

IAEA Briefing on Fukushima Nuclear Accident (5 May 2011, 20:00 UTC)

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- [Summary of Reactor Status](#)
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On Thursday, 5 May 2011, the IAEA provided the following information on the current status of nuclear safety in Japan:

1. Emergency at Fukushima Daiichi Nuclear Power Plant Since 21 April

Overall, the situation at the Fukushima Daiichi nuclear power plant remains very serious.

The IAEA receives information from various official sources in Japan through the Japanese national competent authority, the Nuclear and Industrial Safety Agency (NISA). This Update Brief is based on information received by the IAEA Incident and Emergency Centre up to 17:00 UTC on 3 May 2011.

Fukushima Daiichi Nuclear Power Plant Status

The IAEA has developed new charts for tracking the progress made towards fulfilling the three basic safety functions of the IAEA safety standards: prevention of criticality, removal of decay heat and mitigation of radioactive releases. These new charts, one for each of the reactor units and for the spent fuel pools, will replace the three-colour status chart that has been in use up until now. The charts provide the IAEA with a benchmark for following progress under "Roadmap" plan announced previously by the Tokyo Electric Power Company (TEPCO) to bring the nuclear reactors and the spent fuel pools at the Fukushima Daiichi plant to a stable cooling condition and to mitigate radioactive releases.

On 27 April TEPCO provided an update of the estimated percentage of core damage for **Units 1, 2 and 3**: for **Unit 1** the core damage was revised from an estimated 70% to 55%; for **Unit 2** the core damage was revised from an estimated 30% to 35%; and for **Unit 3** the core damage was revised from an estimated 25% to 30%. This reflects a revised assessment since 15 March rather than any recent changes in conditions in the reactor cores.

On 29 April TEPCO checked the status inside the reactor building of **Unit 1** using a remotely controlled robot and confirmed that there was no significant leakage of water from the primary containment vessel. Nitrogen gas is still being injected into the containment vessel in Unit 1 to reduce the possibility of hydrogen combustion inside the containment vessel.

TEPCO has a plan to fill the primary containment vessel of **Unit 1** with water up to a level above the reactor fuel rods. This measure is intended to provide stable cooling of

the reactor and reactor pressure vessel. (On 5 May TEPCO submitted a report to NISA on this plan).

In **Unit 2 and Unit 3** fresh water is being continuously injected into the reactor pressure vessel and temperatures and pressures remain stable.

Fresh water is being injected as necessary into the spent fuel pools of Units 1 - 4. Radionuclide analysis of a water sample taken from the **Unit 4** spent fuel pool on 28 April detected levels of Cs-134 of 49 Bq/cm³; levels of Cs-137 of 55 Bq/cm³; and levels of I-131 of 27 Bq/cm³.

An amount of approximately 70 000 tonnes of stagnant water with high-level radioactivity in the basement of the turbine buildings of **Unit 1, Unit 2 and Unit 3** is being transferred to the condensers, the radioactive waste treatment facility and temporary storage tanks. Stagnant water in the basement of the turbine building of Unit 6 is being transferred to a temporary tank. Countermeasures against water outflow to the sea and to prevent and minimize the spread of the radionuclides in water have been put in place.

Full-scale spraying of anti-scattering agent is continuing at the site with the use of both conventional and remote controlled equipment.

Measures Announced by Government of Japan

The Government of Japan announced the establishment or redesignation of the following zones:

- A "no entry zone" within 20 km of the Fukushima Daiichi nuclear power plant (as of midnight, Japan local time, on 22 April 2011), with provision for temporary re-entry;
- "Planned evacuation zones" to be applied to some specific zones outside the 20 km radius from the Fukushima Daiichi plant (from which planned evacuations were expected to be implemented in approximately one month's time from 22 April, so in late May);
- "Emergency evacuation preparation zones" to be applied to the area within a 20 - 30 km radius from the Fukushima Daiichi plant (except for areas designated as planned evacuation zones), in which preparations should be made so that the residents can take shelter indoors or can evacuate the area by their own means in the event of an emergency.

The designation of "planned evacuation zones" applies to some specific zones outside the 20 km radius from the Fukushima Daiichi plant: "the villages of Katsurao, Namie and Iitate, part of the town of Kawamata, and part of the city of Minamisoma."

The designation of "emergency evacuation preparation zones" applies to the area within a 20 - 30 km radius from the Fukushima Daiichi plant (except for areas designated as planned evacuation zones): "the towns of Hirono and Naraha, the village of Kawauchi,

and parts of the cities of Tamura and Minamisoma." In addition, with regard to the areas located within a 20 - 30 km radius from the nuclear power plant, the advisory for sheltering indoors that had been in effect to date was lifted.

With regard to the Fukushima Daiichi nuclear power plant, the Government of Japan also announced on April 21 that the size of the evacuation zone around the Fukushima Daiichi plant would be reduced from 10 km to 8 km and the order of evacuation would be lifted from areas farther than 8 km around the plant.

2. Radiation Monitoring (26 April to 3 May 2011)

Deposition in 47 Prefectures

The daily monitoring of the deposition of caesium and iodine radionuclides for 47 prefectures is continuing. For the period 22 April to 2 May, deposition of I-131 was detected in eight prefectures, ranging from 1.8 Bq/m² to 89 Bq/m². Deposition of Cs-137 was detected in 13 prefectures in the same period, the values reported ranging from 1.3 Bq/m² to 92 Bq/m². The reported values show that variable deposition of radionuclides was still occurring in certain prefectures. The values for deposition are significantly lower than those detected in the first weeks of the emergency and the number of prefectures affected is diminishing.

Gamma Dose Rates in 47 Prefectures

Gamma dose rates are measured daily in all 47 prefectures. The only notable values are those from Fukushima prefecture, where gamma dose rates were 1.8 µSv/h or just under, and Ibaraki prefecture, where gamma dose rates were 0.12 µSv/h or just under. In all other prefectures, reported gamma dose rates were below 0.1 µSv/h, with a general decreasing trend.

Gamma Dose Rates in Areas More Than 30 km from Fukushima Daiichi Plant

Gamma dose rates reported specifically for monitoring points in the eastern part of Fukushima prefecture, for distances of more than 30 km from the Fukushima Daiichi plant, showed a general decreasing trend over the period 26 April to 2 May, ranging from 0.1 µSv/h to 19.7 µSv/h.

Air Concentrations of Radionuclides On-site at Fukushima Daiichi Plant

On-site measurements at the west gate of the Fukushima Daiichi plant indicate the presence of I-131 and Cs-137 in the air in the close vicinity of the plant (within approximately 1 km). The concentrations in air reported for the period 31 March to 1 May ranged from 40 Bq/m³ to 1180 Bq/m³ for total I-131 and 10 Bq/m³ to 270 Bq/m³ for total Cs-137.

Concentrations of Radionuclides in Drinking Water

Since 1 April there has been one remaining restriction on the consumption of drinking water relating to I-131 (with a limit of 100 Bq/L), which is applicable only for the village of Iitate in the Fukushima prefecture and only for infants.

Both I-131 and Cs-137 are still detectable, but in only a few prefectures. According to the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), I-131 was detected in a maximum of six prefectures for the period 22 April to 1 May, with reported values ranging from 0.04 to 0.92 Bq/L; Cs-137 was reported in the same period in up to two prefectures with measured values ranging from 0.05 to 0.41 Bq/L. All these levels are below the limits set by the Japanese authorities for the restriction of water consumption due to the presence of radionuclides. The other samples did not show levels of radionuclides above the detection limit for I-131 and Cs-137.

Radiation Monitoring of Workers and Public

Radiation monitoring of workers and the public is continuing.

On 29 April, NISA reported that as of 27 April, 175 045 people had been monitored for radiation.

On 30 April TEPCO summarized the results of exposure measurements of workers engaged in emergency work whose external exposure exceeded 100 mSv at the end of March 2011. According to the summary, for total internal exposure and external exposure there were: two workers with effective doses of 200-250 mSv; eight workers with effective doses of 150-200 mSv; and 11 workers with effective doses of 100-150 mSv.

"Enforced Plan on Environmental Monitoring"

On 22 April MEXT issued a press release on an *Enforced Plan on Environmental Monitoring* that has the objectives of obtaining an overview and providing data necessary to support the decision to establish the planned evacuation zones.

To meet these objectives, the plan includes the following:

- Collection of data on the distribution of radioactive material inside an appropriate area, including the area in the vicinity of the Fukushima Daiichi plant;
- Preparation for future evaluations of changes in dose rates and accumulated amounts of radioactive substances in all delineated zones around the Fukushima Daiichi plant; and
- Provision of information on environmental dose rates for the purpose of evaluation of personal radiation doses to local residents.

It was announced that maps will be produced on the basis of the results of environmental monitoring, including maps of dose rates and distributions of radioactivity, estimated accumulated doses and levels of soil surface contamination.

This *Enforced Plan on Environmental Monitoring* will be conducted in close cooperation between MEXT, Japan Atomic Energy Agency, universities, the Ministry of Defence, the police, prefectural police, Fukushima prefecture, electrical utilities and others, including the United States Department of Energy.

MEXT will compile all the data collected. MEXT and the Nuclear Safety Commission will cooperate with the Ministry of Economy, Trade and Industry (METI) and other organizations, and will establish procedures for standardizations on ranges and methods for the emergency environmental monitoring.

Food Monitoring and Food Restrictions (19 March to 3 May)

Food Monitoring

The Ministry of Health, Labour and Welfare reported that from 19 March to 3 May, 2 461 food samples had been collected from 18 different prefectures. The prefectures of Chiba, Fukushima, Gunma, Ibaraki, Niigata, Saitama and Tochigi accounted for more than 90% of the reported food analysis results, with most food monitoring concentrated in Fukushima prefecture (38% of samples analysed and reported until 3 May). In six prefectures (Chiba, Fukushima, Gunma, Ibaraki, Tochigi, Tokyo), 222 (9%) samples were found to have radioactivity above the Japanese regulation values.

In Fukushima prefecture, levels in over 84% of the 942 samples reported were below the regulation values for I-131 and radioactive caesium. However, 149 of 942 samples (16%) exceeded the regulation values, including vegetables (107 samples), shiitake mushrooms (19 samples), unprocessed raw milk (18 samples) and sand lance fish (five samples).

In Ibaraki prefecture, 89% of the 442 samples reported were below the regulation values. However, 47 of the 442 samples (11%) exceeded the regulation values, including vegetables (37 samples), unprocessed raw milk (five samples) and sand lance fish (five samples).

In four other prefectures, vegetables were the only foods that exceeded the regulation values (11 samples in Chiba, three samples in Gunma, 11 samples in Tochigi and one sample in Tokyo).

Food Restrictions

Restrictions on the distribution and/or consumption of milk and specific types of vegetables have been in place in five prefectures (Chiba, Fukushima, Gunma, Ibaraki and Tochigi) since they were first imposed on 21 March. As of 3 May, the only restrictions remaining are in Fukushima prefecture and for the cities of Kitaibaraki and Takahagi in Ibaraki prefecture.

Specifically, in Ibaraki prefecture there is a continuing restriction on the distribution of spinach produced in the cities of Kitaibaraki and Takahagi. In Fukushima prefecture there are restrictions on the distribution of turnips and on the distribution and consumption of sand lance fish and certain non-head type leafy vegetables (e.g. spinach). In specified areas of Fukushima prefecture there are also restrictions on the distribution of raw unprocessed milk and restrictions on the distribution and consumption of specific head-type vegetables (e.g. cabbage), flowerhead brassicas (e.g. cauliflower) and shiitake mushrooms.

3. Marine Monitoring

The marine monitoring programme is carried out both near the discharge areas of the Fukushima Daiichi plant by TEPCO and at off-shore stations by MEXT. The increase in the radioactivity in the marine environment had occurred by aerial deposition and by discharges and outflow of contaminated water with a high radioactivity level.

Seawater Monitoring

The activity concentrations of I-131, Cs-134 and Cs-137 in seawater close to the Daiichi plant at the screen of **Unit 2** were measured every day from 2 April to 2 May. The concentrations fell by several orders of magnitude from initial values of more than 100 MBq/L at the beginning of April to less than 10 kBq/L for Cs-134 and Cs-137 on 30 April, with a continuing decreasing trend over time. The sandbags containing zeolite absorbers for absorbing caesium, which were placed at several locations between **Unit 2 and Unit 4** to reduce concentrations of Cs-134 and Cs-137, do seem to have effected the observed reduction in the levels of caesium radionuclides. However, levels of I-131 remained at around 100 kBq/L from 26 April to 30 April; on 2 May they had increased to around 200 Bq/L at this sampling position.

The concentrations of the relevant radionuclides at the other TEPCO sampling positions show a general decreasing trend up to 4 May with some fluctuations.

Monitoring performed by MEXT at off-shore sampling positions consists of:

1. Measurement of ambient dose rate in air above the sea;
2. Analysis of ambient dust above the sea;
3. Analysis of surface samples of seawater;
4. Analysis of samples of seawater collected at 10 m above the sea bottom and in a mid-layer.

The analysis for almost all sampling positions has shown a general decreasing trend in concentrations of the relevant radionuclides over time. Samples were taken at stations 1 - 10 every four days after 2 April. Activity concentrations at MEXT sampling points 30 km off-shore are significantly lower than those at TEPCO sampling points 15 km off-shore due to further dilution. None of the activity concentrations of I-131 and Cs-137 in surface samples taken from points 1, 3, 5, 7, 9 and S-3 on 27 April and from points 2, 6 and S-4 on 25 April were above the detection limits. Samples taken from points 4, 8 and 10 showed concentrations of Cs-137 between of 10.5 Bq/L and 40 Bq/L. Only the sample from point 10 had an I-131 activity concentration, at 21.5 Bq/L, that was above the detection limit. (However, there was no information about the limit of detection.)

Samples were taken at the recently added off-shore stations at the Ibaraki prefecture on 25 April. There were no activity concentrations of I-131 and Cs-137 in the surface layer of sea water that were above the detection limits. MEXT has recently added an additional sampling point for sediment collection (S-4) near the Ibaraki coast.

Radiation Monitoring in Ports

On 22 April the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT) issued [guidelines](#) for radiation measurements in ports in Japan in order to provide foreign port authorities with accurate data. The guidelines cover gamma dose rate measurements for export shipping containers and shipping as well as radiation monitoring of the atmosphere and of sea water in ports.

Measurements relating to export shipping containers for export and to shipping can be conducted by the port authorities, by ship operators or by other parties.

The guidelines specify the measuring locations and methodology, as well as criteria for decontamination and for reporting. If measurements have been conducted in accordance with the guidelines, attestations of the measured dose rates will be issued jointly by MLIT and the port authorities.

With regard to export shipping containers, the guidelines state that decontamination is necessary if the measured dose rate exceeds three times the dose rate due to natural background radiation. Decontamination is to be carried out in an area to be specified by the port authorities. In accordance with the International Maritime Dangerous Goods code of the International Maritime Organization, a reporting level of 5 $\mu\text{Sv/h}$ is set. If the dose rate exceeds this reporting level, all relevant organizations are to be informed.

With regard to shipping, the guidelines recommend that decontamination should be carried out if the measured dose rate exceeds three times the dose rate due to natural background radiation, and decontamination must be carried out if the dose rate exceeds 5 $\mu\text{Sv/h}$.

Radiation measurements in the atmosphere and in seawater in ports will be carried out by the port authorities or by MLIT.

4. IAEA Activities

Over the past eight weeks, the following States have provided the IAEA with monitoring data and/or links to their web sites: Austria, Belgium, Bulgaria, Canada, China, Czech Republic, Denmark, Finland, France, Georgia, Germany, Greece, Iceland, Islamic Republic of Iran, Ireland, Italy, Republic of Korea, Latvia, Lithuania, Luxembourg, Malaysia, Mexico, Philippines, Poland, Portugal, Romania, Russian Federation, Singapore, Slovakia, Spain, Sri Lanka, Sweden, Switzerland, Ukraine and United States of America. The IAEA Environmental Laboratories in Monaco also monitor air activity continuously for Monaco. Levels are in the same low range as elsewhere in Europe.