

President's Comment of the Science Council of Japan

For a Better Understanding of Measures for Radiation Protection

The Fukushima Daiichi Nuclear Power Plant Accident occurred on 11th March, 2011 triggered the release of substantial amount of radiological materials into the atmosphere. Since then, it has been a matter of dispute even among “scientists” how the radioactive contamination really give undesirable effects on human health. There is no question, however, that such frequent discharge of inconsistent personal views of “scientists” should make the people of concern deeply bewildered.

Ten days after the accident, a formal statement was issued by the International Commission of Radiological Protection (ICRP)¹ on the measure corresponding to the accident. The ICRP principally establishes the policy of radiation protection taking account of the different views of many scientists and being adopted by many countries in the world. Indeed, the Government of Japan developed the related policies in compliance with this policy established by the ICRP. In view of the importance of the ICRP statement, the Science Council of Japan translated it into Japanese and published on its HP². Unfortunately, however, I am not convinced that people of Japan definitely understand the ICRP policy. This is a reason why I decided to issue the President's Comment over again on this subject.

There are two types of health effects of radiation. One is a “deterministic effect” appeared only when the high dose of radiation received in excess of “the threshold level”³, whose cardinal features are a decrease of white blood cells and a massive loss of hair. There should be no effect if the dose was below the threshold. The other is a “stochastic effect”, which has no threshold dose level, instead, has the probability of cancer occurrence proportional to the dose.

The principal risk of radiation for human health associated with the present nuclear accident is the stochastic effect. It is generally accepted that a cumulative exposure dose of 1,000 milli-Sieverts (mSv) will increase the probability of cancer occurrence by about 5 percent. Consequently, it is estimated that a cumulative dose of 100 mSv will increase the probability of cancer by 0.5 percent, although such a small value cannot be confirmed even by an epidemiological study of a size of 100,000 populations. In this connection, it is relevant here to mention the conclusion of a multi-purpose cohort study achieved by the National Cancer Research Center of Japan

showing that an increase in cancer risk caused by exposure to a dose of less than 100 mSv radiation is smaller than those caused by a second hand smoke or a lack of vegetable intake.

Recommendations of the ICRP for the radiological protection are made based on the following three principle criteria. First, an intentional exposure to the radiation is justified only if the subsequent benefit to individuals or society outweighs the damage caused by the exposure, e.g. patients receiving medical radiological treatments or rescue workers in the nuclear emergency. Secondly, the issues of the national authorities should be optimized by taking into consideration to minimize overall risks of damage on the one hand, and to avoid burdens, such as mental or physical health damage emerge from a mass evacuation, on the other hand. Thirdly, any individual should be protected from the radiation by setting a dose limit not only in ordinary times but also in case of emergency.

In short, although the low levels of exposure are definitely better than high levels, the ICRP takes the position that the harm against humans could also be caused by setting too low permissible dose limit. Thus, the limit must be established which optimizes the effects of the issue taking the views of advantage and disadvantage in good balance. In case of emergency, in fact, it is not always the best decision to make the permissible radiation dose limit as low as possible, rather it is reasonable to keep it as low that can be achieved by rational efforts.

In ordinary times, we are inevitably exposed to a radiation of 1.5 mSv a year (the world average stands at 2.4 mSv), coming from outer space as well as from the soil and substances in our own body. In addition to this, ICRP has permitted an annual dose of additional 1mSv to radiation of artificial origin, such as industrial radiation. However, the dose limit is not set to radiation used for medical purposes such as X-ray examinations or CT scans, because the advantages brought about by those treatments are regarded to outweigh the harm. Needless to say, a special precaution and consideration should be required for children and pregnant women.

It will be easily imagined that if a dose limit of 1 mSv is applied by authorities to the Fukushima Accident, a great number of people would need to be evacuated. This would possibly increase, rather than decrease, the risk of occurrence of mental and physical health problems in many of the evacuees. The 2007 recommendations of the ICRP gave a set of target ranges for the optimum dose limit in emergency situations (acute radiation dose or annual radiation dose); 1 to 20 mSv, 20 to 100 mSv, and over 100 mSv, and recommended that an appropriate dose for the particular situation be chosen

within each range. In the current emergency situation, the IDRPs have advised that an appropriate dose limit should be established for radiation protection in the range of 20 to 100 mSv⁴. In accordance with this, the Government of Japan has set the limit to be the lowest in this range, namely 20 mSv as an annual dose.

This limit is designed to protect the general public in emergency situations and is not intended to be applied for a long time. When the release of radioactive materials from nuclear reactors has been subsided (we call this as “existing exposure situation” and the Government of Japan decided to guarantee to live on the land in question, an appropriate dose limit should be issued in the target range of 1 to 20 mSv per year according to the ICRP recommends. In addition, this issue should be accompanied by efforts to reduce the limit gradually toward 1 mSv per year. Such efforts are already underway in certain areas of Fukushima prefecture.

We, the Science Council of Japan, sincerely hope that people of Japan understand for their protection that the Government has adopted and has been following the strict standards for the radiation protection recommended by the ICRP, which reflect the internationally adopted policy on this issue.

I would like to close the President’s Comment by saying that the Science Council of Japan will surely continue to provide any forms of support in order to alleviate the current abnormal situation and to restore normal life of people as soon as possible.

17th July, 2011

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Note:

The “possibility of cancer occurrence” in the present document means “risk of contracting cancer and of death due to cancer (damage rate is converted into death rate).