

Topics Fukushima introduces JAEA's activities related to Fukushima.

## An unmanned helicopter measures radiation levels to assess the retention of radioactive materials.



Measured data on radiation levels are being recorded every second on the PC screen. An unmanned helicopter carrying a radiation measuring system is flying hundreds meters ahead. The data are sent from the helicopter to the computer, and the map on the computer is colored according to the level of radiation.

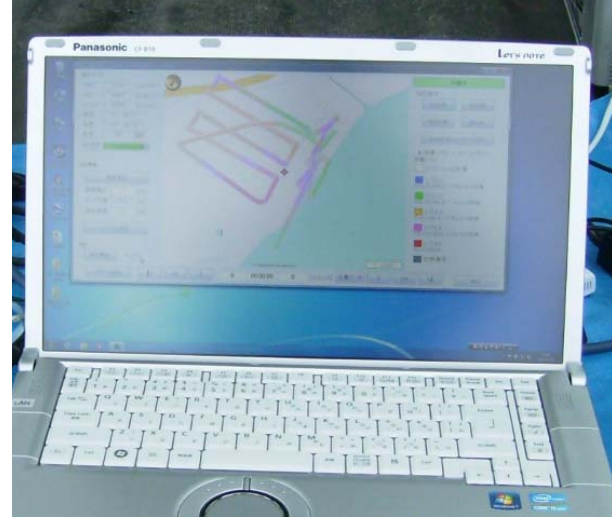
JAEA has surveyed the air dose rates and the retention of radioactive cesium in places such as the restricted area through various monitoring in order to assess the distribution of radioactive materials. As part of the research on distribution of radioactive

materials accumulated in the soil and its chronological change by the transfer of such materials, the use of this unmanned helicopter is planned in order to perform measurement exhaustively in the areas within a three kilometer radius of Fukushima Daiichi Nuclear Power Station, and conduct detailed investigation of the distribution of radioactive materials in the areas along rivers.

On the drizzling afternoon of October 2, in Futaba Town, which is about three kilometers away from Fukushima Daiichi Nuclear Power Station, radiation measurement using this



unmanned helicopter started full-scale operation. In front of almost 20 reporters who have gathered for this event, a staff member of JAEA, having completed the adjustment of the unmanned helicopter, started it remotely. The helicopter slowly soared to the overcast sky and, stabilizing at a height of 50 meters, turned southward to fly zigzagging over the forest. Soon after taking off, the helicopter started sending radiation data, which are being displayed on the PC screen every second.



“As flight of manned aircrafts is restricted over the areas within a three kilometer radius of Fukushima Daiichi Nuclear Power Station, until now the investigation was limited to accessible ‘points’ or ‘lines,’” said Dr. Tatsuo Torii, chief of the remote radiation monitoring group, Fukushima environmental safety center. “With the unmanned helicopter, which is not subject to this restriction, air dose rates and radioactive cesium over the areas within the three kilometer radius can be measured ‘exhaustively’.”

“After analysis, these data will serve as a basis for predicting the future condition. I expect that those results will contribute to the restoration of Fukushima. On the other hand, near the power station there is a possibility of influence on the data by the radiations called direct dose and skyshine dose, and therefore enhancement of the accuracy of evaluating radioactive cesium in surface soil is the challenge to be addressed.”

After this first flight completed and the members of the press left, JAEA staff returned to their work and were again concentrated on tasks such as adjustment and fuelling of the helicopter and preparation for the analysis of the data.

The radiation measurement by this unmanned helicopter over the areas within the three kilometer radius will continue for about 7 days. Forecasts have predicted occasional rain for the night and the next day. The staff kept on working, wiping rain drops on the faces from time to time.

They will also devote sufficient time to carefully analyze the air dose rates and radioactive cesium in soil, taking account of the result of the ground measurement performed for verification and the influence of radiations such as skyhsine.

## **Outline of the monitoring using the unmanned helicopter of the areas within a three kilometer radius of Fukushima Daiichi Nuclear Power Station**

### **Purpose**

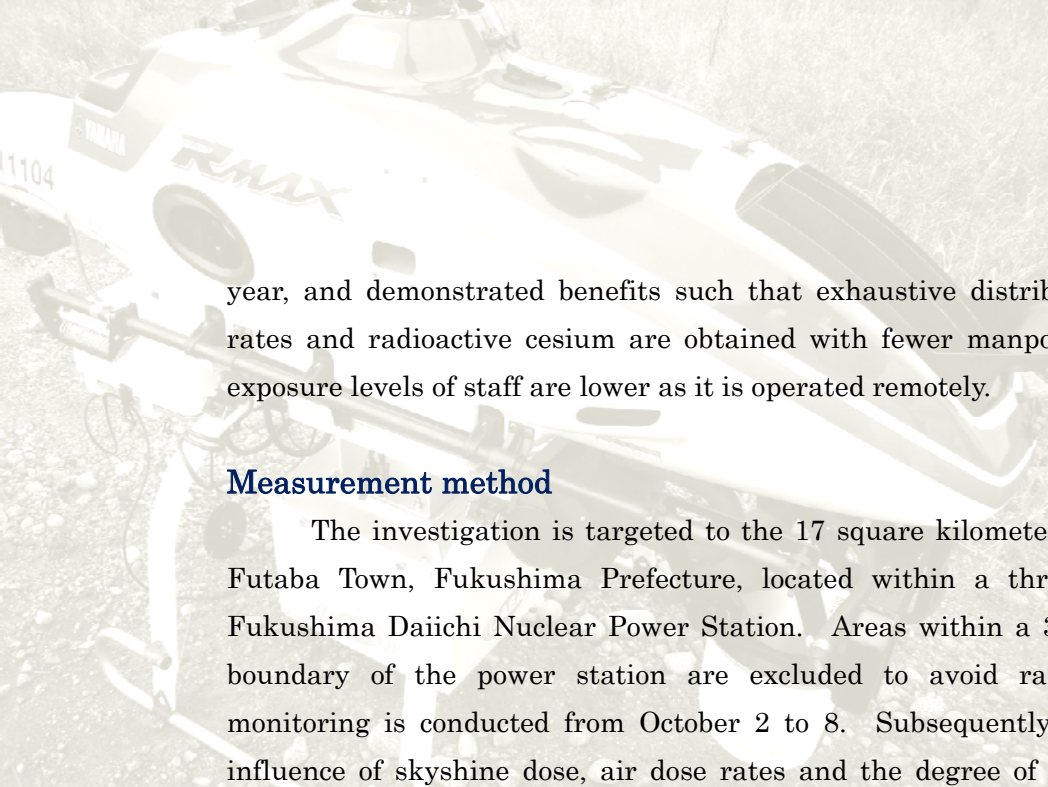
The areas within a three kilometer radius of Fukushima Daiichi Nuclear Power Station are designated as no fly-zones by the Civil Aeronautics Act. Therefore, radiation measurement of these areas was limited to the “spots” and “lines” which are accessible on foot or by cars, and measurement by aircrafts for exhaustive survey of distribution was not available. Also, accuracy of measurement by aircrafts of areas within the three kilometer radius is likely to be lower than that of other areas due to direct dose from the power station and skyshine dose.

Therefore, radiation measurement by an unmanned helicopter, which is not subject to the restriction by the Civil Aeronautics Act and can fly at a low altitude, is required to investigate the detailed retention of radioactive materials in the areas within the three kilometers radius and air dose rates. This unmanned helicopter measurement aims to obtain data to predict the change in the retention of radioactive materials, and for this end, in addition to these areas, detailed measurement is conducted along rivers.

JAEA has been conducting monitoring using the unmanned helicopter since last



There is Fukushima Daiichi NPP on the right in the picture.



year, and demonstrated benefits such that exhaustive distribution data on air dose rates and radioactive cesium are obtained with fewer manpower and time, and the exposure levels of staff are lower as it is operated remotely.

### **Measurement method**

The investigation is targeted to the 17 square kilometers in Koriyama district, Futaba Town, Fukushima Prefecture, located within a three kilometer radius of Fukushima Daiichi Nuclear Power Station. Areas within a 300 meter radius of the boundary of the power station are excluded to avoid radio interference. The monitoring is conducted from October 2 to 8. Subsequently, taking account of the influence of skyshine dose, air dose rates and the degree of retention of radioactive cesium is assessed to the extent possible. Measurement is also performed from the ground so as to through comparison evaluate the measurement/analysis data from the helicopter comprehensively. Meanwhile, detailed investigation on retention of radioactive cesium and distribution of air dose rates is conducted in areas along rivers to predict the change in retention of radioactive cesium.

The unmanned helicopter flies at a speed of 4 to 7 meters per second. Radiation levels are measured in the target areas which are divided into squares 30 meter on a side at different altitudes. The radiation counter installed in the helicopter is the model called Lanthanum Bromide, which can detect high dose radiation and has excellent energy resolution.

### **Benefits of an unmanned helicopter**

It can measure radiation levels of the areas with high dose radiation and forests where people cannot enter. Also, as the course it flies can be recorded, if you program the helicopter to follow the same course before flight, effect of decontamination may be confirmed by comparing the measurements before and after decontamination, as well as change in radiation levels with time can be observed.

