Fukushima: Preliminary comments — CRIIRAD mission in Japan

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CRIIRAD mission in Japan from May 24th to June 3rd, 2011

Preliminary comments

A scientific team of the French NGO CRIIRAD (Commission de Recherche et d'Information Indépendantes sur la RADioactivité / Commission for Independent Research and Information about RADiation) was in Japan from May 24th to June 3rd, 2011. Their study mission had several purposes : to control the radiation levels in contaminated areas, to measure the level of environmental contamination and food, to check if the official figures are accurate ; to equip and train citizens and associations in the area of radiation monitoring; to minimize human exposure and reveal the significant deficiencies identified in monitoring levels of population exposure and in the implementation of measures to protect people.

You can read below a preliminary statement of this mission.

Context and objectives of CRIIRAD mission in Japan

Since March 2011, the CRIIRAD has been trying to provide assistance to citizens and local communities whose territories have been contaminated by the Fukushima Daiichi Nuclear Accident. The contact has been particularly fruitful, since mid April 2011, with Mr. Wataru Iwata, in charge of international contacts for a collaborative group of citizens called "Project 47".

At the end of April 2011, the CRIIRAD dispatched professional and non professional practical radiation monitoring equipment to "Project 47" accompanied with a video (V1 [1]) especially prepared to train citizens for proper use of radiation meters. From then on, the team at "Project 47" carried out measurements in over 100 locations in the Fukushima prefecture, in close cooperation with parents and citizens alike.

Radiation is invisible. So, using a radiation meter to show to people the actual extent of the contamination in their locality, particularly in the areas where their children live, is extremely valuable as this helps them exact their decision-making in terms of long-term health protection and preservation. Concurrently, "Project 47" is doing its utmost to relocate and to welcome people in less contaminated areas of Japan.

Taking into consideration the elevated results of the first measurements conducted by Mr. Iwata in the Fukushima prefecture, the CRIIRAD decided to delegate two [2] of its scientists to Japan. The aim of this mission between May 24th and June 3rd was :

1. To meet with local people in order to get a better understanding on the conditions of their evacuation after the various nuclear accidents occurred at the nuclear plant ; and, for those who

were not evacuated, to closely monitor the degree of contamination of their direct environment and inform them immediately of the ensuing results.

2. To monitor dose rates from deposits of radioactive substances on the soil. Dose rate has been measured in microSievert per hour (µSv/h) with a professional proportional counter with energy compensation (LB1236 monitor).

3. To evaluate cesium 134 and cesium 137 deposits on the soil in various locations in Tokyo, Ibaraki prefecture (Hitachi, Kitaibaraki), Fukushima prefecture (Koriyama, Fukushima city, Miyakoji, Itaate Nagadoro) and Miyagi prefecture (Marumori).

4. To share with local communities CRIIRAD's experience in the field of radiation monitoring and dose calculations.

5. To supply local communities in Fukushima city with a special portable radiation monitor (LB200) and train members for the use of the equipment designed to monitor gamma emitters in food samples. Financial support has been given to this initiative by Days Japan and Mr. Ryuichi Hirokawa. A collaborative group called CRMS (Citizens' Radioactivity Measuring Stations) his willing to install independent radiation monitoring posts in various locations in order to empower citizens and small-scale food producers with devices monitoring radioactive cesium in food samples.

6. To meet with other NGOs involved in radiation monitoring and public protection. Meetings have been organized in Tokyo (Greenpeace Japan, Green Action, Fukuro-no-kai, Project for monitoring sandboxes) and Fukushima city (Fukushima Network for Protecting Children).

7. To participate in lectures, press conferences and workshops organized at the Fukushima prefecture on May 29th and 30th and in Tokyo from May 31st to June 2nd).

Some pictures are available at the end of this document and more video links (not reproduced here: look at the original poisting).

The major preliminary findings of this research have been already presented at various public events organized in Fukushima city (Lecture on May 29th, press conference on May 30th) and Tokyo (Press conferences on May 31st and June 1st, Audience at the Congress on June 1st, lecture and workshop on radiation monitoring on June 2nd). These findings and statements are summarized below.

A more complete scientific report will be made available in the forthcoming weeks following analysis of soil and food samples returned to the CRIIRAD laboratory.

1 / Lack of appropriate information and protection against harmful effects of radiation from the Fukushima Daiichi nuclear accidents

Since March 12th, the damaged Fukushima Daiichi reactors and pools containing spent fuel have released huge amounts of radioactive substances in both the atmosphere and the ocean. According to official data, the most important radioactive releases in the atmosphere occurred between March 12Th and March 30th.

The Japanese government requested the evacuation of the inhabitants within a 20-km radius and indoor confinement for people living within a 20 to 30-km radius. But these countermeasures have revealed to be largely insufficient :

1. The people living outside the 20-km radius should have been evacuated according to wind direction and meteorological conditions. Winds and radioactive particles do not abide by

administrative policies.

2. Confinement is efficient only in case of minor doses when the contamination of the air lasts over a short period of time. In the case of Fukushima Daiichi, the radioactive releases in the atmosphere persisted over several days (and are still occurring, though on a much lower level). Under such circumstances, confinement is not efficient due to the exchange rate between outside and inside air. The air inside the buildings will be contaminated at a level comparable to the outside air quality.

3. Stable iodine tablets are useful to reduce the absorption of radioactive iodine and therefore limit the risks of thyroid cancer particularly among young children. This risk is well-known since the Chernobyl accident. In order to be fully effective, iodine tablets must be ingested several hours before contamination occurs. In Japan, iodine tablets were not distributed proficiently. Testimonies collated during the CRIIRAD's mission in Japan indicate that several local authorities, at municipal levels, opted to distribute iodine pills, as in the case of the city of Miaru where the Mayor decided to distribute pills to his inhabitants on March 15th requiring them to actually ingest them. This initiative has been criticized by the Fukushima prefecture authorities. In Iwaki, a civic administrator was ready to organize the distribution of iodine tablets since March 12th. While the municipality was able to distribute the iodine tablets to the citizens on March 18th, people have been told not to take the pills unless expressly ordered to do so by the authorities...the instruction to ingest the pills was not issued. Other highly exposed inhabitants (like those living in Iitate) have not been issued any iodine tablets.

4. In case of radioactive releases in the atmosphere, the fallout on the ground will rapidly contaminate the food chain, in particular leafy vegetables and milk. The Japanese authorities decided to launch a special monitoring program only as of March 18Th. The first results revealed a massive contamination on several food samples. As an example, spinach sampled in Ibaraki prefecture on March 18th confirmed a contamination of 54 000 Bq/kg with iodine 131. The CRIIRAD calculated that for a child aged between 2 to 7 years old, the consumption of 200 grams of spinach delivers a dose exceeding the annual dose limit of 1 milliSievert. Additional results published later showed that iodine 131 contamination found in grass collected in Iitate about 40 km north-west of Fukushima Daiichi reached 2.5 million Bq/kg. The contamination of vegetables in the area has certainly been very high. It should be noted that for a child aged 2 to 7 years old, the mere consumption of 5 grams of such foods will deliver a dose exceeding 1 milliSievert. The authorities should have advised people, without delay on March 12TH , not to consume foods most at risk in areas where the radioactive fallouts were detected by gamma air dose monitors (this includes locations such as Onagawa, 100 km north of Fukushima, and Tokyo about 230 km south of the Fukushima Daiichi nuclear plant). Conversely, the Japanese authorities claimed that consuming such contaminated foods was the same as receiving a dose from a scanner.

Given the high doses that a great number of Japanese people have been receiving due to the lack of radiological protection measures, the CRIIRAD urged citizens exposed to radiation to press TEPCO and the competent authorities to issue a precise evaluation of the dose they were exposed to. For this purpose, the CRIIRAD advised citizens to ask for the data listed below (the CRIIRAD will draw a more comprehensive list at a later stage) :

1 / An exhaustive list of the radioactive substances that have been released in the atmosphere. There are over 100 radioactive substances inside a nuclear reactor (fission products, activation products, uranium, plutonium and transuranic elements). Tepco published results of activity concentrations in the air on March 19th only. The measurements mentioned only 5 radionuclides (iodine 131, 132 and 133, and cesium 134 and 137, etc..). Data should also be gathered on actual releases of radioactive noble gases such as Krypton 85 or xenon 133, and other radioactive nuclides such as tritium (radioactive hydrogen), carbon 14, strontium radioisotopes, uranium and plutonium isotopes, etc..

2 / The designation of the activity concentration (Bq/m3) of all these substances in the air during the first weeks. This data will allow to calculate :

– The external irradiation of the population by the radioactive substances present in the air.

This should also include beta irradiation of the skin and the internal surfaces of the respiratory system.

– The internal contamination of the population by inhalation of the contaminated air.

3 / Detailed meteorological data including wind direction, rainfall and amounts of snow. These data will be useful to calculate the contamination of the soil (from Bq/m3 to Bq/m2). These calculations will then be compared with the results of effective monitoring of cesium 137 and cesium 134 deposits on the soil (see DOE and MEXT official maps). It will then be possible to reconstruct the deposits of short-lived radionuclides using the ratio of their volumic activity to the activity of cesium 137.

4 / Publication of a detailed map of cesium 137 and cesium 134 deposits for the whole of Japan (at present, MEXT published this kind of data mainly for an 80-km zone around Fukushima). The CRIIRAD measurements of dose rate and in situ gamma spectrometry show that the artificial contamination of the soil surface is high enough to create over a 2 to 3-fold increase of dose rate measured at one meter above ground, in Hitachi, Ibaraki prefecture (about 100 km south of Fukushima Daiichi). This in-depth map should be readied on an adequate scale and include contamination data covering levels well below the present limit of 300 000 Bq/m2 or 1 µSv/h.

The published data should include values down to 1 000 Bq/m2 and 0.1 µSv/h. Such a detailed map will also be useful for the implementation of a food monitoring program taking into account the actual residual contamination of the soil.

2 / Insufficient protection measures for the people living in contaminated territories.

The official maps of soil contamination published by the DOE and MEXT show that territories are highly contaminated outside the 20 km evacuation radius. The CRIIRAD team measured dose rate one meter above ground in different locations. The level of radiation, 1 meter above ground was at least 2 to 3 times above natural values in Hitachi (100 km south of the plant), 9 times in Koriyama (60 km west), 20 times in multiple areas in Fukushima city (60 km northwest) including schools and gardens, 130 times in Iitate Nagadoro. From then on, and up to the next 12 months, these people will exceed the maximum annual dose limit of 1 milliSievert per year if they spend respectively just 12 hours outside, 4 hours, etc. But due to the high energy of cesium 134 and cesium 137 gamma emissions, the contamination of the soil outside the houses, schools or buildings increases the dose rate inside the constructions themselves. As an example, the CRIIRAD measured inside a house in Fukushima city, a dose 6 times above the natural value in the living room, at 1 meter above ground, and nearly 4 times above natural value on the tatami in the children’s bedroom. In this case, given the dose rate measured in other places of the city of Fukushima, the CRIIRAD estimated that these children will receive about 7 to 9 milliSievert within the next 12 months if no proper protective measures are taken.

This estimate concerns only the external irradiation and does not include the dose caused by ingestion of contaminated foods nor inhalation of radioactive particles from the soil. The Japanese authorities have used recommendations expressed by ICRP to enforce an evacuation criterion set at 20 milliSievert per year limit. Such a limit is far too high considering the following facts :

1 / ICRP is considering that there is no safe limit. The risk of dying from cancer in the long term is proportional to the dose and there is no pre-set threshold. For those people (children and adults) already exposed to high doses of radiation during the first days and weeks after the nuclear accidents of the Fukushima Daiichi, the additional dose for the following months should be set at a level below 1mSv.

2 / Conversely, the authorities are considering an additional level of irradiation leading in fact to a risk of dying from cancer 20 times higher than the level usually considered has unacceptable. In order to guide people to accept this risk, the authorities have launched a campaign of disinformation stating that there would be in fact no actual risk of any health effects below 100 mSv. This is false, for example, the CRIIRAD recalled that relatively recent epidemiological studies have established a direct link between the risk of dying from lung cancer and the dose caused by radon inhalation at home. This risk is effective at annual doses as low as 2 mSv and the dose response shows no threshold.

3 / The 20 mSv criterion is based mainly on the contribution of external irradiation. This is illustrated by the fact that the 20 mSv cumulated dose has been converted by the Japanese authorities into an hourly dose rate limit of 3.8 µSv/h (external irradiation). This figure is very high, about 38 times above the normal dose rate on earth (typically about 0.1 µSv/h). The Japanese authorities propose a cumulative dose calculation based on the assumption that the people will spend 8 hours a day outdoor and 16 hours indoor and that inside buildings the dose rate is equal to the value measured outdoor multiplied by an attenuation factor of 0.4. This gives a daily dose of 54.7 µSv and an annual dose of 19,98 milliSievert. At this value should be added the dose due to inhalation of contaminated soil, ingestion of contaminated soil (especially for children), ingestion of contaminated foods grown in these territories. MEXT published on their website that the impact of internal irradiation while children are on the school ground is below 2.5 %. This mean value was calculated from the data of 13 different school ground, measured on April 14th. These calculations should be justified and checked by independent scientists.

Note : During its mission at Fukushima prefecture, the CRIIRAD team has been told by different farmers that the authorities proposed a limitation on the “acceptable” contamination of soils in rice paddies at a level of 5 000 Bq/kg arguing that only 10 % of radioactive cesium will migrate from the contaminated soil to the rice itself. If this assumption is true, it would mean that the rice cultivated in these contaminated territories would become contaminated at a level equal or lower than the tentative limit set at 500 Bq/kg for radioactive cesium in cereals. But the CRIIRAD stressed on the fact that if all the food supplies were contaminated at such a level, the consumption of 1 kilogram of such foods every day would lead to an annual dose of 3 milliSievert, which is 3 times over the limit of an acceptable and unacceptable risk of dying from cancer. The objective of the CRIIRAD mission to Japan was to attempt to improve citizens’ understanding on radiation so they could better negotiate the terms of evacuation, decontamination and meaningful compensation with the government and TEPCO. That is why “Project 47” and the CRIIRAD, along with support of other NGOs such as “Fukushima network for saving children” organized various workshops, lectures and press conferences.

Considering the will of “Project 47” to support people in the monitoring of food samples in an independent manner, the CRIIRAD brought a special monitor (LB200) and organized a monitoring workshop in Fukushima city on May 29th. People could bring one sample of food of their choice. This workshop enabled them to check about 30 different products (onions, leeks, chicken, asparagus, potatoes, peas, soya, tofu, etc..). The estimated cesium contamination was comprised between the detection limit of about 30-40 Bq/kg and a value of 200-300 Bq/kg. Most of these foods had probably been grown in greenhouses, therefore controls should be extended to species most at risk such as tea leaves, bamboo shots, shiitake, etc.. For example, the measurement

performed on a sample of sugina (edible plant) collected by the CRIIRAD technician in the Watari area of Fukushima city showed a cesium contamination of about 3 600 Bq/kg.

3 / Insufficient monitoring network and preparation in case of new releases at the Fukushima Daiichi nuclear plant.

At Fukushima Daiichi; 3 nuclear reactors have been very severely damaged, along with several spent fuel pools. TEPCO is continually postponing the estimated delay to stabilize the nuclear reactors back to a “safe state”. The nuclear plants are still releasing far above normal levels of radionuclides into
the atmosphere. One would think that in such a situation, the environmental monitoring network operated to evaluate the impact of on-going releases would be of high quality and would launch an alert in the event of aggravated releases.
During TEPCO’s press conference of May 30th, the CRIIRAD laboratory manager, Mr Chareyron, asked a TEPCO representative about the air contamination monitoring procedure in the vicinity of Fukushima Daiichi. TEPCO explained that there was only one monitoring station, located at the western gate, but stated that the device is used only about 20 minutes each day. This
means that during the remaining 98,6 % of the time, the contamination of the air around the plant is not measured. The CRIIRAD wondered how it is be possible when a small NGO such as the CRIIRAD is able to run 5 air monitoring stations in France, that TEPCO could not afford one.

TEPCO replied that it was not a money issue but a lack of personnel qualified to change the filters of the instruments.

In the same building belonging to the Fukushima prefecture, the CRIIRAD met with an officer in charge of emergency situations. The CRIIRAD asked about the type of measurement that was implemented to detect early increases of air contamination. The officer said that the air dose monitor located in Fukushima city was no longer operational due to contamination by the accident and that a network of air samplers were measuring air contamination in the vicinity of
the nuclear plant. He explained that these devices are not automatically operated but instead manually operated by people who have to physically go there and change the filters.

Unfortunately, this is done in such a way, that the measurements are done only during 15 to 20 minutes each day.

During the conversation, the CRIIRAD also asked if, at least, stable iodine tablets had been distributed to the inhabitants in residential areas and in schools in case of new massive releases of radioactive iodine so people could take them immediately after notification of the contamination. The officer from Fukushima prefecture answered that no such plan had been arranged as this decision is of government nature.

He also notified that the side effect linked to stable Iodine tablet intake is much more serious than the irradiation by artificial Iodine, but did not provide any reference. CRIIRAD answered that in the case of the Chernobyl accident for example, the Polish authorities decided to distribute stable iodine tablet to the population and that no significant side effects have been documented.

4 / The CRIIRAD plea to citizens

25 years after the Chernobyl accident, one could think that states and operators involved in nuclear energy production would have been prompt to react resourcefully in order to reduce the consequences of a nuclear accident. The Fukushima Daiichi accident illustrates that this is not the case, even in a modern country like Japan. When an accident occurs and the contamination

permeates vast territories, the governments have no possibility to guarantee the safeguard of their own population. The citizens are compelled to choose between two extremely difficult situations.

1 / First, to stay in contaminated areas declared as such at an “acceptable level” by the governments;

2 / Second, to expatriate in non (or less) contaminated territories, but with no adequate compensation for the suffering endured, the necessary moving expenses, prospecting for a new job, etc.

The CRIIRAD also presented excuses to the Japanese people for the attitude of the French Nuclear Safety Institute (IRSN). This Institute made calculations published on March 17th showing that the dose to children living near Fukushima prefecture would remain below 50 milliSievert which is the value above which temporary evacuation is required in Japan.

Fortunately, the Japanese authorities decided to evacuate people living in a 20-km radius. This evacuation was not sufficient, but at least allowed to safeguard some people. The CRIIRAD is very concerned should we have to rely on the French State official institute’s decisions regarding public health protection in France, in the event of a nuclear accident.

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ABOUT CRIIRAD :

CRIIRAD (Commission de Recherche et d’Information Indépendantes sur la RADioactivité / Commission for Independent Research and Information about RADiation) is a nongovernmental and non-profit organisation, and works to improve information and protection of the public against ionizing radiation/radioactivity.

CRIIRAD was created in May 1986 by French citizens willing to obtain reliable data on the actual intensity of radioactive fallout from Chernobyl, CRIIRAD set up in Valence (France) an independent laboratory specialised in radiological analysis and radio-ecological studies. Since 1986, the CRIIRAD laboratory has implemented more than 20 000 measurements by gamma spectrometry and hundreds of environmental studies in France and abroad.

P.S.

* http://www.criirad.org –Email : contact criirad.org

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Footnotes

[1] (V1) : http://www.criirad.org/actualites/dossier2011/japon_bis/photos_videos/radioactivite_ambiante.html

[2] Mr. Bruno Chareyron, Engineer in Nuclear Physics and Head of the CRIIRAD Laboratory and Mr. Christian Courbon, on-site mission technician specialist at the CRIIRAD laboratory.