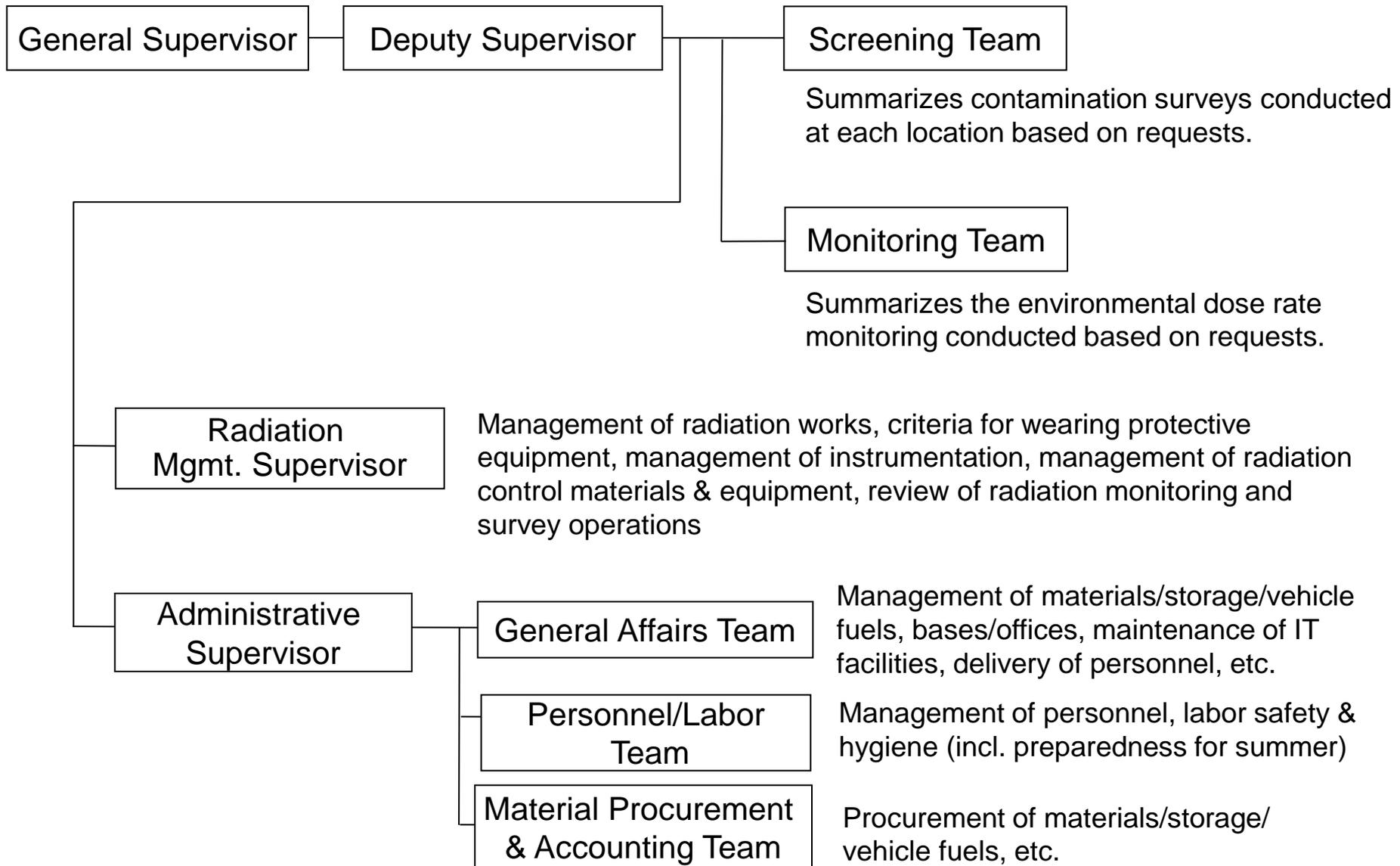


Operational preparations being made at the local headquarters (photo provided by Denki Shimbun)

Rental Office in Koriyama  
City (July to December)

- Immediately after the accident, base was established at a large hotel where large meeting room, accommodations and meal services were available.
- Since July, an office was rented in Koriyama City for improving office functions.

# Outline of Support (Organization of Supporting Electric Power Companies)



# Outline of Support – Findings (Logistics, Organization, etc.)

- Due to the Cooperative Agreement concluded in advance, support activities began immediately; required personnel successfully entered the site on March 12.
- Fortunately, a large hotel with meeting rooms, accommodations and meal services was acquired for the base from March 12, despite the unavailability of activity bases specified in the Cooperative Agreement.
- Since support activities covered all of Fukushima Pref., it was favorable to be based in Koriyama in terms of logistics.
- Due to the large amount of support that was required, functional teams were organized into teams such as monitoring, screening, radioactive management, general affairs, so that activities could be performed systematically.
- Materials and equipment were provided to TEPCO, but there was a lack of full-face masks immediately after the accident.
- Since support requests poured in from the Government, Fukushima Pref. and TEPCO immediately after the accident, it was hard for the supporting companies to organize the information obtained through several routes.

# Outline of Support – Future Outlook (Logistics, Organization, etc.)

- It is necessary to pre-select several places as support activity bases including places both nearby and far from the power station, so that activities can cover the extensive size of the accident as required.
- The stockpiled amount of materials and equipment provided must be reconsidered, taking into account the current accident.
- To avoid confusion in handling support requests, a definite route of communication must be established.

# Environmental Monitoring (Fixed-point Monitoring)

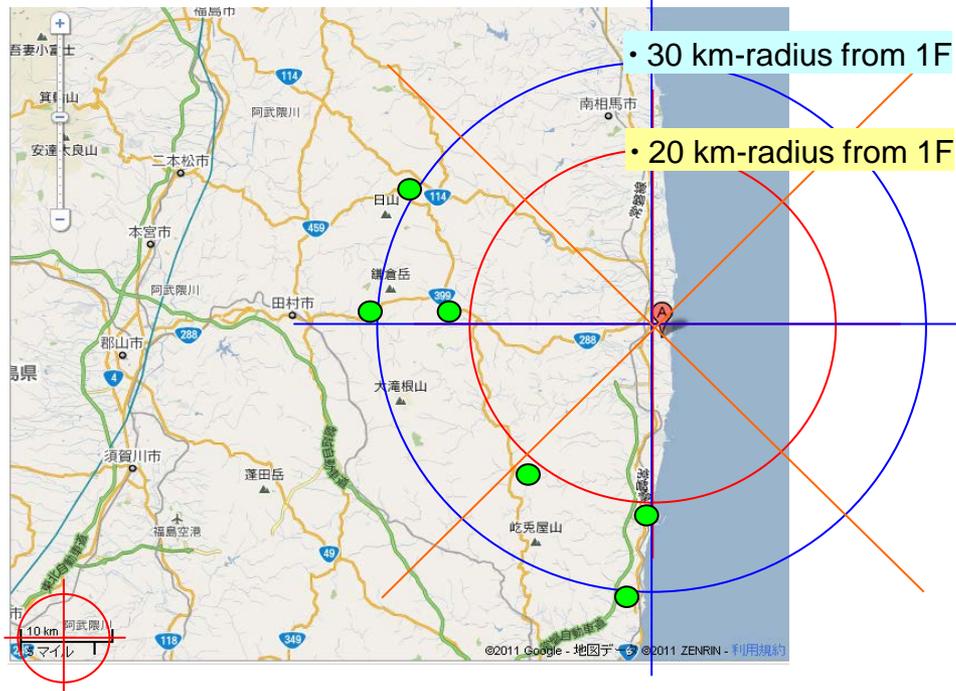
Fixed-point monitoring outside the 20 km-radius area

Six points (supporting companies are responsible for)

March to June: twice a day

Since June: once a day

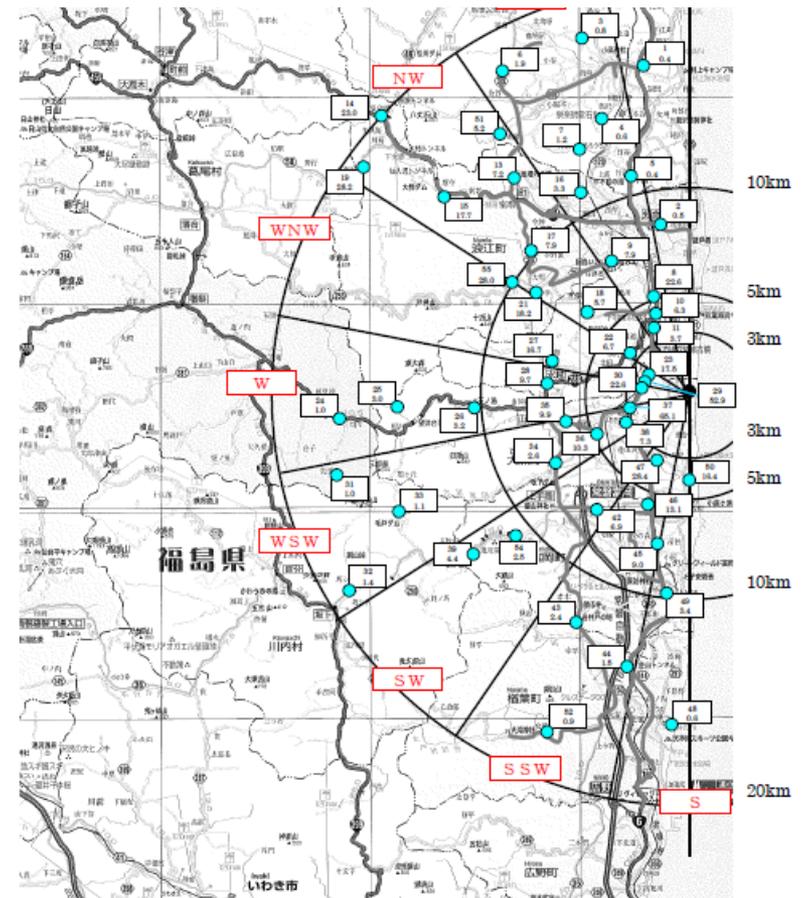
Items measured: Air dose rate, integrated dose, dust, iodine sampling



Fixed-point monitoring inside the 20 km-radius area

50 points, once a week

Air dose rate was measured



福島第一原子力発電所より 20km 圏内の空間放射線量率測定結果 (測定日:平成 23年 12月 26日)

# Environmental Monitoring (Separate Monitoring)

- Separate Monitoring (1)
  - In-depth examinations were made at the points where relatively high doses were detected from the survey of vehicles, etc.
  - Conducted based on the requests from Off-site Center or Fukushima Pref.
  - The air dose rate was measured at a height of 1 m, 50 cm, etc. in the gardens of family houses.
  - Conducted in Date City (Oguni, Aiyoshi, Tukidate, Toyonari, Hashirasawa), Fukushima City (Ohnami, Watari, Oguraji, Nankodai), Minami-Soma City (Haramachi Area, Kashima Area), Nihonmatsu City (Sugita, Ohira), and others.
- Separate Monitoring (2)
  - 4-km mesh monitoring, 2-km mesh monitoring inside the 20 km-radius area, monitoring of schools and sport facilities were conducted in Fukushima Pref.
  - Conducted based on requests from Fukushima Pref. or MEXT.
  - Air dose rate was measured at a height of 1 m, 50 cm, etc. at each point. In the 2-km mesh monitoring inside the 20 km-radius area, soil samples were taken.

# How Environmental Monitoring was Conducted



# Environmental Monitoring – Findings (1)

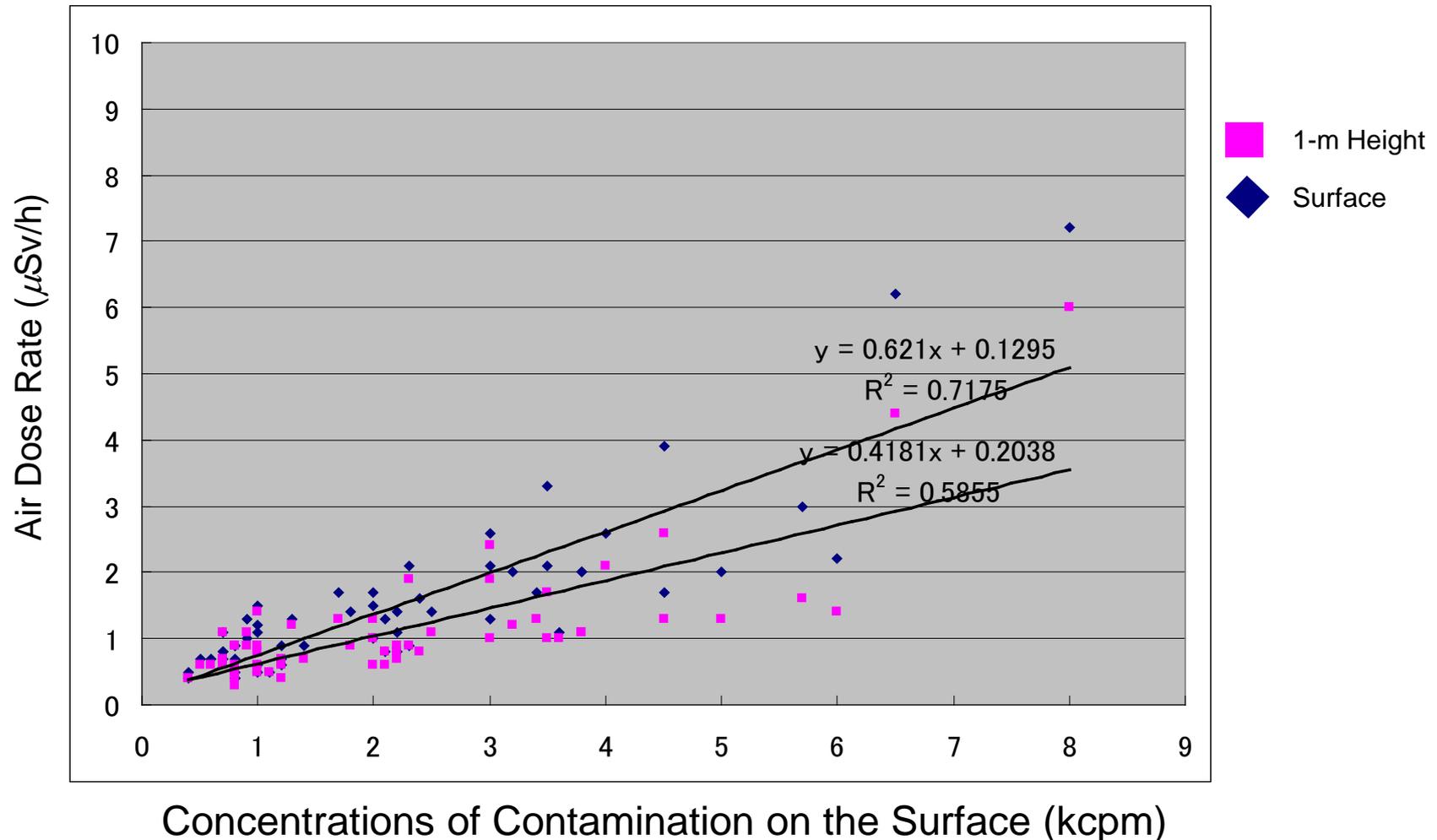
- Inside the 20 km-radius area, monitoring was limited because of damaged roads.
  - Due to collapsed roads and rubble caused by the tsunami, the monitoring vehicle could not operate in some locations.
  - The monitoring vehicle would suddenly get a flat tire because of rubble on the road; thereafter, two vehicles were used inside the 20 km-radius area so that they could return anyway.
  - Requests were made for monitoring at equal intervals inside the 20 km-radius area; however, such monitoring could not be performed in some places because of difficulty of access.
  - On the roads inside the 20 km-radius area, there were continual dangers because of falling rocks and partially collapsed roads.
- Satellite mobile phones were needed inside the 20 km-radius area.
- GPS was used to fix measurement points. The measurement locations that were measured several times were also photographed.
- The air dose rate was measured with a survey meter (at a height of 1 m).

## Environmental Monitoring – Findings (2)

- Fixed-point monitoring outside the 20 km-radius area was started six days after the accident; on the other hand, monitoring in areas not evacuated should have desirably been started earlier.
- During the environmental monitoring of the air dose rate, dust, and iodine concentrations, results never experienced before were observed, which made us realize the significance of our mission.
- During separate monitoring, an operation manual was developed so that personnel from a wide variety of fields could join in the support effort.
- For the monitoring of gardens at individual houses, measurements were made in areas as extensive as possible at the request of residents, in addition to measuring the points specified by the Off-site Center and Prefecture.
- Questions and complaints were obtained from residents regarding radioactivity and current difficulties. At the same time, words of thanks were received from residents.

# Environmental Monitoring – Experiences (3)

Some measurement data revealed the following concentrations of contamination on the ground surface and the air dose rate, with relative scatterings.



# Environmental Monitoring – Future Outlook

- Monitoring vehicles must be required to operate on damaged roads.
- Satellite mobile phones, GPS, and car navigation systems are all effective means of communication.
- Usage of dose rate meters mounted on monitoring vehicles (for higher places) and survey meters (used at a height of 1m) must be coordinated in advance.
- When the target areas where emergency measures will be more focused on are changed, new monitoring points should be required and backup procedures using monitoring vehicles must be developed for when the functionality of fixed monitoring points is lost.

# Screening of Residents (1)

- Since March 15 after the accident, screening was conducted for residents and vehicles used for evacuation.
- Venues for screening
  - Iwaki Public Health Center, Koriyama City Public Health Center, Soso Public Health Center in Minami-Soma City, Fukushima Gender Equality Center (Nihonmatsu City), Motomiya High School, Kawamata Elementary School, etc.
- Number of people screened: approx. 120,000 people in total (March to October)
- Screening criteria
  - Initial criteria: 6,000 cpm
  - On and after March 20:
    - Below 13,000 cpm: No problem
    - 13,000 cpm to below 100,000 cpm: partial decontamination by wiping away the contaminated area
    - 100,000 cpm or over: whole-body decontamination

# Screening of Residents (2)



# Screening for Temporary Return (1)

## <Common matters for the first and second rounds>

- Based on the request from the Off-site Center, screening was conducted for residents who lived inside the alert area and temporarily returned home after having left the alert area.
- First round of temporary returns: May to September, 2012  
Second round of temporary returns: September to December, 2012
- Venues for screening include the four places such as Baji Koen in Minami-Soma City, Roadside Station Naraha, Miyakoji Gymnasium in Tamura City, and Kawauchi Village Gymnasium.
- Vehicles that did not satisfy the screening criteria even after being wiped at the place of screening were transferred to the J Village for further decontamination.
- The screening criteria was established based on the instructions from the Off-site Center, according to advice from the Nuclear Safety Commission.

# Screening for Temporary Return (2)

## Screening Procedures for Temporary Return

	First Round	Second Round
Method of returning home	By bus (when private cars were permitted, the residents entered the area by bus and returned home using their own cars)	Returning home by private car or by bus
Outfit when returning home	Thai Beck suits, gloves, rubber gloves, masks, goggles, shoe covers	Shoe covers (Thai Beck suits were provided for those who requested)
Survey points (for people)	Whole body	Shoe covers only: put on only the sole (additional points were covered based on individual's request) Thai Beck suits: for the whole body

# Screening for Temporary Return (3)

	First Round	Second Round
Survey points (for vehicles)	Entire outer surface of the body	Only tires (additional points based on individual's request)
Survey points (for brought- back items)	Survey was conducted on the plastic bag containing items brought back (initially, items were taken out and surveyed)	Returning home by private car: The surface of loads were surveyed while loaded. Returning home by bus: Survey was conducted on the plastic bag containing items brought-back.
Survey criteria	100,000 cpm	13,000 cpm

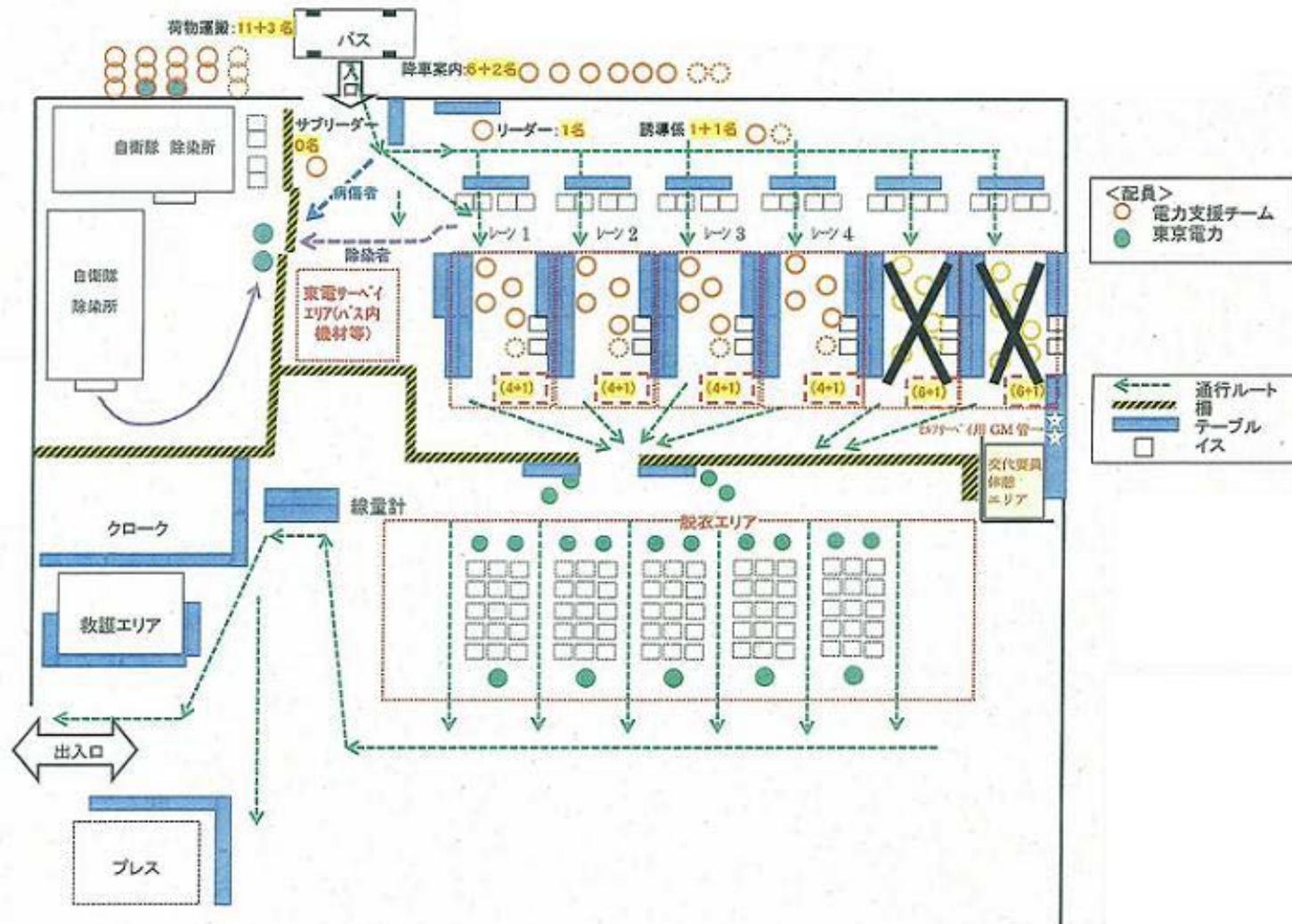
# Screening for Temporary Return (4)



# Screening for Temporary Return (5)

Screening venue

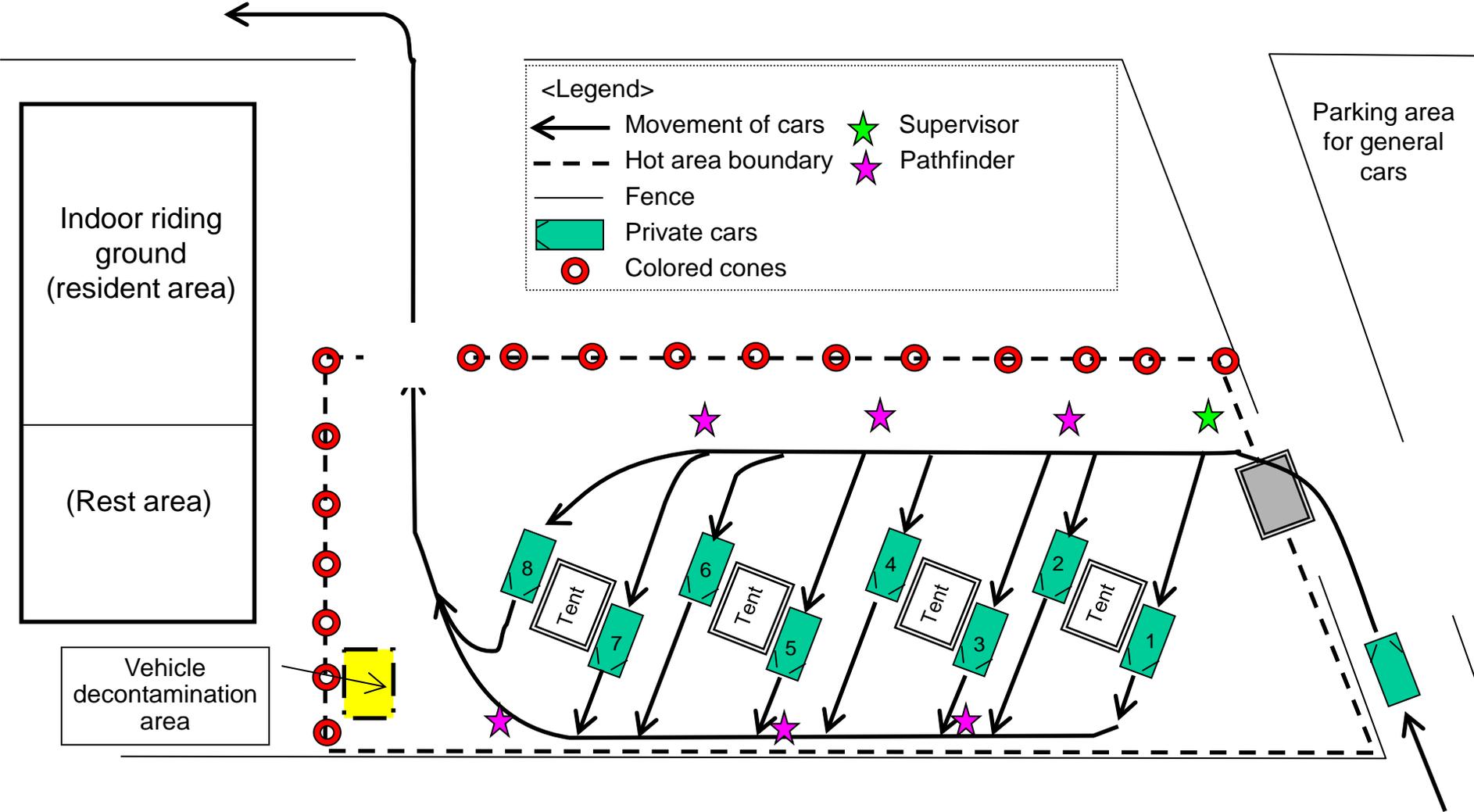
(Example: Baji Koen in Minami-Soma City when returning by bus)



# Screening for Temporary Return (6)

## Screening venue

(Example: Baji Koen in Minami-Soma City when returning by private car)



# Screening – Findings (1)

- The screening criteria established just after the accident was gradually increased to 6,000 cpm, 13,000 cpm, and 100,000 cpm; however, the basis for the rate was not told, which made it difficult to organize information at the site.
- The first round of temporary returns was conducted starting from the rainy season through the summer; however, the preventive outfit for people returning home was not suitable for the season. On the other hand, the measurement results of the survey turned out to be low.
- During the second round, the preventive outfit was simplified.
- For vehicles, the survey criteria was exceeded in some cases, including the lower part of the front window where rainwater gathered, the wiper blades, and light-weight truck beds (these cases were covered by simple decontamination or by the decontamination conducted at J Village).
- At some screening venues, many questions were received from residents

# Screening – Findings (2)

- During the screening for temporary return, operations were performed in a way that shortened the waiting time at the venue, by taking the following measures.
  - Several lanes were provided.
  - The traffic lines of people and vehicles were optimized.
  - Screening points were reduced.
    - People: the whole body → only the sole
    - Vehicle: the entire body → only around the tire
    - Items brought back: items taken out of the bag → items contained in the bag
- Measures to prevent heatstroke during the summer are crucial.
  - Periodic breaks should be provided through an appropriate reassignment of personnel.
  - Cool vests should be put on.
  - Tents should be used.
- Labor-intensive measures were implemented during the screening process.

# Screening – Future Outlook

- The screening criteria must be well understood by providing the basis for the criteria, including comparisons of the nuclides of interest in each case, dose references, etc.
- The preventive outfit for residents temporarily returning home should be considered based on the actual state of contamination. This should also be applied to the workers restoring the areas in the future.
- Special care should be given to measures to prevent heatstroke while the preventive outfit is put on.
- The use of equipment for continuous screening should also be taken into account.

# Summary – Future Outlook (1/2)

## <General Matters>

- Several places should be pre-selected as the base for support activities so that these places can properly cover the entire activities depending on the size of the accident.
- The stockpiled amount of materials and equipment provided should be reconsidered.
- A definite route of communication based on requests should be established.

## <Environmental Monitoring>

- Monitoring vehicles must be required to operate on damaged roads.
- Satellite mobile phones, GPS, and car navigation systems are all effective means of communication.
- The height when the dosage is measured should be adjusted in advance (1 m, the roof of the monitoring vehicle).
- When the target areas where emergency measures will be more focused on are changed, new monitoring points should be required and backup procedures using monitoring vehicles must be developed for when the functionality of fixed monitoring points is lost.

# Summary – Future Outlook (2/2)

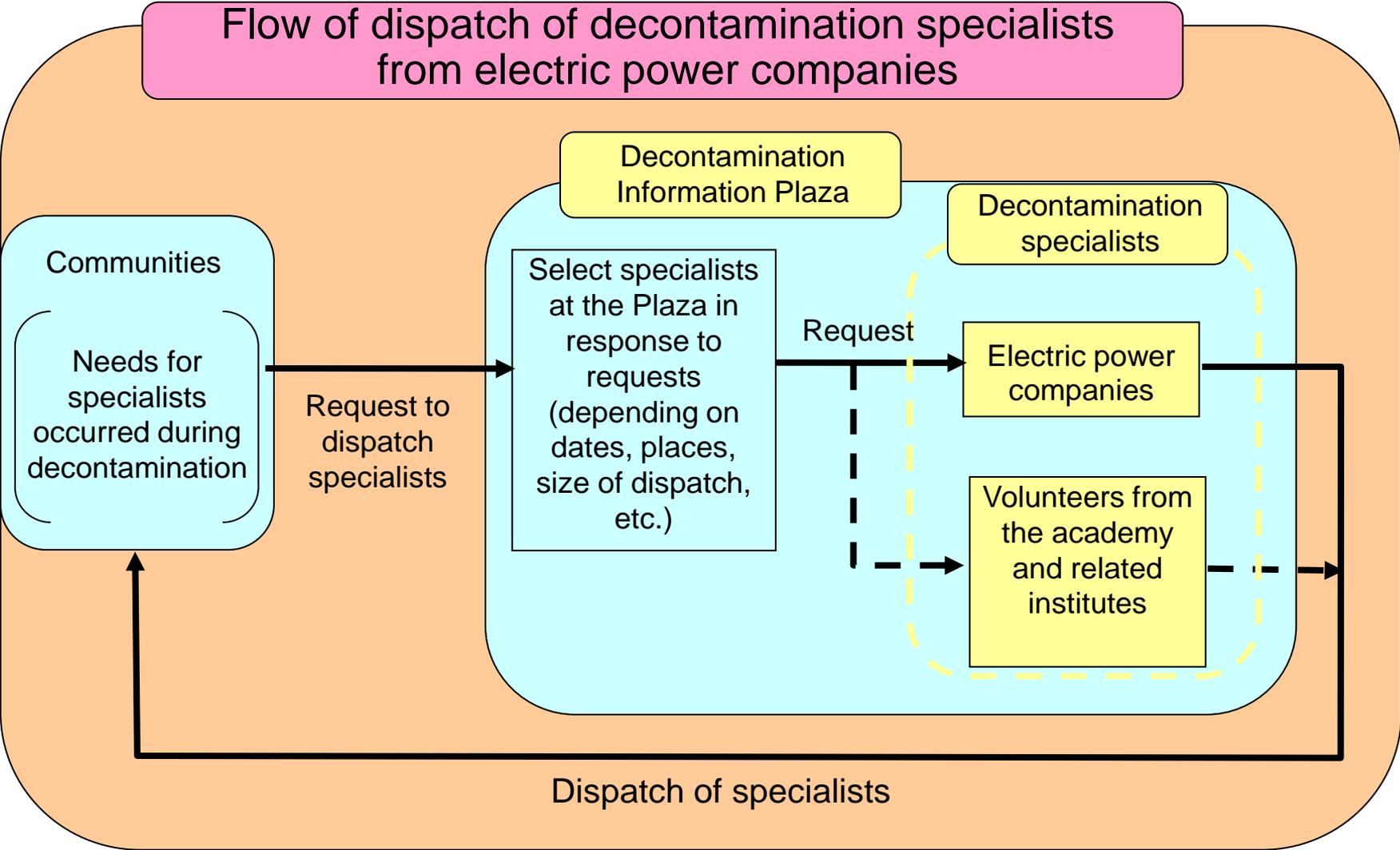
## <Screening>

- A clear basis for the screening criteria should be established and a definite method of notification should be developed.
- Consideration of the best protective outfit depending on the state of contamination and weather
- Importance of measures to prevent heatstroke while the protective outfit is worn
- The use of equipment for screening

# Future Actions – Dispatch of Decontamination Specialists (1)

- The Decontamination Information Plaza has been established by the Ministry of the Environment and Fukushima Pref. in order to dispatch specialists to respond to inquiries and give advice for decontamination.
- Specialists will be dispatched from 11 companies including electric power companies of Hokkaido, Tohoku, Chubu, Hokuriku, Kansai, Chugoku, Shikoku, Kyushu, Japan Atomic Power Co., J-Power, and Japan Nuclear Fuel Ltd. through the above-mentioned plaza to give advice for decontamination.
- Tasks of these specialists are as follows:
  - Measurement of radioactivity such as air dose rate during decontamination
  - Advice on the method of decontamination (how deep the ground should be dug, how to temporarily store waste, etc.)
  - Advice on radiological protection (protective outfit such as masks and gloves, other cautions)
  - Response to questions from residents on radiation and decontamination
- The number of specialists dispatched will be about 10 people in five teams on Saturdays, Sundays and holidays.
- Activities will be started from April 2012.

# Future Actions – Dispatch of Decontamination Specialists (2)



*Fight!*  
**Fukushima!**

