

**The Grand Design for the Long-term Health care of Workers
at the TEPCO Fukushima Daiichi Nuclear Power Plant**

(1) Background

The TEPCO Fukushima Daiichi Nuclear Power Plant relief efforts have been prolonged, and growing concerns have been raised regarding health impairment associated with radiation exposure of medium to long-term workers involved in response to emergency work. Thus, a long-term health care to these high risk workers is urgently needed.

On 17 May 2011, the Nuclear Emergency Response Headquarters issued a report entitled “Policy for actions to respond to nuclear disaster victims in the immediate future,” which indicated to strive toward restoration from the accident in the earliest possible way with consideration for the impact on safety and the surrounding environment and also the work environment. Especially for the long-term health care of workers, it was indicated in the policy that “a database will be developed that allows tracing the radiation exposure dose of all workers engaged in the emergency work even after they leave their jobs to implement the long term health care”.

On the basis of the aforementioned conditions, the Ministry of Health, Labour and Welfare established the “Expert Meeting on Long-term Health care of Workers at the TEPCO Fukushima Daiichi Nuclear Power Plant” in June 2011 and started discussing the following issues:

- Information to be included in the database
- Preferable way of controlling the long-term health care of workers including the period after leaving the jobs, such as implementation of medical examinations.

This grand design shows the framework for the aforementioned issues for discussion.

(2) Basic Policy

The database that has a mechanism for registering not only radiation exposure dose but also other workers’ health information and for inquiry by workers themselves so that workers who engaged in the emergency work will be able to learn about the condition of their own health over time even after they left their workplaces, and receive health consultation or guidance to control their health outcome in an appropriate manner.

In addition, those workers who demonstrate concerns about their health due to their engagement in the emergency work and there is an incremental risk of health impairment along with the increase in radiation exposure dose. Therefore, in order to manage the long-term health care of these workers, it is appropriate to establish consultation desks to assist them in managing their health even after leaving their jobs and to implement medical examination to those who were exposed to certain levels of radiation

(3) Development of the database

a) Information to be registered in the database

Following information from (i) to (v) below should be collected and stored in the database in order to assist long-term health care of high risk workers:

- (i) Profile information including ID number, name, employer, and address
- (ii) Radiation exposure dose and description of the previous work during and after engaging in the emergency work.
- (iii) Results of medical examination
- (iv) Information regarding health consultation and guidance
- (v) Other information necessary for health care (i.e. lifestyle)

The information before they leave from their job will be provided via their former employers.

An example of the page from the database is shown in Table 1. The database contains information obtained from statutory examination which are implemented routinely such as general medical examination based on, for example, the Industrial Safety and Health Act and also from optional examination. The database should allow controlling based on results of the medical examination after leaving their jobs submitted voluntarily from workers.

It is advisable to define the information of the database assuming that they may be used for epidemiological studies in the future with certain restrictions.

b) Access to the database

Workers engaged in emergency work should be able to access their own health record including information about their radiation exposure dose. In order to protect personal information of highly sensitive nature the information should be available only through the information desks directly to the workers. Given that many of those workers are from various regions of Japan, a certain number of information desks will be established across the country for their convenience.

The workers will be responsible for providing their information when requested by family doctors or employers.

c) Management of the database

The database should be able to continuously provide updated, longitudinal record concerning health care of emergency workers.

It is necessary that the medical record obtained before they leave their job should be submitted by their former employers without becoming a burden to the workers.

To ensure uninterrupted, long-term services, the organization primarily responsible for management of the database should establish a certain number of information desks across various regions of Japan and be able to effectively coordinate with health care providers that conduct medical examination.

(4) Implementation of the health care with the database

a) Implemented Content Specific measures for implementation

Given that some of the workers who were engaged in emergency work have heightened concerns about their mental and physical health in the long run, health care should be provided to workers, in principle, by their employers while they are still in their jobs, and health consultation desks should be established for those who have left from their jobs.

Concerns have been raised regarding the late-onset impairment for workers who demonstrated above the normal levels of radiation exposure dose after responding to emergency work. Thus, special examination should be provided along regular medical examination to these high-risk workers.

Further, there are a certain number of workers who received unexpected doses of radiation while engaged in conventional duties. Concerns for serious tardive disorders including cancer have been raised for those workers. Therefore, applicable medical examination should be implemented as a part of regular medical examination for those workers.

b) Database registration card

A database registration cards should be issued to workers engaged in the emergency works so that individual workers can be smoothly identified and proper health care will be provided with the information in the database.

c) Periodical review

Medical records for managing the health care of the workers should be reviewed, as

appropriately, with potential advancement in medicine and changes in examination procedures.

Table 1 Images of Database

1. Basic information

ID	
Name	
Date of birth	
Sex	
Address	
Telephone number	
Possession of radiation passbook	
Registration number (of the Radiation Effects Association)	
Employer at the time of the emergency work	

2. Information during radiation exposure on duty

Date starting the dose measurement	
Date finishing the dose measurement	
Employer	
Workplace	
Work descriptions	
Regular or emergency work	
Equivalent dose to eyes	mSv
Equivalent dose to skin	mSv
Equivalent dose to thyroid	mSv

Effective dose	mSv
Effective external exposure dose	mSv
Committed effective internal exposure dose	mSv
Evaluation method for internal exposure	
Measurement date for internal exposure	
Measured values	
Nuclides	
Date for blood sampling (chromosome of lymphocytes)	
Biological dose evaluation	
Biological scoring	

3. Information on health consultation/guidance

Date serviced			Types of health consultation	
Description				

4. Results of medical examination

Date of examination		<Eye (cataract)>*	
Types of examination		Examination method	
Past illness		Eye findings	
Diet and alcohol intake		<Skin>*	
Smoking		Dermatological findings	
Subjective symptoms		<Thyroid>	
Objective symptoms		TSH	
<General routine examination>		FT3	
Height	cm	FT4	
Weight	kg	TRAb	
Abdominal circumference	cm	MCPA	
Eyesight (right)		Anti-TPO antibody	
Eyesight (left)		TgAb	
Hearing 1000Hz (right)	dB	Thyroid ultrasound	
Hearing 1000Hz (left)	dB	<Upper digestive tract (stomach)>	
Hearing 4000Hz (right)	dB	Stomach fluoroscopy	
Hearing 4000Hz (left)	dB	Stomach endoscopy	
Chest X-ray		Helicobacter pylori	
Sputum		Pepsinogen 1	ng/mL
Blood pressure (systolic)	mmHg	Pepsinogen 2	ng/mL
Blood pressure (diastolic)	mmHg	Pepsinogen 1/2 ratio	
Red blood cell count	/mm ³	<Lower digestive tract (large intestine)>	
Hemoglobin	g/dL	Fecal Occult blood	
Hematocrit	%	Large intestine fluoroscopy	
Platelet count	/mm ³	Large intestine endoscopy	
GOT (AST)	U/L	<CT, MRI, others>	
GPT(ALT)	U/L	Head and Neck	
γ-GTP	U/L	Chest	

Total cholesterol	mg/dL	Abdomen	
HDL cholesterol	mg/dL	Other regions	
LDL cholesterol	mg/dL	<Others>	
TG	mg/dL	HBsAg	
Blood glucose	mg/dL	HBsAb	
HbA1c	mg/dL	HBcAb	
Urinal glucose	mg/dL	HBeAg	
Uric protein	mg/dL	HBeAb	
Uric blood	mg/dL	HCV Ab	
ECG	mg/dL	Sensitive CRP	mg/dL
<White blood cells>*			
WBC count			
Neutrophil	%		
Eosinophil	%		
Basophil	%		
Monocyte	%		
Lymphocyte	%		

*(white blood cells, eye, skin) – included in the medical examination based on the Ionizing Radiation Ordinance

(Reference) Supplement to items of “Images of Database”

General routine medical examination

It includes items in the routine medical examination conducted according to the Industrial Safety and Health Act and other general items which are usually examined during this routine examination (platelet count, uric blood).

White blood cells

It includes WBC count and differential leukocyte count.

Thyroid

It includes commonly measured thyroid hormones, changes in autoantibody levels caused by thyroidal disease and items for an ultrasound examination of the thyroid.

Upper digestive tract (stomach)

It includes typical examination items for stomach imaging, items related to Helicobacter pylori and pepsinogen tests (a blood test to determine contraction of gastric mucosa, an indicator of high risks for stomach cancer).

Lower digestive tract (large intestine)

It includes fetal occult blood examination and items for typical imaging examination for large bowel cancer screening.

Others

It includes examination items on hepatitis B and C and those for inflammation (sensitive CRP).