Fukui Prefectural

Environmental Radiation Monitoring Telemetry System

Fukui Prefectural Environmental Radiation Research and Monitoring Center

Outline of the Environmental Radiation Monitoring Telemetry system

The Fukui Prefectural Environmental Radiation Research and Monitoring Center measures the air dose rates and weather conditions continuously at prefectural monitoring stations installed at 44 locations around the nuclear power plants. Once measured, the data are collected at the Central Monitoring Station and the Data Center servers and analyzed to identify even the slightest effect from power plants to ensure environmental safety. Any unusual value in measurements during holidays or overnight is reported to staff immediately by automatic reporting devices.

In addition to the data measured by the 44 prefectural stations for routine monitoring, those by 62 posts of nuclear power operators, 55 compact monitoring posts for use in case of emergency, and 11 national posts for the Nuclear Regulation Authority (NRA) environmental radioactivity level monitoring, as well as the operational information from the power plants are all collected via this system to be checked. All data can be accessed on line and are shown in real time on monitoring data display installed in the lobbies of prefectural and municipal government offices. These data are also transmitted to four regional Nuclear Emergency Preparedness Centers and the monitoring data sharing system in order to reinforce the monitoring network in preparation for emergencies.

Data Measurement

Monitoring stations (44)

Concrete cabin type (A)

Installed within 10km or so of the nuclear facilities, continuously measures the air dose rates and the concentration of radioactive substances in the atmosphere. It also monitors weather conditions , e.g. precipitation, wind direction and speed.

Aluminum panel cabin type (B)

Installed within 30km of the nuclear facilities, continuously measures mainly the air dose rates. It also monitors meteorological conditions, e.g. precipitation, wind direction and speed.

Compact monitoring posts (55)

Installed in each elementary school zone which has no monitoring station and within 30km of a nuclear power plant, continuously measures the air dose rates in preparation for emergency protective measures.

Portable monitoring posts (18)

Installed on an as-needed basis to measure the air dose rates in order to supplement and back up the monitoring stations and posts in an emergency. Battery-powered and can run for about two weeks without an external power supply.

National posts for the NRA radioactivity level monitoring (11)

Installed nationwide in all 47 prefectures by the Nuclear Regulation Authority to monitor environmental radioactivity level. The posts continuously measure and monitor the air dose rates.

Fixed Wire Network + Satellite Communication

Fixed Wire Network + Satellite Communication

Mobile Network + Satellite Communication

Fixed Wire Network

Fixed Wire Network

Data measurement

The Japan Atomic Power Co

The Kansai Electric Power C

Japan Atomic Energy Agency

Measurement data from the nuclear power operators' 62 monitoring posts operational information from the nucle plants are transmitted by the environ radiation monitoring telemetry system.

Data collection/accumulation/ checking/analysis

Central Monitoring Station (Environmental Radiation Research and Monitoring Center)

Data interconnection

Data collection/ accumulation

Data Center

Automatic reporting on any unusual measurement

Measurement data are collected and accumulated at both the Central Monitoring Station and the Data Center, then checked and analyzed at the Central Monitoring Station.

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[Measurement items of the monitoring posts]

- Air dose rate (62 points)
- Weather (35 points)

[Operational information of the nuclear power plants]

- Electric output (15 units)
- Exhaust stack monitor (24 monitors)
- Discharge canal monitor (10 monitors)

Data display/disclosure

Website

Smartphone application

Monitoring data central display unit

(Environmental Radiation Research and Monitoring Center)

Monitoring data display device

(Lobbies of municipal government offices, etc.)

Data sharing in an emergency

Nuclear Emergency Preparedness Centers

Monitoring data-sharing system

Radiation monitoring information is shared by the monitoring information sharing system installed at the Nuclear Emergency Preparedness Centers, which serve as local bases of operation in an emergency.

Geographical layout of the Prefectural Environmental Radiation Monitoring Telemetry System

- Central Monitoring Station
- Data Center
- Nuclear Power Plant
- 44 Prefectural stations : measures the air dose rate
- 55 Prefectural posts : measures the air dose rate in preparation for emergency protective measures
- 11 National posts : measures the air dose rate for NRA radioactivity level monitoring
- 62 Nuclear power operators' posts : measures the air dose rate
- 11 Prefectural posts : measures the concentration of radioactive substances in the atmosphere
- 36 Prefectural posts : measures the concentration of radioactive substances in the atmosphere in the event of an emergency

Tsuruga Nuclear Power Plant (Japan Atomic Power Co.)

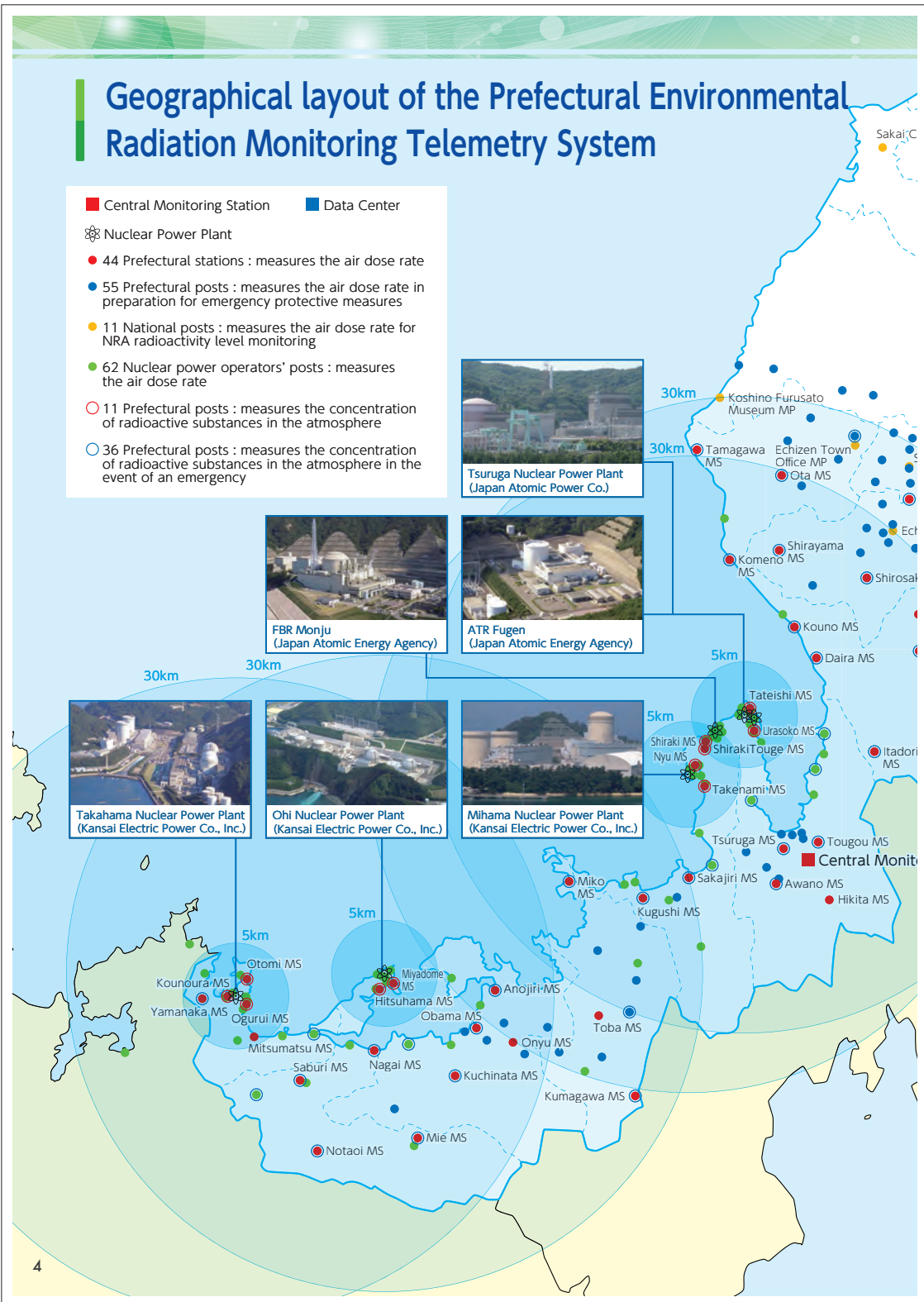
FBR Monju (Japan Atomic Energy Agency)

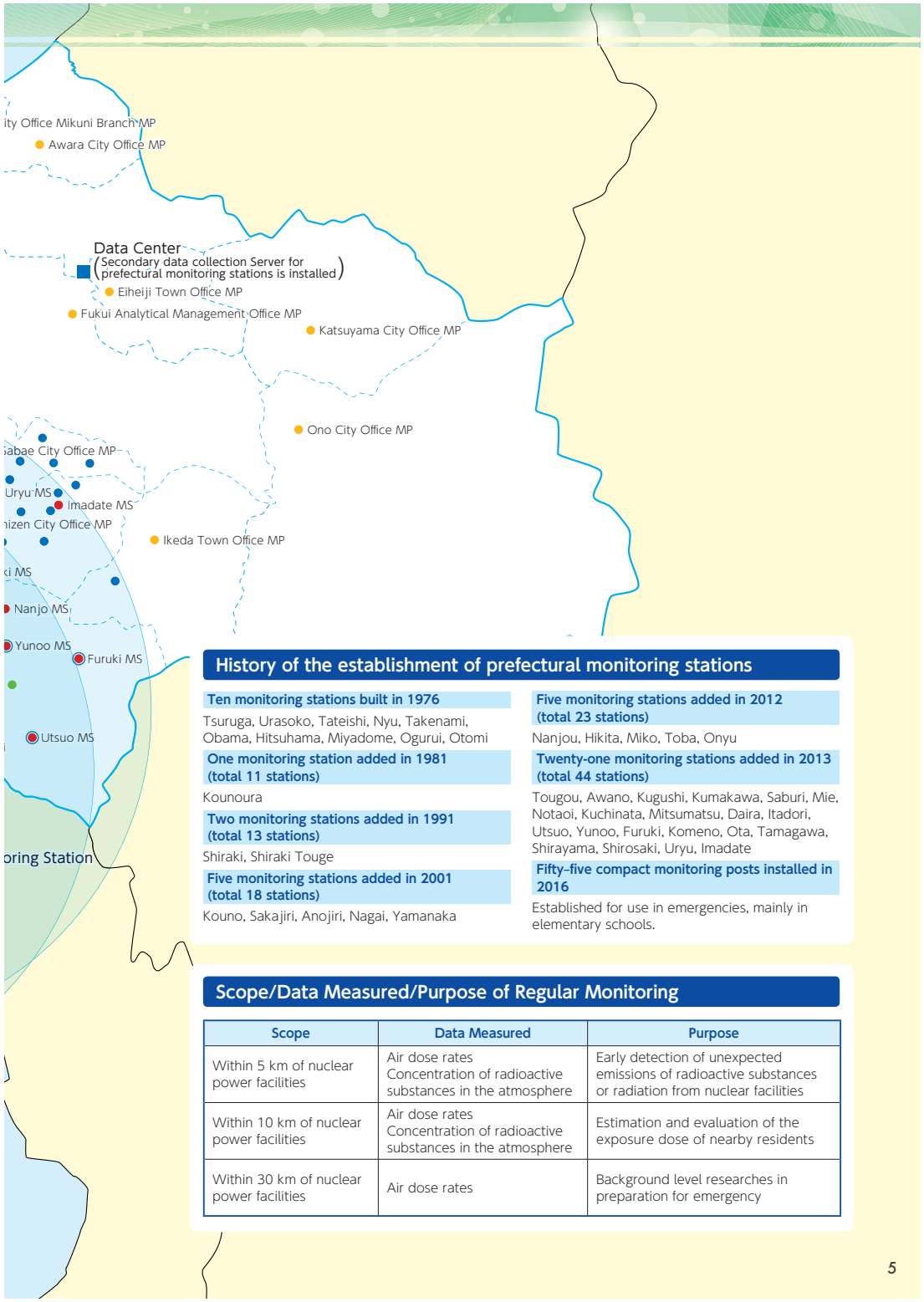
ATR Fugen (Japan Atomic Energy Agency)

Takahama Nuclear Power Plant (Kansai Electric Power Co., Inc.)

Ohi Nuclear Power Plant (Kansai Electric Power Co., Inc.)

Mihama Nuclear Power Plant (Kansai Electric Power Co., Inc.)





History of the establishment of prefectural monitoring stations

Ten monitoring stations built in 1976

Tsuruga, Urasoko, Tateishi, Nyu, Takenami, Obama, Hitsuhama, Miyadome, Ogurui, Otomi

One monitoring station added in 1981 (total 11 stations)

Kounoura

Two monitoring stations added in 1991 (total 13 stations)

Shiraki, Shiraki Touge

Five monitoring stations added in 2001 (total 18 stations)

Kouno, Sakajiri, Anojiri, Nagai, Yamanaka

Five monitoring stations added in 2012 (total 23 stations)

Nanjou, Hikita, Miko, Toba, Onyu

Twenty-one monitoring stations added in 2013 (total 44 stations)

Tougou, Awano, Kugushi, Kumakawa, Saburi, Mie, Notaoi, Kuchinata, Mitsumatsu, Daira, Itadori, Utsuo, Yunoo, Furuki, Komeno, Ota, Tamagawa, Shirayama, Shirosaki, Uryu, Imadate

Fifty-five compact monitoring posts installed in 2016

Established for use in emergencies, mainly in elementary schools.

Scope/Data Measured/Purpose of Regular Monitoring

Scope	Data Measured	Purpose
Within 5 km of nuclear power facilities	Air dose rates Concentration of radioactive substances in the atmosphere	Early detection of unexpected emissions of radioactive substances or radiation from nuclear facilities
Within 10 km of nuclear power facilities	Air dose rates Concentration of radioactive substances in the atmosphere	Estimation and evaluation of the exposure dose of nearby residents
Within 30 km of nuclear power facilities	Air dose rates	Background level researches in preparation for emergency

Devices and functions of the monitoring stations

Monitoring stations installed by the Fukui Prefectural Environmental Radiation Research and Monitoring Center monitor the environmental effects of nuclear power plants 24 hour a day with various types of devices.

Radiation monitoring devices

Low and High dose detectors allow wide-ranging measurements, from background radiation levels to the high levels expected in emergencies.

Low dose detector
(NaI scintillation detector)

High dose detector
(Ionization chamber)

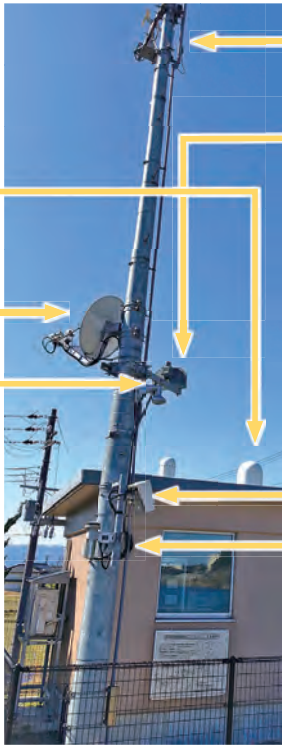
Satellite antenna

The measurement data are transmitted through wirelines in normal times. Satellite communication system is set up to back up the data exchange in a trouble.

Monitoring camera

Monitoring the situation around the station (e.g. snow coverage) to refer in researching cause of dose rate changes.

Miyadome monitoring station
(Ohi Town)



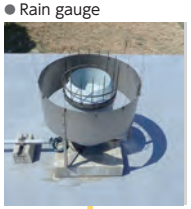
Weather observation devices

As the air dose rates change according to weather conditions, weather observation data measured by these devices are used to judge if the change is caused by the weather conditions or not.

- Anemoscope and anemometer

- Precipitation sensor

- Rain gauge



- Snow depth gauge

- Thermometer

Display device on site

The latest air dose rate is displayed in real time at monitoring station.

Emergency generator

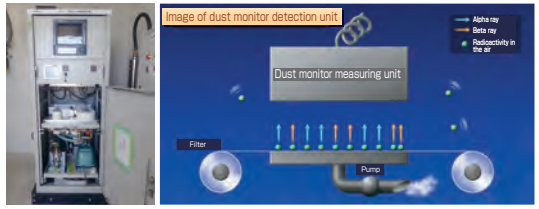
It starts automatically when the power fails and supplies power to each measuring device. Can be operated for 72 hours or more in succession

Devices in the station cabin

Devices for measuring the radioactivity in airborne dust

Radioactive dust monitors measure the concentration of radioactive substances contained in airborne dust. In an emergency, air sampleres collect radioactive iodine suspending in the air.

- Radioactive dust monitor (for the regular monitoring)



(Miyadome monitoring station)

- Radioactive dust monitor (for the emergency monitoring) (left)
- Radioactive iodine sampler (right)

(Saburi monitoring station)

Data collecting device

The telemeter relay unit is equipped to measure and collect the air dose rate and weather conditions and transmit them to the Central Monitoring Station and Data Center.

- Air dose measurement control unit (left)
- Weather observation control unit (center)
- Telemeter relay unit (right)

Uninterruptible power supply device (UPS)

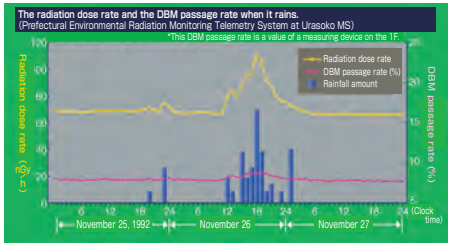
In case of a power failure, power is secured by UPS until the emergency generator is started, so that all devices can run without interruption.

Examples of the measurement results

Examples of the measurement results of the air dose rate

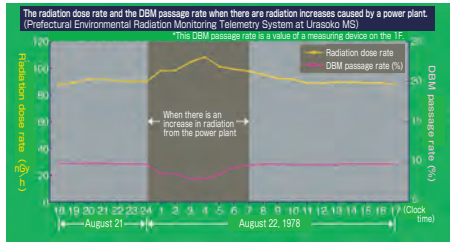
Natural fluctuations

When it rains or snows, both the dose rate and the DBM passage rate* increase, while they both decrease when snow accumulates.



Artificially caused by the power plant

When there is an increase in radiation caused by the power plant, the dose rate increases, while the DBM passage rate decreases.

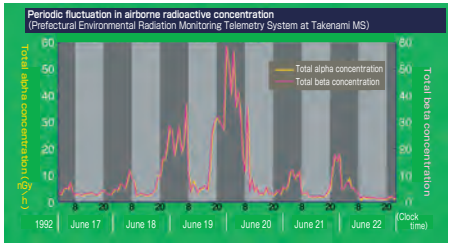


* The DBM passage rate, i.e. a benchmark recording the energy information of the radiation, is used as a measure to quickly identify the cause of a rise of the dose rate. The energy of the rare gases, i.e. the artificial radionuclides derived from power plants tends to be low, while that of the natural radionuclides tends to be high.

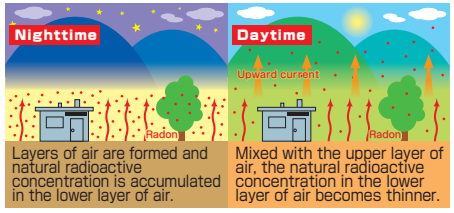
Examples of the measurement results of the radioactivity in airborne dust

Natural fluctuations

The natural radioactivity concentration in airborne dust shows circadian fluctuations. The α radiation concentration and the β radiation concentrations show similar fluctuations.

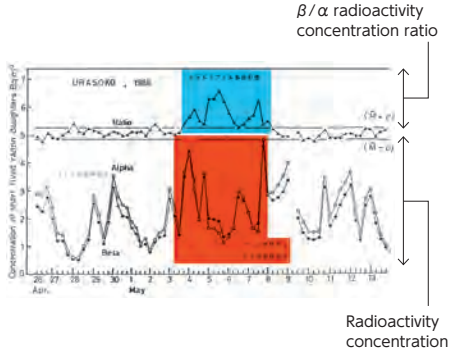


The radioactivity concentration in airborne dust increases during nighttime and decreases during daytime.



Artificially caused by the power plant

This is an example from the impact of the Chernobyl nuclear power plant accident in the former Soviet Union. When the radioactivity in airborne dust is caused only by the natural radionuclides, the β / α radioactivity concentration ratio remains almost constant though the radioactivity concentrations change. On the other hand, as most of the artificial radionuclides from power plants are β-emitting, the β / α radioactivity concentration ratio will raise when they are released into the air.



Data display and disclosure

In Fukui Prefecture, monitoring data are shown on the monitoring data display at the Central Monitoring Station's hi-vision hall and the 23 municipal government offices. These data are also accessible via the internet on our websites, from smartphones too.

Website

Website address

Main site: http://www.houshasen.tsuruga.fukui.jp
Mirror site: http://www.houshasen-mirror.fukui.jp

Main site

Mirror site

Smartphone application

The data can be accessed by searching for "Fukui Prefecture Radiation Monitoring Data" via Google Play or the App Store.

For Android

For iPhone

Monitoring Data Central Display Unit

The hi-vision display of The Central Monitoring Station

(1st floor, Fukui Prefectural Environmental Radiation Research and Monitoring Center)

The central display unit provides the latest monitoring data as well as educational programs on radiation monitoring and nuclear power generation.

Monitoring data display device

Locations of the monitoring data display devices

Tsuruga City	1st floor lobby, Tsuruga City Hall
Mihama Town	1st floor lobby, Mihama Town Hall
Wakasa Town	1st floor lobby, Wakasa Town Hall Mikata Branch Office
	1st floor lobby, Wakasa Town Hall Kaminaka Branch Office
Obama City	1st floor lobby, Obama City Hall
Ohi Town	1st floor lobby, Ohi Town Welfare Center
	1st floor lobby, Natasho Branch Office
Takahama Town	1st floor lobby, Takahama Town Hall
Awara City	1st floor lobby, Awara City Hall
Sakai City	1st floor lobby, Sakai City Hall
Eiheiji Town	1st floor lobby, Eiheiji Town Hall
Fukui City	1st floor lobby, Fukui City Hall
Ono City	1st floor lobby, Ono City Hall
Katsuyama City	1st floor lobby, Katsuyama City Hall
Sabae City	1st floor lobby, Sabae City Hall
Echizen City	1st floor lobby, Echizen City Hall
Ikeda Town	1st floor lobby, Ikeda Town Hall
Echizen Town	1st floor lobby, Echizen Town Hall
	1st floor lobby, Echizen Community Center
Minami Echizen Town	1st floor lobby, Minami Echizen Town Hall
	1st floor lobby, Imajou Branch Office
	1st floor lobby, Kouno History and Culture Fureai Hall
Fukui Prefectural Government	1st floor lobby, Fukui Prefectural Government Office

Locations of monitoring stations and table of equipped devices

Name of the monitoring stations	Location	Station cabin type	Low dose rate meter	High dose meter	Radioactive dust monitor (for the regular monitoring)	Radioactive iodine sampler (for the regular monitoring)	Radioactive dust monitor (for the emergency monitoring) *	Radioactive dust sampler (for the emergency monitoring)	Anemoscope and anemometer	Rain gauge	Precipitation sensor	Thermometer	Snow depth gauge
Tateishi	Tateishi, Tsuruga City	A	○	○	○	○			○	○	○	○	
Urasoko	Urasoko, Tsuruga City	A	○	○	○	○			○	○	○	○	○
Tsuruga	Chuo-cho, Tsuruga City	A	○	○			○	○	○	○	○	○	
Tougou	Igawa, Tsuruga City	B	○	○			○		○	○	○		
Awano	Gomyou, Tsuruga City	B	○	○			○		○	○	○		
Hikita	Hikita, Tsuruga City	B	○	○					○	○	○		
Shiraki	Shiraki, Tsuruga City	A	○	○	○	○			○	○	○	○	
Shiraki Touge	Shiraki, Tsuruga City	A	○	○	○	○			○	○	○	○	○
Nyu	Nyu, Mihama Town, Mikata County	A	○	○	○	○			○	○	○	○	
Takenami	Takenami, Mihama Town, Mikata County	A	○	○	○	○			○	○	○	○	○
Sakajiri	Sakajiri, Mihama Town, Mikata County	A	○	○			○	○	○	○	○	○	○
Kugushi	Kugushi, Mihama Town, Mikata County	B	○	○			○		○	○	○		
Miko	Miko, Wakasa Town, Mikatakaminaka County	B	○	○			○		○	○	○		
Toba	Mita, Wakasa Town, Mikatakaminaka County	B	○	○					○	○	○		
Kumakawa	Kumakawa, Wakasa Town, Mikatakaminaka County	B	○	○			○		○	○	○		
Miyadome	Oshima (Miyadome), Ohi Town, Ohi County	A	○	○	○	○			○	○	○	○	○
Hitsuhama	Oshima (Hitsuhama), Ohi Town, Ohi County	A	○	○	○	○			○	○	○	○	
Nagai	Nagai, Ohi Town, Ohi County	A	○	○			○	○	○	○	○	○	○
Saburi	Shikano, Ohi Town, Ohi County	B	○	○			○	○	○	○	○		
Mie	Mie, Natasho, Ohi Town, Ohi County	B	○	○			○		○	○	○		
Notaoi	Notaoi, Natasho, Ohi Town, Ohi County	B	○	○			○		○	○	○		
Obama	Otemachi, Obama City	A	○	○			○	○	○	○	○	○	
Anojiri	Anojiri, Obama City	A	○	○			○	○	○	○	○	○	
Onyu	Onyu, Obama City	B	○	○									
Kuchinata	Kuchidano, Obama City	B	○	○			○		○	○	○		
Otomi	Otomi, Takahama Town, Ohi County	A	○	○	○	○			○	○	○	○	
Ogurui	Ogurui, Takahama Town, Ohi County	A	○	○	○	○			○	○	○	○	○
Kounoura	Kounoura, Takahma Town Ohi Country	A	○	○	○	○			○	○	○	○	
Yamanaka	Yamanaka, Takahama Town, Ohi County	A	○	○			○	○	○	○	○	○	○
Mitsumatsu	Higashi Mitsumatsu, Takahama Town, Ohi County	B	○	○					○	○	○		
Daira	Daira, Minami Echizen Town, Nanjou County	B	○	○			○		○	○	○		
Kouno	Kouno, Minami Echizen Town, Nanjou County	A	○	○			○	○	○	○	○	○	
Itadori	Itadori, Minami Echizen Town, Nanjou County	B	○	○			○		○	○	○		
Utsuo	Utsuo, Minami Echizen Town, Nanjou County	B	○	○			○	○	○	○	○		
Yunoo	Yunoo, Minami Echizen Town, Nanjou County	B	○	○			○		○	○	○		
Nanjo	Higashi Daidou, Minami Echizen Town, Nanjou County	B	○	○					○	○	○		
Furuki	Furuki, Minami Echizen Town, Nanjou County	B	○	○			○		○	○	○		
Shirayama	Isobe-cho, Echizen City	B	○	○			○		○	○	○		
Shirosaki	Shirosaki-cho, Echizen City	B	○	○			○	○	○	○	○		
Uryu	Uryu-cho, Echizen City	B	○	○			○		○	○	○		
Imadate	Sadatomo-cho, Echizen City	B	○	○					○	○	○		
Komeno	Komeno, Echizen Town, Nyu County	B	○	○			○		○	○	○		
Ota	Shimogawara, Echizen Town, Nyu County	B	○	○			○	○	○	○	○		
Tamagawa	Tamagawa, Echizen Town, Nyu County	B	○	○			○		○	○	○		

* Seven more radioactive dust monitors (for the emergency monitoring) are equipped to the monitoring posts of the nuclear power operators (Suidu MS, Itsuhata MS, Nouma MS, Sata MP, Kato MP, Wada MP and Kawakami MP).

Locations of compact monitoring posts and table of equipped devices

Name of the monitoring posts	Location	High dose rate meter (Semiconductor)	Radioactive dust monitor (for the emergency monitoring)
Denga elementary school	Kazao-cho, Fukui City	○	
Koshino community hall	Gumizaki-cho, Fukui City	○	
Shimizu Nishi elementary school	Omori-cho, Fukui-city	○	
Shimizu Minami elementary school	Makuri-cho, Fukui City	○	
Sekiin elementary school	Hinode-cho, Sabae City	○	
Shintoku elementary school	Chosenji-cho, Sabae City	○	
Sabae Higashi elementary school	Shinyokoe, Sabae City	○	
Shinmei elementary school	Mizuochi-cho, Sabae City	○	
Toba elementary school	Shinmei-cho, Sabae City	○	
Nakagawa elementary school	Nakano-cho, Sabae City	○	
Katakami elementary school	Ono-cho, Sabae City	○	
Tachimachi elementary school	Sugimoto-cho, Sabae City	○	
Yoshikawa elementary school	Okura-cho, Sabae City	○	
Yutaka elementary school	Shimonoda-cho, Sabae City	○	
Kitanakayama elementary school	Isobe-cho, Sabae City	○	
Kawada elementary school	Nishibukuro-cho, Sabae City	○	
Takefu Higashi elementary school	Kokuhu , Sabae City	○	
Takefu Nishi elementary school	Chuo , Echizen City	○	
Takefu Minami elementary school	Yanagi-cho, Takefu, Echizen City	○	
Kamiyama elementary school	Hirose-cho, Echizen City	○	
Yoshino elementary school	Honbo-cho, Echizen City	○	
Omushi elementary school	Takamori-cho, Echizen City	○	
Sakaguchi elementary school	Yuya-cho, Echizen City	○	
Kita Hino elementary school	Onodani-cho, Echizen City	○	
Kita Shinjo elementary school	Kita-cho, Echizen City	○	
Ajimano elementary school	Ikeizumi-cho, Echizen City	○	
Kakyo elementary school	Awatabe-cho, Echizen City	○	
Minami Nakayama elementary school	Nakatsuyama-cho, Echizen City	○	
Fukuma elementary school	Fujiki-cho, Echizen City	○	
Asahi elementary school	Tenoo, Echizen Town, Nyu County	○	○
Itou elementary school	Kamiitou, Echizen Town, Nyu County	○	
Tokiwa elementary school	Aono, Echizen Town, Nyu County	○	
Miyazaki elementary school	Enami, Echizen Town, Nyu County	○	
Hagino elementary school	Hosono, Echizen Town, Nyu County	○	
Kyu Ikeda Dai San elementary school	Sugo, Ikeda Town, Imadate County	○	
Tsuruga Nishi elementary school	Yuuki-cho, Tsuruga City	○	
Tsuruga Minami elementary school	Kiyomizu-cho, tsuruga City	○	
Tsuruga Kita elementary school	Akebono-cho, Tsuruga City	○	
Matsubara elementary school	Matsushima-cho, Tsuruga City	○	
Kutsumi elementary school	Kutsumi, Tsuruga City	○	
Awano elementary school	Azono, Tsuruga City	○	
Awano Minami elementary school	Kumonmyo, Tsuruga City	○	
Mihama junior high school	Aso, Mihama Town, Mikata County	○	

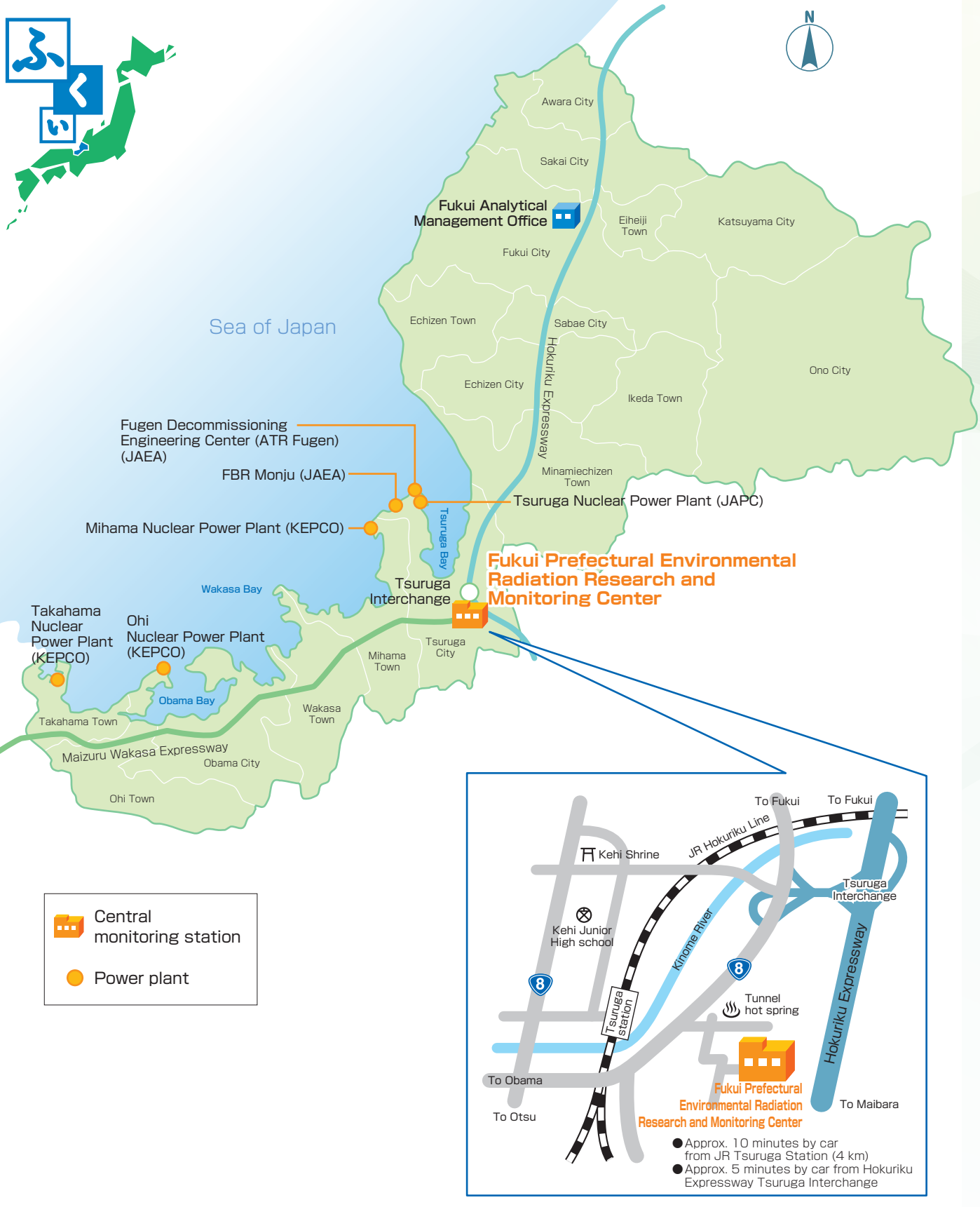
Name of the monitoring posts	Location	High dose rate meter (Semiconductor)	Radioactive dust monitor (for the emergency monitoring)
Mikata B&G gymnastic hall	Ueno, Wakasa Town, Mikatakaminaka County	○	○
Meirin elementary school	Fujii, Wakasa Town, Mikatakaminaka County	○	
Kiyama elementary school	Kiyama, Wakasa Town, Mikatakaminaka County	○	
Umenosato elementary school	Tai, Wakasa Town, Mikatakaminaka County	○	
Uryu elementary school	Wakibukuro, Wakasa Town, Mikatakaminaka County	○	
Nogi elementary school	Mushu, Wakasa Town, Mikatakaminaka County	○	
Aoi Dai Ichi park	Aoi, Obama City	○	
Kyu Matsunaga elementary school	Ueno, Obama City	○	
Kyu Kunitomi elementary school	Tsugiyoshi, Obama City	○	
Imatomi elementary school	Wakuri, Obama City	○	
Nakanata elementary school	Shimoda, Obama City	○	
Kyu Miyagawa elementary school	Takenaga, Obama City	○	

Prefectural monitoring station

Concrete cabin type (A)

Aluminum panel cabin type (B)

Compact monitoring post



福井県

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