Attachment

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Equipment to be Used in Controlled Areas

1. Values for various categories of controlled areas

Category by degree of contamination	Contamination-A area (No contamination)	Contamination-B area (Contamination-B)	Contamination-C area (Contamination-C)
Surface concentration of contamination (Bq/cm^2)	No contamination	Less than 4	Less than 40
Radioactive material concentration in the air (Bq/cm^3)	No contamination	Less than 1×10^{-4}	Less than 1×10^{-3}

Note: • Natural nuclides are not included in the reference values.
• The reference values for surface concentration of contamination are based on the smear method.
• Radioactive material concentration in the air is based on ^{60}Co as a representative.

2. Standards regarding the wearing of protective clothing and equipment

Area category / Protective clothing	Contamination-A[*1]	Contamination-B1[*2]	Contamination-B2[*2]	Contamination-C
Standard work clothes	✓	✓	✓[*3]	—
Clothes B	—	✓[*4]	✓	—
Clothes C	—	—	—	✓
anorak	—	—	—	✓[*5]
Gloves B	—	✓	✓	—
Gloves C	—	—	—	✓[*5]
Thin rubber gloves	—	—	✓[*6]	✓
Socks B	—	✓	✓	✓
Socks C	—	—	—	
Shoes B	—	✓	—	—
Shoes B2	—	—	✓	—
Shoes C	—	—	—	✓
Cap C	—	—	—	✓
Standard work helmet	✓	✓	✓[*3]	—
Helmet B	—	✓[*4]	✓	—
Helmet C	—	—	—	✓

*1 Wear protective clothing specified for Contamination-B1 areas when entering a Contamination-A area through a Contamination-B1 area.

*2 These areas are classified as Contamination-B1 and B2 areas based on the degree of contamination.

*3 This type of clothing may be used in place of Clothes B and Helmet B if it is considered unnecessary in terms of protection from radiation (e.g. during patrols).

*4 This type of clothing may be used in place of standard work clothes or standard work helmets as required.

*5 This type of clothing may be used as required.

*6 This type of clothing does not need to be worn if it is considered unnecessary in terms of protection from radiation (e.g. during patrols).

3. Examples of protective clothing and equipment

Standard work clothes,
Gloves B, Shoes B
and Helmet B

Clothes B,
Gloves B, Shoes B
and Helmet B

Clothes B, Gloves B,
thin rubber gloves,
Shoes B2 and Helmet B

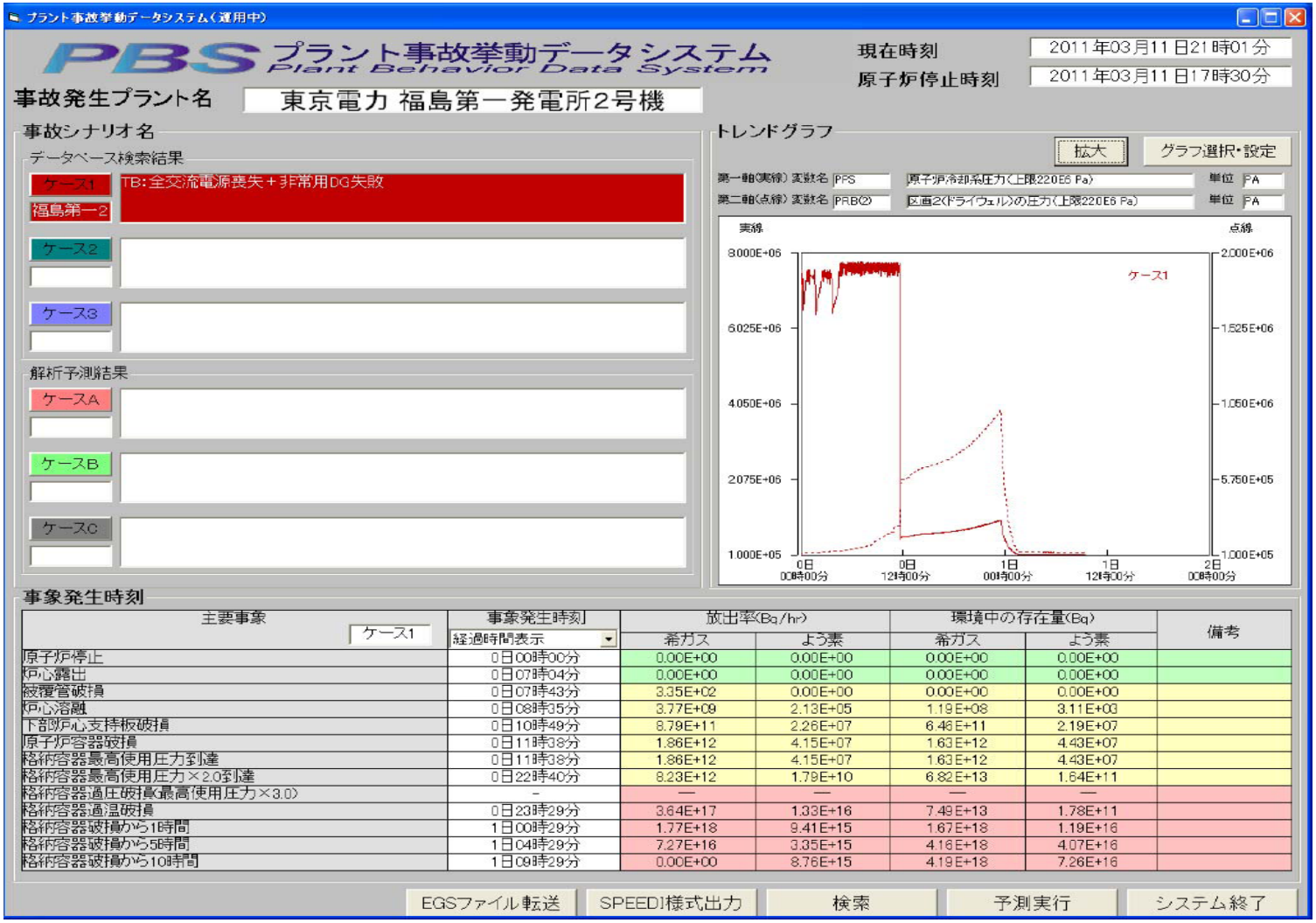
Clothes C,
thin rubber gloves, Cap C
and Socks C

Clothes C, thin rubber gloves,
Cap C, Socks C,
Shoes C and Helmet C
(Gloves C as required)

Wind breaker jacket
and pants

Full-face mask

Hooded mask



主要事象 ケース1	事象発生時刻 経過時間表示	放出率(Bq/hr) 希ガス	放出率(Bq/hr) よう素	環境中の存在量(Bq) 希ガス	環境中の存在量(Bq) よう素	備考
原子炉停止	0日00時00分	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
炉心露出	0日07時04分	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
被覆管破損	0日07時43分	3.35E+02	0.00E+00	0.00E+00	0.00E+00	
炉心溶融	0日08時35分	3.77E+09	2.13E+05	1.19E+08	3.11E+03	
下部炉心支持板破損	0日10時49分	8.79E+11	2.26E+07	6.46E+11	2.19E+07	
原子炉容器破損	0日11時38分	1.86E+12	4.15E+07	1.63E+12	4.43E+07	
格納容器最高使用圧力到達	0日11時38分	1.86E+12	4.15E+07	1.63E+12	4.43E+07	
格納容器最高使用圧力×2.0到達	0日22時40分	8.23E+12	1.79E+10	6.82E+13	1.64E+11	
格納容器過圧破損(最高使用圧力×3.0)	-	—	—	—	—	
格納容器過温破損	0日23時29分	3.64E+17	1.33E+16	7.49E+13	1.78E+11	
格納容器破損から1時間	1日00時29分	1.77E+18	9.41E+15	1.67E+18	1.19E+16	
格納容器破損から5時間	1日04時29分	7.27E+16	3.35E+15	4.16E+18	4.07E+16	
格納容器破損から10時間	1日09時29分	0.00E+00	8.76E+15	4.19E+18	7.26E+16	

Figure 1 Data on the Progression of the Accident at Unit 2

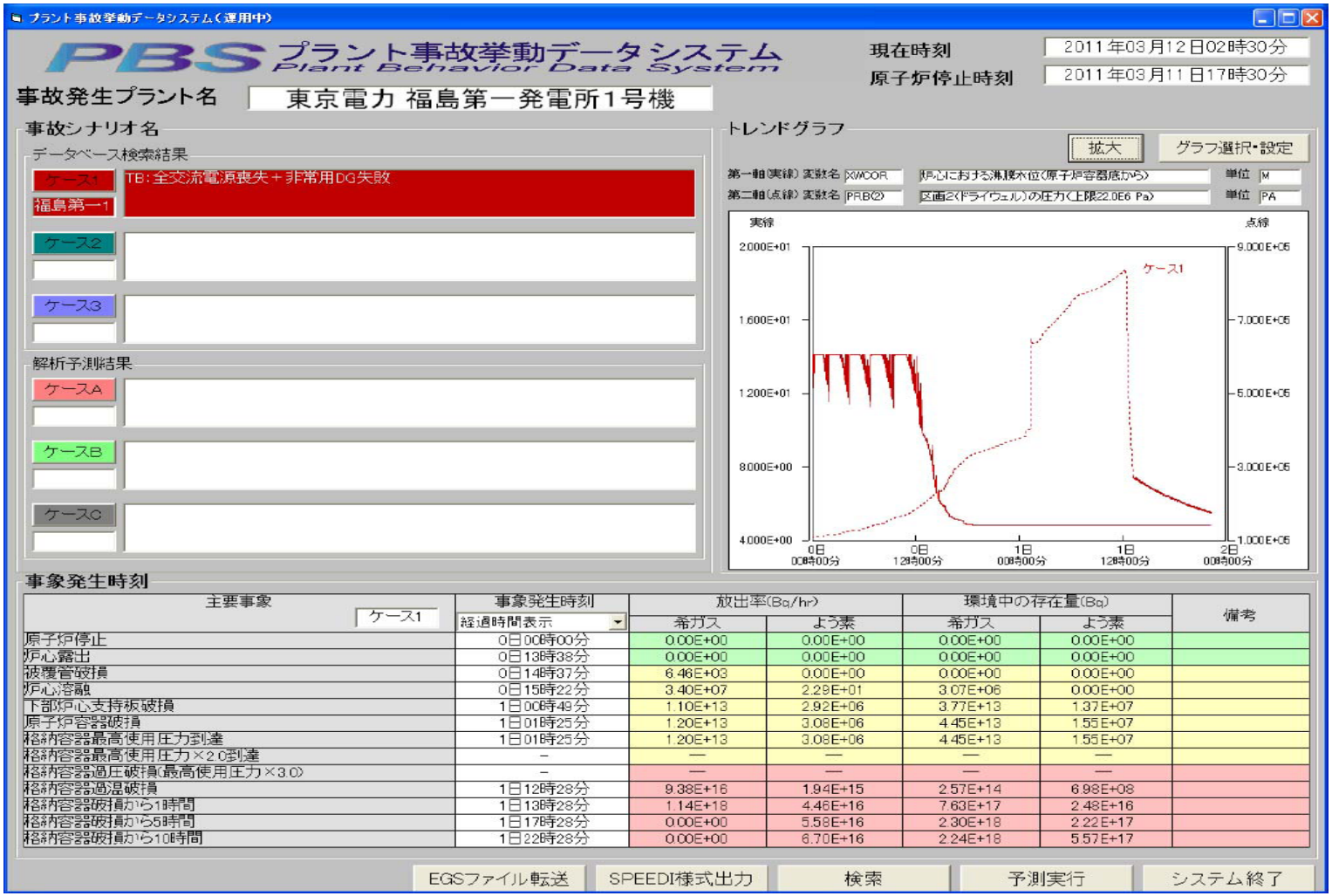


Figure 2 Data on the Progression of the Accident at Unit 1

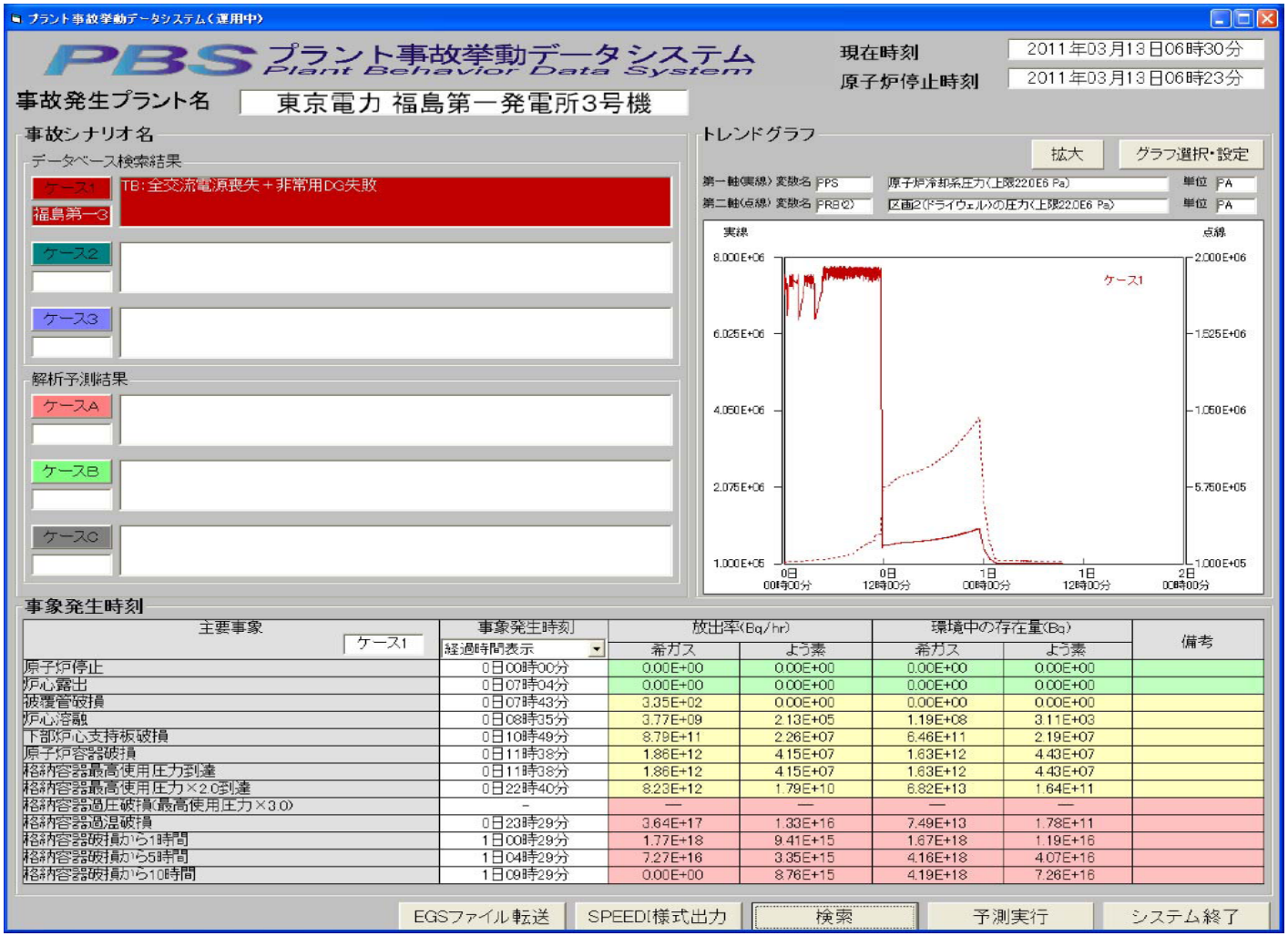


Figure 3 Data on the Progression of the Accident at Unit 3

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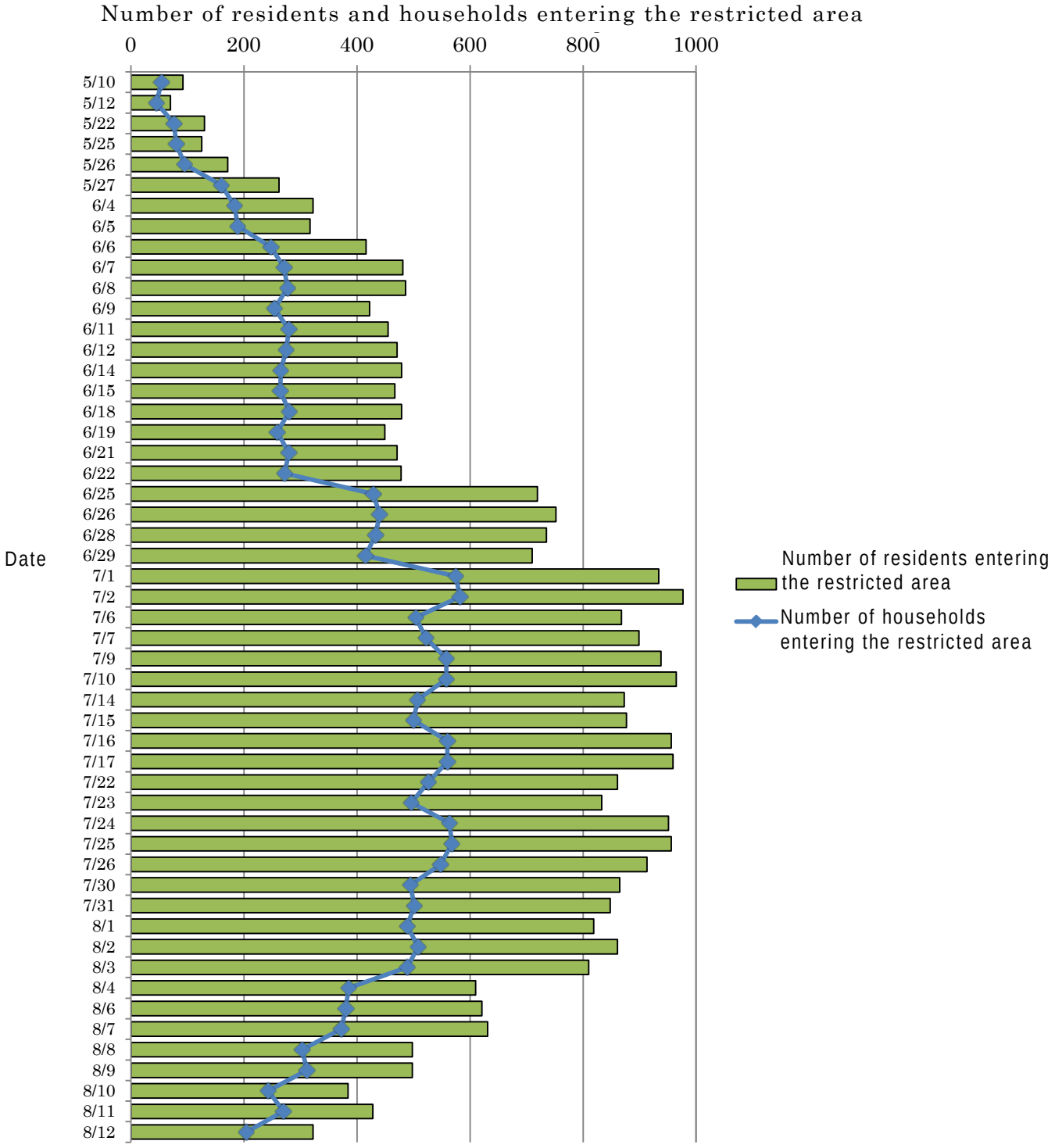
Trends in the number of temporary access for residents into the restricted area



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Regarding Response to the Specific Spots Estimated to Exceed an Integral Dose of 20mSv Over a One Year Period After the Occurrence of the Accident

June 16, 2011
Nuclear Emergency Response Headquarters

1. The Government's response to the spots where an integral dose will exceed 20mSv per year

- Outside the Deliberate Evacuation Areas as well as the Restricted Area, there exists plural spots inside certain areas that are not wide spread in region to warrant the designation of a Deliberate Evacuation Area, at which air dose rates have been maintained at a level that is estimated to exceed an integral dose of 20mSv over a one year period after the accident.

- The radiation dose decreases when going away from these spots, therefore, a risk of exceeding 20mSv per year through daily life in general is low. Considering that the level of 20mSv per year was adopted because it was the lowest figure within the range that ICRP and other organizations have indicated as a reference level, being different from the Deliberate Evacuation Areas where high dose areas expand in entire region, the spots are not in a situation that the Government should instruct across-the-board evacuation or restrict industrial activities from the standpoint of safety.

- On the other hand, it is natural for residents to feel anxious about the situation, and since the possibility of exceeding 20mSv per year depending on a person's lifestyle cannot be ruled out, it is important for the Government to take measures for the issue. Therefore, these spots will be designated as "Specific Spots Recommended for Evacuation" and the Government will need to call the attention of residents in these spots, and assist and promote their evacuation.

2. Scheme

- Said spots are not hazardous enough to require across-the-board evacuation, therefore the immediate action will be to call the attention of

residents and to express the Government's assistance. On the other hand, in order to thoroughly ensure the safety and security of the residents in the vicinity of these spots, the Government will specify the spots and will address and clarify externally that adequate measures will be taken for these spots.

<Specifics of the Scheme>

(1) The Ministry of Education, Culture, Sports, Science and Technology (MEXT) will conduct even further detailed monitoring at the vicinity of these spots, and if the result of the measurement shows an air dose rate that is estimated to exceed 20mSv over a one year period, MEXT will promptly notify the Governor of Fukushima Prefecture and the Mayors and the Heads of relevant cities, towns and villages through the Local Response Headquarters.

(2) The Local Response Headquarters, Fukushima Prefecture and related municipalities will hold a discussion, and will designate the spots, which are hard to be decontaminated and will exceed 20mSv per year, as "Specific Spots Recommended for Evacuation" per residence. The Director-General of the Local Response Headquarters will notify said municipalities in writing.

(3) The municipalities will notify the residences individually that correspond to the "Specific Spots Recommended for Evacuation," together with an explanatory document, covering, for example, monitoring results, impact of radiation, assistance measures that residents can utilize, and schedules of explanatory meetings, etc. For the evacuated households, the municipality will issue certificates as residents affected by the nuclear incident.

In particular, the Headquarters will consult with the municipalities to ask them to urge families with pregnant women or children, etc. to evacuate.

(4) Monitoring will be conducted periodically. Based on the result, the Local Response Headquarters, Fukushima Prefecture and related

municipalities will hold discussions and removal of a designation in a flexible manner.

(Note) This is a scheme to respond to such a situation, for example, that there are 50 households in the subject spot, of which 20 wish to evacuate, considering their lifestyles and family composition. The remaining 30 households in this case will not be required to evacuate.

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Attachment II-5

Regarding Establishment of Specific Spots Recommended for Evacuation in Date City

June 30, 2011
Local Nuclear Emergency Response Headquarters

Based on the notification “Regarding Response to the Specific Spots Estimated to Exceed an Integral Dose of 20mSv Over a One Year Period After the Occurrence of the Accident” dated June 16, 2011 (Nuclear Emergency Response Headquarters), in view of the discussions by the Local Nuclear Emergency Response Headquarters, Fukushima Prefecture, and Date City, the Local Nuclear Emergency Response Headquarters has established “Specific Spots Recommended for Evacuation” for the residences in the below-listed regions, and issued the notification to Date City.

In the future, Date City will individually notify this establishment to the subject households of the residents in the City.

Furthermore, the Nuclear Emergency Response Headquarters will conduct continuously monitoring of the specified regions in addition to the support related to the evacuation and other actions of the residences in the area established as Specific Spots Recommended for Evacuation.

Details

Part of Kamioguni, Ryozenmachi, Date City: 30 spots (32 households)

Part of Shimooguni, Ryozenmachi, Date City: 49 spots (54 households)

Part of Ishida, Ryozenmachi, Date City: 19 spots (21 households)

Part of Tsukidate, Tsukidatemachi, Date City: 6 spots (6 households)

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Attachment II-6

Regarding Establishment of Specific Spots Recommended for Evacuation in the City of Minami Soma

July 21, 2011
Local Nuclear Emergency Response Headquarters

Based on the notification “Regarding Response to the Specific Spots Estimated to Exceed an Integral Dose of 20mSv Over a One Year Period After the Occurrence of the Accident” dated June 16, 2011 (Nuclear Emergency Response Headquarters), the Local Nuclear Emergency Response Headquarters established “Specific Spots Recommended for Evacuation” on the residence in the area listed below, in light of the discussing with the Fukushima prefectural government and the authority of Minami Soma City, and notified Minami Soma City today.

Minami Soma City will hereafter notify the households living in the residences subject to the establishment individually.

Furthermore, the Nuclear Emergency Response Headquarters will provide support concerning evacuation and more for the residences designated as Specific Spots Recommended for Evacuation, as well as continue monitoring the specified region.

Details

A part of Jisabara, Kashima Ward, Minami Soma City	1 spot	(1 household)
A part of Ogai, Haramachi Ward, Minami Soma City	13 spots	(14 households)
A part of Ohara, Haramachi Ward, Minami Soma City	21 spots	(21 households)
A part of Takanokura, Haramachi Ward, Minami Soma City	22 spots	(23 households)

Total: 57 spots (59 households)

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Attachment II-7

Regarding Establishment of Specific Spots Recommended for Evacuation in the City of Minami Soma

August 3, 2011
Local Nuclear Emergency Response Headquarters

Based on the notification "Regarding Response to the Specific Spots Estimated to Exceed an Integral Dose of 20mSv Over One Year Period After the Occurrence of the Accident" dated June 16, 2011 (Nuclear Emergency Response Headquarters), the Local Nuclear Emergency Response Headquarters established "Specific Spots Recommended for Evacuation" on 57 spots in the city of Minami Soma (59 households) on July 21 in light of the June 27th monitoring result.

This time, in light of the monitoring results of July 13, 18 and 21, the Local Nuclear Emergency Response Headquarters has discussed with the Fukushima Prefectural government and the authority of Minami Soma City, and has established "Specific Spots Recommended for Evacuation" on the residences in the regions listed below and notified Fukushima Prefecture and Minami Soma City. The specific spots include the residences of which the family composition was unable to be confirmed at the time of July 21st establishment.

The authority of Minami Soma City will hereafter notify the households subject to the establishment individually.

Nuclear Emergency Response Headquarters will provide support concerning evacuation and more for residences designated as Specific Spots Recommended for Evacuation, as well as continue monitoring the specified regions.

Details

A part of Jisabara, Kashima Ward, Minami Soma City
1 spot (2 households)

A part of Ogai, Haramachi Ward, Minami Soma City
3 spots (3 households)

A part of Ohara, Haramachi Ward, Minami Soma City
18 spots (19 households)

A part of Takanokura, Haramachi Ward, Minami Soma City
9 spots (11 households)

A part of Oshigama, Haramachi Ward, Minami Soma City

3 spots (3 households)

A part of Katakura, Haramachi Ward, Minami Soma City

2 spots (2 households)

A part of Baba, Haramachi Ward, Minami Soma City

29 spots (32 households)

Total: 65 spots (72 households)

Attachment II-8

Regarding Establishment of Specific Spots Recommended for Evacuation in the Village of Kawauchi

August 3, 2011
Local Nuclear Emergency Response Headquarters

Based on the notification “Regarding Response to the Specific Spots Estimated to Exceed an Integral Dose of 20mSv Over One Year Period After the Occurrence of the Accident” dated June 16, 2011 (Nuclear Emergency Response Headquarters), the Local Nuclear Emergency Response Headquarters established “Specific Spots Recommended for Evacuation” on the residence in the area listed below, in light of discussing with the Fukushima prefectural government and the authority of the village of Kawauchi, and notified the authority of the village of Kawauchi today.

The authority of the village of Kawauchi will hereafter notify the household living in the residence subject to the establishment individually.

Furthermore, the Nuclear Emergency Response Headquarters will provide support concerning evacuation and more for the residence designated as Specific Spots Recommended for Evacuation, as well as continue monitoring the specified region.

Details

A part of Mitsuishi / Kajioi Shimokawauchi, Kawauchi Village
1 spot (1 household)

Total: 1 spot (1 household)

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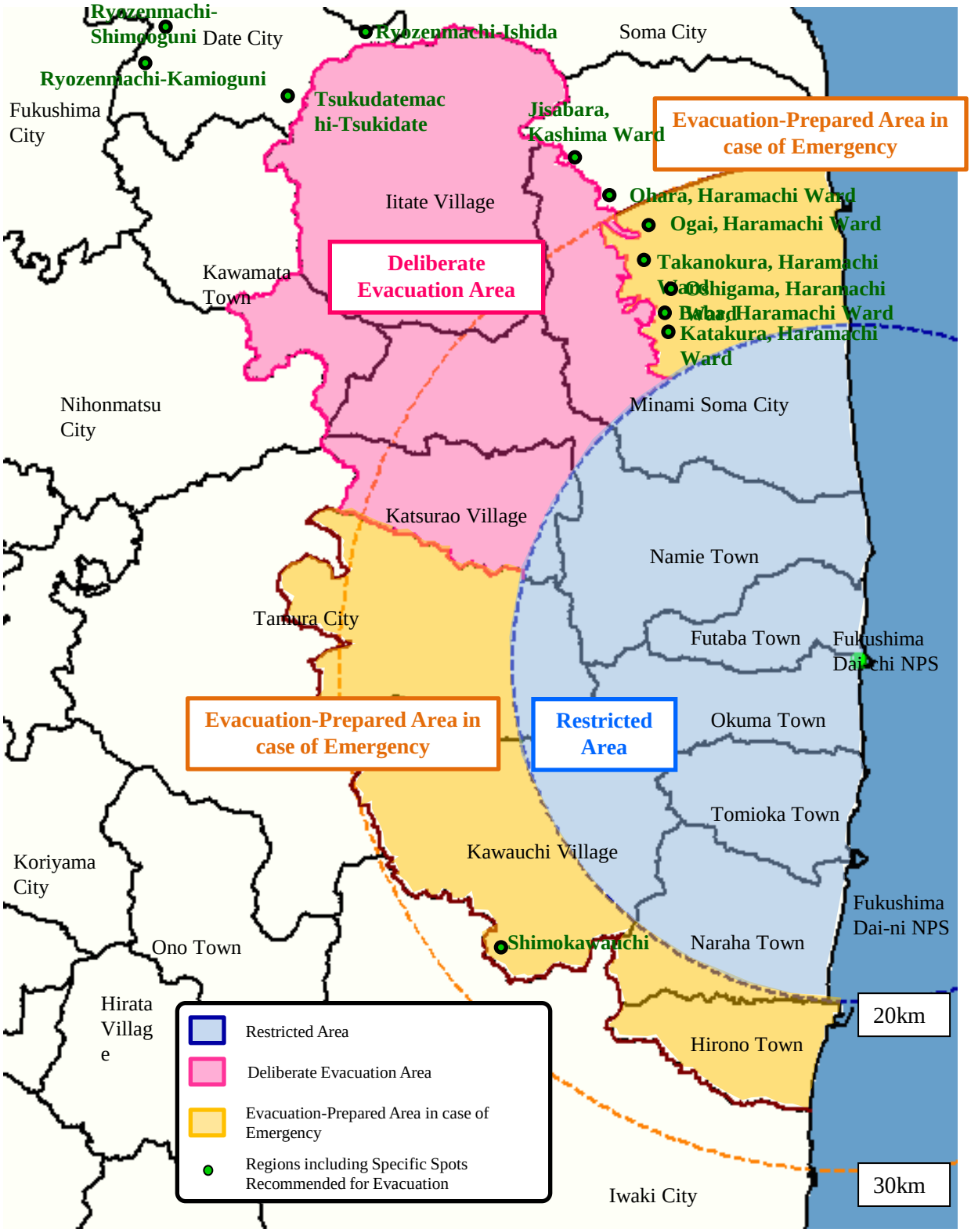
Restricted Area, Deliberate Evacuation Area, Evacuation-Prepared Area in case of Emergency And Regions including Specific Spots Recommended for Evacuation (As of August 3, 2011)



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Attachment II-10

News Release

経済産業省
Ministry of Economy, Trade and Industry

June 30, 2011
Nuclear and Industrial Safety Agency

Regarding Lifestyle in "Specific Spots Recommended for Evacuation"

Today, this is to inform the public that Lifestyle in "Specific Spots Recommended for Evacuation" has been compiled.

(Contact Person)
Mr. Toshihiro Bannai
Director, International Affairs Office,
NISA/METI
Phone: +81-(0)3-3501-1087

Regarding Lifestyle in "Specific Spots Recommended for Evacuation"

June 30, 2011
Support Team for Residents
Affected by Nuclear Incidents

1. Specific Spots Recommended for Evacuation

"Specific Spots Recommended for Evacuation" is where an integral dose of residents may reach 20mSv, if they continue to reside in the same spot for one year depending on lifestyle, but does not expand to the entire region or daily living areas, including areas of commuting to work and school, and going shopping.

For this reason, possibility of the integral dose of residents to reach 20mSv in living a normal life is small and it is permissible to continue residing in the spots.

It is possible to reduce radiation exposure by following the points below:

(Things to keep in mind in daily life)

- Usual clothing is fine when leaving home however wear a mask, if concerned.
- After outdoor activities, make sure to wash hands and face, as well as gargle.
- Be careful not to put soil or sand in the mouth. (Especially young children need to be careful and refrain from playing in sandboxes.)
- If soil or sand got into the mouth, gargle thoroughly.
- Remove mud from shoes as much as possible when coming home.
- Do not drink river water or rain water.
- There are no problems with drinking tap water, as long as there are no intake restrictions.
- When eating vegetables grown in kitchen gardens, make sure to wash them sufficiently.

- There are no problems with consuming food available in the market.
- Avoid spending time outside when it's windy.
- Close windows when it's dusty.
- Avoid smoking, eating and such outside, where there is much dust.
- There are no problems with using air-conditioning.
- Make sure to wipe the body of pets that stay outside for a long time when taking them inside or touching them.

2. **Regarding Work/Operations in the Specific Spots Recommended for Evacuation**

In the specific spots recommended for evacuation, even if work or operations involving industrial activities, including farming are carried out, possibility of the annual radiation exposure to reach 20mSv is small and therefore, it is permissible to carry out work and such.

Moreover, it is possible to reduce the amount of radiation exposure by following the points below. Furthermore, refer to the attachment 3 if working near mud and fallen leaves accumulated in gutters/side ditches or spouting or air intake facilities of buildings.

(Things to keep in mind during work)

- Keep the outdoor work to a minimum and short as much as possible.
- Usual clothing (light clothing in summer) is sufficient during outdoor work however wear a mask, if concerned.
- Make sure to wash hands and face, as well as gargle after outdoor work.
- Remove mud from shoes as much as possible when going home.
- Avoid smoking, eating and such outside, where there is much dust.

3. **Approach towards Reducing the Amount of Radiation Exposure from the Environment**

Cleaning up mud and fallen leaves accumulated in gutters, side ditches and watercourses and spots where the mud and fallen leaves are collected and stored, as well as collection of sediments and cleaning up spouting and air intake facility will help reduce radioactive materials in the living environment.

Please follow the items below when carrying out these operations.

- Develop a plan in advance and keep the operations short, as well as keep the number of operations to a minimum.
- Wear a mask, rubber gloves, rubber boots, long-sleeves and such.
- Make sure to wash exposed areas, such as arms, legs and face thoroughly and gargle after work.
- Remove mud from shoes as much as possible and change clothing and try not to bring in dust and dirt inside after work.

Only if the work takes a long time to complete or management of removed mud and fallen leaves, such as storage and disposal is difficult, please consult the national or prefectural government or the relevant municipality beforehand.

4. Others

Regular monitoring will be carried out in the specific spots recommended for evacuation and its result will be provided to the residents. If possibility of the annual integral dose to reach 20mSv is confirmed to be zero based on the monitoring result, the established specific areas will be lifted on a flexible basis.

Overview of Heath Management Survey for the Residents in Fukushima Prefecture

June 18, 2011

Exploratory Committee for the Fukushima Health Management Survey

Basic survey

Subjects:	Residents in Fukushima Prefecture as of March 11, 2011 (including those evacuated to other prefectures) (Official bulletins and other such means were used to invite individuals who had been visiting the prefecture but had not transferred their certificate of residence to participate.)
Method:	Self-completion questionnaire
Details:	Record of actions since March 11 (estimated exposure dose evaluations) e.g. dietary conditions
Implementation period:	August 2011 (depending on the progress made with the preliminary survey)

Detailed survey

Subjects:	Residents in the evacuation areas and those deemed necessary based on the results of the basic survey (estimated to be approx. 200,000 people)
Method:	Medical checkups (held at examination venues, medical institutions, and so on)
Details:	Questionnaire survey (lifestyle, mental health, etc.) Body measurements, blood test and urine test (some blood and urine samples are to be stored) * Thyroid ultrasonography for children (the implementation period has yet to be decided)
Implementation period:	To be decided

- The survey results are to be compiled into databases and managed on a long-term basis.
- The surveys will continue to be carried out next year and thereafter, but the intervals at which they should be conducted and what they should focus on are still under consideration.

Preliminary survey

This survey is to be conducted prior to the basic survey in order to identify and resolve problems in advance of the full-scale implementation of the basic survey throughout the prefecture. (Late June)

Subjects: Present and former residents of the target districts

Target districts: Namie Town, Iitate Village and Yamakiya District, Kawamata Town

Survey content: Same as the basic survey

Note: The method to be used for selecting the individuals to take the internal exposure test will be discussed with the target municipalities.

Reference

Efforts to manage the health of the residents in Fukushima Prefecture

1. Background

The lingering aftermath of the nuclear power plant accident has left Fukushima residents suffering from serious anxiety and mounting stress. Complaints include: “I don’t know how much radiation I have been exposed to” and “I am worried how this will affect my health in the future.” Moreover, a lack of basic information and variations in the quality of information are making matters even worse.

There is an increasing possibility that such anxiety and stress will result in local people experiencing a deterioration in their physical and mental health (e.g. aggravation of underlying diseases). Prolonged residence in evacuation shelters and other factors may also contribute to this deterioration.

2. Purpose

To help reduce anxiety that Fukushima residents have regarding the accident at the nuclear power plant and to ensure safety and peace of mind through long-term health monitoring.

3. Initiatives

(1) Fukushima Prefecture Health Monitoring Survey

1) Aims
   To reduce anxiety by estimating and presenting information on radiation doses
   To implement long-term health management based on the survey results

2) Details
   A basic survey and then a detailed survey will be conducted
   A preliminary basic survey is to be conducted in a few selected districts.

* An internal exposure test is also to be carried out as part of the surveys.

(2) Efforts to alleviate the anxiety of Fukushima residents

- Provision of information to local residents
- Holding of seminars and training sessions for healthcare professionals, etc.

(3) Provision of healthcare and medical services

Medical checkup and health counseling services for local residents will continue to be provided, and this is expected to help prevent any deterioration in the health of local residents by providing them with appropriate healthcare and medical services.

Health Management Survey for the Residents in Fukushima Prefecture (for all the prefecture's residents)

Ascertain radioactive dose (Basic data)

Basic survey

Subjects: Residents in Fukushima prefecture as of March 11, 2011
Method: Self-completion questionnaire
Details: Record of actions since March 11
(estimated exposure dose evaluations)

Ascertain health conditions

Detailed survey

Thyroid gland examination (to be conducted for all Fukushima prefecture residents aged 18 or younger, including those taking refuge outside the prefecture)

Details: Thyroid ultrasonography
* Ascertain the present condition of all survey participants in the next three years and conduct periodic examinations thereafter

Medical checkups (utilizing existing medical checkups)

Subjects: Residents residing in evacuation areas, etc
Details: General medical checkup items as well as differential white blood count, etc.

Subjects: Residents not residing in evacuation areas
Details: General medical checkup items

Having workplace medical checkups, municipal medical checkups and/or cancer screening helps ensure early detection and early treatment of diseases.

Conducting of medical checkups for Fukushima prefecture

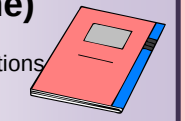
Survey regarding mental health and lifestyle (questionnaire survey targeting residents in evacuation areas, etc.)

Survey regarding pregnant women and nursing mothers (questionnaire survey targeting residents who applied for a maternity and child health hanndbook between August 1, 2010 and July 31,

Ongoing management

Health management file (provisional name)

☆Results of health surveys and examinations recorded and retained by individuals
☆Increase awareness of radiation



Creation of a database

◆ Utilized for long-term healthcare and medical treatment of Fukushima prefecture residents
◆ Knowledge acquired in providing healthcare will be used for future generations

- Whole-body counter
- Individual dosimeter

Consultation and support | Follow-up | Treatment

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Reference

Nuclide	Provisional regulation values of radioactive materials in food in accordance with the Food Sanitation Act (Bq/kg)	
Radioactive iodine (Representative radio-nuclides among mixed radio-nuclides: ^{131}I)	Drinking water	300
	Milk, dairy products*	
	Vegetables (Except root vegetables and tubers)	2,000
	Fishery products	
Radioactive cesium	Drinking water	200
	Milk, dairy products	
	Vegetables	500
	Grains	
	Meat, eggs, fish, etc.	
Uranium	Infant foods	20
	Drinking water	
	Milk, dairy products	
	Vegetables	100
	Grains	
	Meat, eggs, fish, etc.	
Alpha-emitting nuclides of plutonium and transuranic elements (Total radioactive concentration of ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{242}Cm, ^{243}Cm, ^{244}Cm)	Infant foods	1
	Drinking water	
	Milk, dairy products	
	Vegetables	10
	Grains	
	Meat, eggs, fish etc.	

*) Provide guidance so that materials exceeding 100 Bq/kg are not used in milk supplied for use in powdered baby formula or for direct drinking.

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Food Safety Risk Assessment
Radioactive Nuclides in Foods
(DRAFT)

The food Safety Commission, Japan (FSCJ)
Working Group for an assessment of the effect of radioactive nuclides in food on health

July, 2011
(Original is written in Japanese. English translation is made by FSCJ Secretariat)

ABSTRACT

In response to the accident at the Fukushima I Nuclear Power Plant by Tokyo Electric Power Company (TEPCO) and detection of higher-than-normal radiation levels near the plant after the Great East Japan Earthquake that occurred on March 11, 2011, the Ministry of Health, Labour and Welfare (MHLW) adopted *Indices for Food and Beverage Intake Restriction* posted by the Nuclear Safety Commission of Japan as provisional regulation values. These provisional regulation values were established urgently without an assessment of the effect of food on health; thus, on March 20, 2011 the Minister of Health, Labour and Welfare requested the Food Safety Commission of Japan (FSCJ) to conduct an assessment according to Article 24, Item 3 of the Food Safety Basic Act.

For this risk assessment of the effect of food on health, a wide-ranging publications on radioactive material were analyzed including references cited in reports of radioactive materials by Agency for Toxic Substances and Disease Registry (ATSDR) and United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), documents published by International Commission on Radiological Protection (ICRP) and World Health Organization (WHO). Numbers of publications available on health effect by oral ingestion of radioactive materials were limited. Therefore not only the reports on internal exposure from oral ingestion, but findings related to the toxicity of chemical substances were extensively collected. Radioactive nuclides which were examined are: radioactive iodine, radioactive cesium, uranium, plutonium, α particles of transuranium elements (americium and curium), which the provisional regulation values are defined by the MHLW, and additionally, radioactive strontium. However there were little data on health effect by oral ingestion of examined radionuclides. Tolerable daily intake (TDI) was decided to be established for uranium, whose toxicity as the chemical substance was determined to exceed the toxicity effect from radiation. Apart from uranium, there are still important radioactive nuclides: radioactive iodine, which exerts a profound effect on thyroid thus, could lead to thyroid cancer, and radioactive cesium, which was considered to be most critical radioactive nuclide in regard to intake from food according to current detection outcome of radioactive materials in food. However there are not enough knowledge on all the radioactive nuclides except uranium including radioactive iodine and radioactive cesium to establish risk assessment on each radioactive nuclide.

Based on the findings above, the effect on health of low dose radiation to human health was investigated, and concluded. Only for uranium, TDI was established.

Epidemiological data have various limitations, however, by fully recognizing those limitations, FSCJ's working group conducted its own investigation based on available publications. The publications were classified from various viewpoints such as the validity of study design and study subject population, existence or non-existence of statistically significant difference, appropriateness of estimated exposure amount, the influence of the confounding factors, and the presence of uncertainty referred by the author in order to identify its applicability for this assessment.

As a result, following studies covering the detection of effect at low dose radiation to human health and studies reporting no detection of effect at high dose radiation to human health in adults based on a large body of epidemiological data were taken into consideration as authentic research.

(1) A study reporting no identification of increased cancer risk in high background radiation area in India where the cumulative radiation dose is 500 mGy or higher. (Nair et al.2009)
(2) A study covering the excessive relative risk of solid cancer mortalities among atomic bomb survivors in Hiroshima and Nagasaki. A significant linearity was observed for dose-response relationship in groups exposed to the dose range of 0-125 mSv, but no significant relationship was observed in groups exposed to the dose range of 0-100 mSv. (Preston et al. 2003)

(3) A study reporting estimated relative risk of leukemia mortalities among atomic bomb survivors in Hiroshima and Nagasaki. In the case where the estimated relative risk of leukemia mortalities among atomic bomb survivors in Hiroshima and Nagasaki was compared to those in the control group (0 Gy), statistically significant increase was observed in organ-absorbed dose over 0.2 Gy, but no significant difference was observed in dose below 0.2 Gy. (Shimizu et al. 1988)

Based on the above mentioned researches, the WG concludes that more than around 100 mSv of cumulative effective doses of radiation during lifetime could increase the risk of effect on health. The amount does not include radiation from natural environment and medical exposure.

The vulnerability of children was pointed out, who have greater risks of developing thyroid cancer and leukemia than adults do.

Some epidemiological researches indicate the health effects from radiation doses at below 100 mSv, however data reliability of those researches remains uncertain.

There is an undeniable possibility that health effect from low radiation doses has not been validated by epidemiological research considering various factors. Therefore, health effect from cumulative exposure below 100 mSv excluding natural and medical radiation exposure during life time are difficult to be verified based on the current available knowledge.

For uranium, an administration study in drinking water for 91 days was conducted on groups of 15 male and 15 female weanling Sprague-Dawley rats. LOAEL of uranium was proposed 0.06mg/kg bw/day based on changes in kidney tubule functions were seen in all administered rats. Nuclear vesiculation of the tubular epithelial nuclei were observed in both sexes. In males, proximal tubular dilatation, apical displacement of the proximal tubular epithelial nuclei, and cytoplasmic vacuolation were observed. (Gilman et al. 1998 a) In this study, various examinations were conducted including the histopathological surveys. The calculation of TDI was considered to be applicable based on the LOAEL with safety factor of this study. No further adjustment was considered necessary to add a safety factor based on a sub-chronic study for 91 days, on the ground of nonsevere influence of uranium on kidney from this experiment, and the disposition, rapid excretion of uranium as well as rapid return to its steady state. Considering the rapid excretion of uranium from human kidney, the application of safety factor 300 was determined to be adequate. (species difference: 10, individual difference: 10, extrapolation of LOAEL to NOAEL: 3) Hence regarding uranium, based on 0.06 mg/kg bw/day as LOAEL from the result of toxicity study in rat, the WG proposed 0.2μg/kg bw/day as TDI with the safety factor 300.

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Annex

Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies

The Nuclear Emergency Response Headquarters

I. Purpose

On March 17, 2011, the provisional regulation values for radioactive materials were established based on the Food Sanitation Act (Law No. 233 issued in 1947). On April 4, the "Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" were compiled based on findings obtained until then. Since then, while the level of radioactive iodine detected in foods has declined, radioactive cesium exceeding the provisional regulation values has been detected in certain foods. This has led us to reorganize the concepts of the following, based on the current findings: the inspection planning to properly judge the need for the restriction of distribution and/or consumption of foods; the judgment criteria on the necessity for the restriction of distribution and/or consumption based on inspection results; and the cancellation of the restriction of distribution and/or consumption.

This revised "Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies," in light of the nature of radioactive materials released and the status in which they have been detected in foods, intends to change the focus from one that emphasized on foods susceptible to the fallout of radioactive iodine emitted immediately after the nuclear power plant accident to that based on the impact of radioactive cesium and the actual situations of the public consumption of foods.

The implementation of the revised "Concepts of Inspection Planning and the Establishment and Cancellation of Items and Areas to which Restriction of Distribution and/or Consumption of Foods Concerned Applies" will be managed based on findings obtained so far (regarding the fallout and attachment of radioactive materials; their migration from water, farm soil, and atmosphere; and the effects of production and feeding of animals).

Information on the system for implementing inspections of radioactive materials at the local government level will continue to be obtained, on an as-needed basis. The relevant Ministries will also consider securing a medium- and long-term inspection system.

II. Inspection planning for the local governments

1. Basic concepts

   Additional requirements were set out in the "Manual on Radiation Measurement of Foods in Emergency Situations" (March, 2002).

2. The local governments concerned

   (1) The local governments instructed by the Prime Minister and the adjacent local governments

Fukushima Prefecture, Ibaraki Prefecture, Tochigi Prefecture, Gunma Prefecture, Chiba Prefecture, Kanagawa Prefecture, Miyagi Prefecture, Iwate Prefecture, Aomori Prefecture, Akita Prefecture, Yamagata Prefecture, Niigata Prefecture, Nagano Prefecture, Saitama Prefecture, Tokyo, Yamanashi Prefecture, and Shizuoka Prefecture

(2) The local governments separately instructed depending on the status of the detection of radioactive materials

3. Items concerned

(1) Items in which radioactive materials exceeding the provisional regulation values have been found

i. Vegetables (those cultivated outdoor are selected on a priority basis)
Non-head type leafy vegetables (e.g. Spinach , Komatsuna); Turnip; Cabbage; Broccoli; Parsley; Japanese parsley; Ume; Log-grown shiitake (outdoor cultivation); Bamboo shoot; Ostrich fern; Raw tea leaf; Unrefined tea leaf; and Refined tea leaf

ii. Milk
Milk

iii. Fishery products
Sand lance; Whitebait; Greenling; Brown hakeling; Hen-clam; Blue mussel; Northern sea urchin; Wakame seaweed; Sea oak; Hijiki; Japanese smelt; Cherry salmon; Ayu; and Japanese dace

iv. Meat
Beef

(2) Major items which take into account of the amount of the public consumption
(Reference) The items ranked high in the public consumption level in the National Health and Nutrition Survey (based on the survey of 2008)
Rice; Tea for drinking; Milk; Lightly colored vegetables (including Japanese radish, Cabbage, Chinese cabbage, Onion, and Cucumber); Deeply colored vegetables (including Carrot, Spinach, and Tomato); Egg; Pork; Potatos (including Potato, Sweat potato, and Satoimo); Citrus; Fruits (e.g. Apple, Grapes, and Nashi); Fishery products; Mushrooms; Chicken; and Algae

(3) Items whose restriction of distribution was cancelled at the local government level

(4) Items separately instructed by the government

(5) Other items concerned

i. Major agricultural products which take into account of the status of production

ii. Foods distributed in the market (whose information on producers is identified)

As for the fisheries products that migrate in wide areas, the government separately instructs local governments.

4. The designation of inspection areas

In order to grasp the spread of radioactive contamination, local governments divide their prefectural areas into appropriate zones, based on the actual situations of production, the landing of captured fishes, and the labeling of origins. Samples are then collected in a multiple number of municipalities per zone concerned.

Inspections are implemented in a multiple number of municipalities within targeted inspection areas. Regarding the selection of the municipalities to be inspected, those where radioactive materials exceeding the provisional regulation have been detected in foods are given priorities, and the concentration of cesium in soil and the results of environmental monitoring inspections are taken into consideration.

5. The frequency of inspections

Inspections are planned in accordance with the actual situations of the production and distribution and/or consumption of items and carried out on a regular basis (in principle, about once a week, by designating a day of the week). As for items whose distribution period is limited, they are inspected in a period from 3 days prior to the first distribution to an early stage of the distribution. Other items are regularly inspected.

However, when radioactive materials exceeding or close to the provisional regulation values are detected, inspections are strengthened.

The government may separately instruct local governments on the frequency of inspections as needed.

III. The requirements for establishing items and areas to which restriction of distribution and/or consumption of foods concerned applies by the government

1. Items

When it is considered that the areas producing the items exceeding the provisional regulation values have been spread out, relevant areas and items become subject to restriction.

2. Areas

Prefectural areas are inspected, as a rule, considering that the obligation of labeling origins regulated under the Japan Agricultural Standards is by the unit of prefecture. However, prefectures can be divided into a multiple number of areas if they can be administered by prefectures and municipalities.

3. Consideration for the establishment of restrictions

(1) The establishment of restrictions is considered per item, based on inspection results.

(2) For consideration of the establishment of restrictions, inspection results are consolidated and their applicability with the requirements is judged in a comprehensive way. Instructions for additional inspections are given as necessary.

(3) When the territorial spread of items exceeding the provisional regulation values is uncertain, the surrounding areas are inspected to determine the need for the restriction of distribution and the areas where distribution is to be restricted.

(4) When a significantly high level of concentration is detected in items, the restriction of consumption is immediately established, regardless of the number of samples collected for the items concerned.

IV. Cancellation of items and areas to which restriction of distribution and/or consumption of food concerned applies by the government

1. Application for cancellations

The cancellations will be based on the application of the relevant local governments.

2. Areas in which cancellation applies.

Prefectures can be divided into a multiple zones, in the light of the actual situations of the shipments of the items.

3. Requirements for cancellations

(1) The restriction of distribution instructed based on the detected values of radioactive iodine

In principle, inspections are conducted in a multiple number of municipalities once a week per relevant zone, and the inspection results must indicate below the provisional regulation values for 3 consecutive times (Inspections must be conducted in municipalities where radioactive materials exceeding the provisional regulation levels were detected in the past. In other municipalities, in principle, inspections shall not be conducted in the same municipalities where inspections were implemented before.)

(2) The restriction of distribution instructed based on the detected values of radioactive cesium

In principle, inspection results obtained at 3 or more points per municipality in each zone concerned within the last one month must all indicate below the provisional regulation values. (Inspections must be conducted in municipalities where radioactive materials exceeding the provisional regulation levels were detected in the past).

The judgment of cancellation is determined in consideration with the status of the TEPCO's Fukushima No. 1 Nuclear Power Plant.

4. Inspections following the cancellation of restrictions

When radioactive materials exceed the provisional regulation values following the implementation of the same inspections as in above 3, necessary measures are taken.

V. Other

The government may separately give instructions to local governments on the matters from I to V as needed.

Attachment: Handling of individual items

a. Vegetables, fruits, and the like
   Attachment 1
b. Milk
   Attachment 2
c. Tea leaf
   Attachment 3
d. Fishery products
   Attachment 4
e. Wheat, Barley, and the like
   Attachment 5

f. Beef

Attachment 6

g. Rice

Attachment 7

Attachment 1

Vegetables, fruits, and the like

1. Inspection planning for the local governments concerned

Inspections are conducted on the major items and at the major producing areas, during a period from 3 days prior to the first distribution to an early stage of the distribution, in principle. When there is no problem, inspections are implemented at regular intervals per month.

2. The establishment of items and areas to which the government imposes restrictions on distribution and/or consumption

(1) Areas

The restrictions of distribution and/or consumption can be established or cancelled by unit with a clear geographical scope, such as a city, town, and village, if the restrictions can be administered by prefectures and municipalities, by taking into account the unit of distribution.

(2) Items

In principle, restrictions are established or cancelled by item. Also, they can be established or cancelled by items' groups, by setting indicator produces. In addition, restrictions can be established or cancelled by cultivation method, if prefectures and municipalities can administer them by distinguishing those grown in hothouses from those cultivated outdoors.

3. The cancellation of items and areas to which the government imposes restrictions of distribution and/or consumption

(1) Requirements for the cancellation

Taking into consideration that radioactive cesium in soil migrates to vegetables, fruits, and the like, requirements for cancelling restrictions of distribution and/or consumption shall be as follows:

a. In order to cancel restrictions on items within specific areas, 3 or more sampling points are selected per municipality in areas in which the items concerned are produced. (to the extent possible, samples are obtained at the same points where those samples used to decide restrictions of distribution were collected).

b. Samples are collected in each sampling point and inspected.

c. Restrictions on the items and areas concerned are cancelled when the results of inspections carried out within the last month show below the provisional regulatory values (including not detectable) at all sampling points of the items concerned within areas where the cancellation is being considered.

If the shipments of the items concerned in restricted areas is finished, restrictions of distribution and/or consumption can be cancelled, based on inspection results obtained 3days prior to the next distribution begins.

(2) Measures to be taken following the cancellation of restrictions

Samples are regularly collected and inspected while distribution continues even after restrictions have been lifted, and the results are made public.

As for the frequency of inspections, inspections are conducted, in general, once per month, when inspection results of radioactive iodine and radioactive cesium obtained in the last month all indicate below the provisional regulatory values in a stable manner.

Attachment 2

Milk

1. Inspection planning for the local governments concerned
   (1) Collection of samples

   Samples are collected by the unit of cooler station or dairy plant (or all those who directly distribute to dairy plant).
   (2) The frequency of inspections

   As a rule, samples are collected, in general, every 2 weeks on a continuous basis and inspected.

2. The requirements for establishing items and areas to which restriction of distribution and/or consumption of foods concerned applies by the government
   (1) Areas

   When prefectures are divided into a multiple number of areas, the restrictions of distribution and/or consumption can be established and/or cancelled by the unit of municipalities where cooler station or dairy plant(or all those who directly distribute to dairy plant) belong.
   (2) Consideration for the establishment of restrictions

   When, as a result of the inspections above 1, radioactive materials exceeding the provisional regulation values are detected, the need for additional inspections, the necessity for the restriction of distribution, and restricted areas are assessed, by taking into account inspection results obtained in other areas.

3. The cancellation of items and areas to which the government imposes restrictions of distribution and/or consumption
   (1) Requirements for the cancellation

   Samples are collected and analyzed by the unit of cooler station or dairy plant(or all those who directly distribute to dairy plant). When, as a result of the analyses meet criteria, restrictions of distribution and/or consumption are cancelled by the unit of municipalities where cooler station or dairy plant (or all those who directly distribute to dairy plant) belong.

   Radioactive iodine shall become less than 100Bq/kg (including not detectable) for 3 consecutive times.
   (2) Inspections following the cancellation of restrictions

   Even after the restriction is cancelled, samples are collected and analyzed on a regular basis, and the results are made public.

   As for the frequency of inspections, when inspection results of radioactive iodine and radioactive cesium obtained in the last month all indicate below the provisional regulatory values in a stable manner, the frequency of the inspections can generally be made to every 2 weeks.

Attachment 3

Tea leaf

1. Inspection planning for the local governments concerned

Tea leaves are inspected per harvest period, such as first flush tea and second flush tea. In principle, unrefined tea leaves are inspected one or more times, during a period from 3 days prior to distribution to the initial stage of the distribution, in the main production areas.

2. Requirements for establishing items and/or areas to which the government imposes restrictions of distribution and/or consumption

The restrictions of distribution and/or consumption can be established or cancelled by unit with a clear geographical scope, such as a city, town, and village, if the restrictions can be administered by prefectures and municipalities, by taking into account the unit of distribution.

3. Cancellation of items and/or areas to which the government imposes restrictions of distribution and/or consumption

(1) Requirements for the cancellation of restrictions

In order to cancel the restrictions of distribution of tea leaves cultivated in the next and following harvest periods, samples are collected, in principle, at 3 or more places in a municipality in an area where the cancellation of the restriction is being considered (to the extent possible, the samples are obtained at the same points where those samples used to decide restrictions of distribution were collected). Inspections are conducted based on these samples.

The restriction of the distribution is cancelled when, as a result of the inspections, the concentration level of radioactive cesium becomes less than the provisional regulatory values (or not detectable, and such) at all sampling points in an area where the cancellation of the restriction is being considered.

(2) Measures to be taken after cancellation

Even after the restrictions are lifted, tea leaves are inspected per harvest period, and the results are made public.

Attachment 4

Fishery products

1. The formulation of inspection plans and implementation of inspections

Inspections are conducted on the major items and at the major fishery sites in a planned manner as follows. When inspected, the items are distinguished between farmed-grown and naturally-grown ones, even when they are the same species.

(1) The designation of inspection areas

Inspection areas are designated as follows by taking into account the situations of the environmental monitoring.

1) Inland water fishes (e.g. Cherry salmon, Japanese smelt, and Ayu)

Prefectural areas are divided into appropriate zones, by taking into account of the ranges of fishery rights in rivers and lakes. Samples are then collected in the major areas per zone.

2) Coastal fishes

Prefectures' coasts are divided in to appropriate zones, by taking into consideration of fishery sites and seasons of the fisheries concerned and in the lights of the actual situations of the landing of captured fishes and the fishery managements (e.g. the ranges covered by fishery rights and the detail of fishery permission). Samples are then collected at the major landing ports in the zones concerned.

The main items are selected per fishery season, by taking into consideration of the fish habitats such as surface layer (e.g. juvenile sand lance), middle layer (e.g. sea bass and sea bream), deep layer (e.g. founder and conger eel), and for seaweed.

3) Migratory fishes (e.g. bonito, sardine and mackerel, saury, salmon)

Fishery sites extending from Chiba Prefecture to Iwate Prefecture are divided by prefectural offshore, (demarked by the east due lines originating from each prefectures' borders), by taking into consideration of the migratory habitats of fishes concerned. Samples are then collected at the major landing ports in the zones concerned.

(2) The frequecy of inspections

1) Inspections are carried out prior to the beginning of fishery seasons, by taking into consideration of the situation of the discharge of contaminated water from the nuclear power plant.

2) After the fishery seasons begin, inspections are conducted, in principle, once per week. When inspection results obtained in the last month indicate below the provisional regulatory values in a stable manner, the frequency of the inspections can be decreased (for example, to every 2 weeks).

2. The establishment of items and areas to which the government imposes restrictions on distribution and/or consumption

(1) Items and areas

In principle, the restrictions are established or cancelled by item and by the fishery site. Also, they can be established or cancelled with the distinction of farmed-grown fishes and naturally-grown ones.

In case the fish species is captured under the permission by the Minister of Agriculture and Fisheries, such as the case of migratory fishes, instructions to restrict distribution and/or consumption are issued to the Minister.

(2) Consideration for the establishment of restrictions

The following inspections are implemented per fishery site and fish species. Depending on the inspection results, the need for the instruction to restrict distribution and the zones of fishery sites where distribution is to be restricted are determined. Furthermore, the spread of radioactive contamination will be investigated as necessary.

1) Inland water fishes

By taking into account the ranges covered by fishery rights at the fishery sites where radioactive materials exceeding the provisional regulatory values were detected, the surrounding fishery sites (e.g. upper and lower streams of rivers, and the main stream and branches of rivers) are inspected.

2) Coastal fishes

By taking into account the actual situations of the landing of captured fishes, permission of fishery, and the ranges covered by fishery rights at the fishery sites where radioactive materials exceeding the provisional regulatory values were detected, the surrounding fishery sites are inspected.

3) Migratory fishes

Considering the impact of the nuclear power plant accident, and fish behavior that fishery sites move as fishes migrate, fishery sites (per prefectural offshore) where radioactive materials exceeding the provisional regulatory values were detected or the surrounding fishery sites are inspected.

Note: When the restriction of distribution is established, an instruction is given to properly indicate the fishery sites when labeling origins of the fishes concerned.

3. Requirements for the cancellation of items and areas to which the government imposes restrictions on distribution and/or consumption

(1) Areas where cancellation are to be cancelled

The fishery sites where cancellations are applied can be divided into a multiple zones, by taking into consideration of the situations of the landing of captured fishes and the fishery management

(e.g. the ranges covered by fishery rights and the detail of fishery permission).

(2) Requirements for the cancellations

1) Inland water fishes

In order to cancel the restrictions at fishery sites, in principle, a multiple number of fishing points of the fishery areas where the cancellation to be applied shall be inspected every week in general (about 3 times), by taking into account the fluctuations in the situation of the radioactive contamination due to the weather condition . Then, the inspection results obtained within the last one month must all indicate below the provisional regulation values. Points where radioactive materials exceeding the provisional regulation values were detected in the past shall be inspected (unless the samples cannot be collected).

2) Coastal fishes

In order to cancel restrictions at fishery sites, in principle, inspection results obtained at 3 or more points where the cancellation to be applied (limited to those inspected within the last one month) must all indicate below the provisional regulation values. In cases of sedentary shellfish, crustaceans, and seaweed, and low-migratory species, such as demersal fishes, points where radioactive materials exceeding the provisional regulation values were detected in the past shall be inspected (unless the samples can be collected).

3) Migratory fishes

In order to cancel restrictions at fishery sites, as a rule, inspection results obtained at 3 or more points where the cancellation to be applied (limited to those inspected within the last month) must all indicate below the provisional regulation values.

When the fishes concerned can no longer be captured in the restricted zones due to the migration of fishes from the restricted zones to the outside or the end of fishery seasons, the restrictions of distribution can be cancelled, based on inspection results obtained before the next fishery seasons of fishes concerned begin.

(3) Measures to be taken following the cancellation of restrictions

When fishery operations continue after the restrictions are cancelled, inspections are conducted according to 1-(2)-2), and the results are made public.

Attachment 5

Wheat, Barley, and the like

1. The plans and implementation of inspections for the local government concerned

Because almost entire wheat, barley, and the like are collected by agricultural cooperatives and sold to specific users, such as flour milling companies, safety can be checked by the unit of lot*. Therefore, inspections are conducted by the lot unit at the country elevators or storage warehouses.

*The lots for inspections are set up by the type of cereal per commercial collector, such as agricultural cooperatives. The lots are established by storage silo at country elevators. When the lots stored at storage warehouses, they are generally established with an upper limit of about 300 tons.

2. The implementation of inspections for all lots and measures to be taken based on inspection results

(1) The implementation method for all lots

The local governments implement inspections on all lots in areas where the following applies:

- The air radiation dose rates measured during the season of developing and blooming of wheat ears exceed the normal backgrounds (the level in which the air radiation dose rate becomes 0.1 μSv/h when it is calculated to two decimal places and rounded down to one decimal place); or
- The concentration of radioactive cesium in farmland soil (sampled at the depth of 15 cm from the surface soil) is 1,000 Bq/kg or above.

In addition, in areas other than the above, when the results of the first lot inspections carried out by the local governments exceed certain levels, they shall also inspect all lots.

(2) Measures to be taken based on inspection results

The lots which exceed the provisional regulation values based on the inspection results shall not be sold, in accordance with the Food Sanitation Act (restrictions of distribution based on the Act on Special Measures concerning Nuclear Emergency Preparedness are not applicable).

Attachment 6

Beef

1. Cancellation of items and/or areas to which the government imposes restrictions of distribution and/or consumption

The cancellation of shipment restriction related to beef exceeding the provisional regulation values due to rice straw contaminated by high concentrations of radioactive cesium shall be approved, if an appropriate feeding control is fully enforced after shipment restrictions are instructed, and applications for the partial cancellation of shipment restrictions are filed based on the setting up of the following safety management system for beef.

(1) In specifically designated areas, all cattle will be subject to testing. Only those beefs whose levels of radioactive cesium fall below the provisional regulation values will be approved for sale.

(2) In areas other than (1), all livestock farms will be subject to testing, in which at least one head of cattle will be tested in each farm in the first shipment. Only those farmers whose tested cattle show the levels of radioactive cesium sufficiently below the provisional regulation values will be approved to ship and slaughter their cattle. These farmers will continue to be subject to regular testing following such approval.

Attachment 7

Rice

1. Inspection planning for the local governments concerned

   Inspections of rice shall be implemented per municipality before its shipment begins.

   In this case, the local governments concerned shall determine municipalities subject to inspections and the number of the inspections, by taking into account the outcomes of investigations implemented prior to the harvesting of rice with consideration for the concentrations of cesium in soil and the results of environmental monitoring inspections.

2. Requirements for establishing items and/or areas to which the government imposes restrictions of distribution and/or consumption

   The restrictions of distribution and/or consumption can be established by unit with a clear geographical scope, such as municipalities or, former municipalities, if such restrictions can be administered by prefectures and municipalities.

3. Cancellation of items and/or areas to which the government imposes restrictions of distribution and/or consumption

   The restrictions of distribution of rice produced in fiscal year 2011 shall not be cancelled.

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The instructions associated with food by Director-General of the Nuclear Emergency Response Headquarters
(Restriction of distribution in Fukushima Prefecture)

As of 29 Aug 2011

			Restriction of distribution	
			Fukushima prefecture	
			whole area	Individual areas
raw milk			***3/21～ (excluding areas listed on the right cells)***	3/21～4/8 Kitakata-shi, Bandai-machi, Inawashiro-machi, Mishima-machi, Aizumisato-machi, Shimogo-machi, Minamiaizu-machi
				3/21～4/16 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kunimi-machi, Otama-mura, Koriyama-shi, Sukagawa-shi, Tamura-shi(excluding miyakoji area) , Miharu-machi, Ono-machi, Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Hirata-mura, Furudono-machi, Shirakawa-shi, Yabuki-machi, Izumizaki-mura, Nakajima-mura, Nishigo-mura, Samegawa-mura, Hanawa-machi, Yamatsuri-machi, Iwaki-shi
				3/21～4/21 Soma-shi, Shinchi-machi
				3/21～5/1 Minamisoma-shi (limited to Kashima-ku excluding Karasuzaki, Ouchi, Kawago and Shionosaki area), Kawamata-machi (excluding Yamakiya area)
				3/21～6/8 Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones), Kawauchi-mura (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant)
Vegetable	non-head type leafy vegetables, e.g. spinach, komatsuna	spinach, kakina	***3/21～ (excluding areas listed on the right cells)***	3/21～5/4 Shirakawa-shi, Iwaki-shi, Yabuki-machi, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Nishigo-mura, Izumizaki-mura, Nakajima-mura, Samegawa-mura
				3/21～5/11 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yugawa-mura, Yanaizu-machi, Mishima-machi, Kaneyama-machi, Showa-mura, Minamiaizu-machi, Shimogo-machi, Hinoemata-mura, Tadami-machi
				3/21～5/25 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones)
				3/21～6/1 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Furudono-machi, Miharu-machi, Ono-machi, Tenei-mura, Tamakawa-mura, Hirata-mura
				3/21～6/23 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-machi (excluding Yamakiya area) , Otama-mura
		all the other	***3/23～ (excluding areas listed on the right cells)***	3/23～5/4 Shirakawa-shi, Iwaki-shi, Yabuki-machi, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Nishigo-mura, Izumizaki-mura, Nakajima-mura, Samegawa-mura
				3/23～5/11 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yugawa-mura, Yanaizu-machi, Mishima-machi, Kaneyama-machi, Showa-mura, Minamiaizu-machi, Shimogo-machi, Hinoemata-mura, Tadami-machi
				3/23～5/25 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones)
				3/23～6/1 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Furudono-machi, Miharu-machi, Ono-machi, Tenei-mura, Tamakawa-mura, Hirata-mura
				3/23～6/23 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-machi (excluding Yamakiya area) , Otama-mura
	head type leafy vegetables, e.g. cabbage		***3/23～ (excluding areas listed on the right cells)***	3/23～4/27 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yugawa-mura, Yanaizu-machi, Mishima-machi, Kaneyama-machi, Syouwa-mura, Minamiaizu-machi, Shimogou-machi, Hinoemata-mura, Tadami-machi
				3/23～5/4 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Iwaki-shi, Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Furudono-machi, Miharu-machi, Ono-machi, Tenei-mura, Tamagawa-mura, Hirata-mura
				3/23～5/11 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-machi (excluding Yamakiya area) , Otama-mura, Shirakawa-shi, Yabuki-machi, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Nishigo-mura, Izumizaki-mura, Nakajima-mura, Samegawa-mura
				3/23～5/25 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones)
	flowerhead brassicas, e.g. broccoli, cauliflower		***3/23～ (excluding areas listed on the right cells)***	3/23～4/27 Shirakawa-shi, Yabuki-machi, Nishigou-mura, Izumizaki-mura, Nakajima-mura, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Samegawa-mura
				3/23～5/4 Iwaki-shi
				3/23～5/11 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Kagamiishi-machi, Tenei-mura, Ishikawa-machi, Tamagawa-mura, Hirata-mura, Asakawa-machil, Furudono-machi, Miharu-machi, Ono-machi
				3/23～5/18 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yukawa-mura, Yanaidu-machi, Mishima-machi, Kanayama-machi, Syowa-mura, Minamiaizu-machi, Shimogo-machi, Hinoemata-mura, Tadami-machi
				3/23～6/15 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones), Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-mura (excluding Yamakiya area), Otama-mura
	turnip		***3/23～ (excluding areas listed on the right cells)***	3/23～5/4 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Iwaki-shi, Kori-machi, Kunimi-machi, Kawamata-machi (excluding Yamakiya area), Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Furudono-machi, Miharu-machi, Ono-machi, Otama-mura, Tenei-mura, Tamakawa-mura, Hirata-mura
				3/23～5/18 Shirakawa-shi, Yabuki-machi, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Nishigo-machi, Izumizaki-mura, Nakajima-mura, Samekawa-mura, Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yukawa-mura, Yanaidu-machi, Mishima-machi, Kanayama-machi, Syowa-mura, Minamiaizu-machi, Shimogo-machi, Hinoemata-mura, Tadami-machi
				3/23～6/23 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones)
	log-grown shiitake (grown outdoor)		—	***4/13～: Date-shi, Iitate-mura, Soma-shi, Minamisoma-shi, Namie-machi, Futaba-machi, Okuma-machi, Tomioka-machi, Naraha-machi, Hirono-machi, Kawamata-machi, Katsurao-mura, Tamura-shi (limiting area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Kawauchi-mura (limiting area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant)***
				4/18～: Fukushima-shi
				4/13～4/25 Iwaki-shi
				4/25～: Motomiya-shi
				4/13～5/16 Shinchi-machi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant,
				4/13～5/23 Kawauchi-mura (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant,
	log-grown shiitake (hothouse cultivation)		—	***7/19～ Date-shi, Motomiya-shi***
				7/22～ Shinchi-machi
	bamboo shoot		—	***5/9～: Date-shi, Soma-shi, Miharu-machi***
				5/13～ Minamisoma-shi, Motomiya-shi, Kori-machi, Kawamata-machi, Nishigo-mura
				5/9～5/30 Hirata-mura
				5/9～6/8 Iwaki-shi
				5/9～6/21 Tenei-mura
				5/13～6/21 Kunimi-machi
	ostrich fern		—	***5/9～: Fukushima-shi, Kori-machi***
	ume		—	***6/2～: Fukushima-shi, Date-shi, Kori-machi***
			—	***6/8～: Soma-shi, Minamisoma-shi***
	yuzu		—	***8/29～: Fukushima-shi, Minamisoma-shi***
Fishery product	sand lance (juvenile)		***4/20～***	
	cherry salmon yamame (excluding farmed fish)		-	***6/6～: Akimoto Lake, Hibara Lake, Onogawa Lake and rivers flowing into these Lakes, Nagase River (limiting upper reaches from the junction with Su River), Abukuma River (including its branches but limiting inside Fukushima prefecture)***
				6/17～: Mano River (including its branches)
	japanese dace		-	***6/17～: Mano River (including its branches)***
				6/27～: Abukuma River (limiting lower reaches from Shinobu Dam but including its branches)
	ayu (excluding farmed fish)		-	***6/27～: Abukuma River (limiting lower reaches from Shinobu Dam but including its branches), Mano River (including its branches), Niida River (including its branches)***
meat・egg	beef		***7/19～ (8/25 Excluding cattle which are managed based on shipment and inspection policy set by Fukushima prefecture)***	

＊Instructions still imposed are expressed in Italic type.

The instructions associated with food by Director-General of the Nuclear Emergency Response Headquarters
(Restriction of distribution in prefectures other than Fukushima Prefecture)

As of 29 Aug 2011

			Restriction of distribution													
			Ibaraki prefecture		Tochigi prefecture		Gunma prefecture		Chiba prefecture		Kanagawa prefecture		Miyagi prefecture		Iwate prefecture	
			whole area	individual areas	whole area	individual areas	whole area	individual areas	whole area	individual areas	whole area	individual areas	whole area	individual areas	whole area	individual areas
raw milk			3/23～4/10		–	–	–	–	–	–	–	–	–	–	–	–
vegetable	non-head type leafy vegetables, e.g. spinach, komatsuna	spinach	3/21～4/17 excluding areas listed on the right cells)	3/21～6/1 Kitaibaraki-shi, Takahagi-shi	3/21～4/27	3/21～4/21 Nasushiobara-shi, Shioya-machi	3/21～4/8	–	–	4/4～4/22 Asahi-shi, Katori-shi, Tako-machi	–	–	–	–	–	–
		kakina	3/21～4/17	–	3/21～4/14	–	3/21～4/8	–	–	–	–	–	–	–	–	–
		garland chrysanthemum, qing-geng-cai, sanchu asian lettuce	–	–	–	–	–	–	–	4/4～4/22 Asahi-shi	–	–	–	–	–	–
	parsley		3/23～4/17	–	–	–	–	–	–	4/4～4/22 Asahi-shi	–	–	–	–	–	–
	celery		–	–	–	–	–	–	–	4/4～4/22 Asahi-shi	–	–	–	–	–	–
meat	beef		–	–	*6/2～ (8/25 Excluding cattle which are managed based on shipment and inspection policy set by Tochigi prefecture)*	–	–	–	–	–	–	–	*7/28～ (8/19 Excluding cattle which are managed based on shipment and inspection policy set by Miyagi prefecture)*	–	*8/1～ (8/25 Excluding cattle which are managed based on shipment and inspection policy set by Iwate prefecture)*	–
others	tea leaf		*6/2～*	–	–	*6/2～ Kanuma-shi, Ootawara-shi 7/8～ Tochigi-shi*	–	*6/30～ Shibukawa-shi, Kiryu-shi*	–	*6/2～ Noda-shi, Narita-shi, Yachimata-shi, Tomisato-shi, Sammu-shi, Oomishirasato-machi 7/4～ Katsuura-shi*	–	*6/2～ Odawara-shi, Aikawa-machi, Manazuru-machi, Yugawara-machi, Kiyokawa-mura 6/23～ Sagamihara-shi, Matsuda-machi, Yamakita-machi 6/27～ Nakai-machi 6/2～8/29 Minamiashigara-shi*	–	–	–	–

Attachment II-16

The instructions associated with food by Director-General of the Nuclear Emergency Response Headquarters
(Restriction of consumption in Fukushima Prefecture)

As of 29 Aug 2011

		Restriction of consumption	
		Fukushima prefecture	
		whole area	individual areas
vegetable	non-head type leafy vegetables, e.g. spinach, komatsuna	***3/23～ (excluding areas listed on the right cell)***	3/23～5/4 Shirakawa-shi, Iwaki-shi, Yabuki-machi, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Nishigo-mura, Izumizaki-mura, Nakajima-mura, Samegawa-mura 3/23～5/11 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yugawa-mura, Yanaizu-machi, Mishima-machi, Kaneyama-machi, Showa-mura, Minamiaizu-machi, Shimogo-machi, Hinoemata-mura, Tadami-machi 3/23～5/25 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones) 3/23～6/1 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Furudono-machi, Miharu-machi, Ono-machi, Tenei-mura, Tamakawa-mura, Hirata-mura 3/23～6/23 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-machi (excluding Yamakiya area) , Otama-mura
	head type leafy vegetables, e.g. cabbage	***3/23～ (excluding areas listed on the right cell)***	3/23～4/27 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yugawa-mura, Yanaizu-machi, Mishima-machi, Kaneyama-machi, Syouwa-mura, Minamiaizu-machi, Shimogou-machi, Hinoemata-mura, Tadami-machi 3/23～5/4 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Iwaki-shi, Kagamiishi-machi, Ishikawa-machi, Asakawa-machi, Furudono-machi, Miharu-machi, Ono-machi, Tenei-mura, Tamagawa-mura, Hirata-mura 3/23～5/11 Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-machi (excluding Yamakiya area), Otama-mura, Shirakawa-shi, Yabuki-machi, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Nishigo-mura, Izumizaki-mura, Nakajima-mura, Samegawa-mura 3/23～5/25 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones)
	flowerhead brassicas, e.g. broccoli, cauliflower	***3/23～ (excluding areas listed on the right cell)***	3/23～4/27 Shirakawa-shi, Yabuki-machi, Nishigou-mura, Izumizaki-mura, Nakajima-mura, Tanagura-machi, Yamatsuri-machi, Hanawa-machi, Samegawa-mura 3/23～5/4 Iwaki-shi 3/23～5/11 Koriyama-shi, Sukagawa-shi, Tamura-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant), Kagamiishi-machi, Tenei-mura, Ishikawa-machi, Tamagawa-mura, Hirata-mura, Asakawa-machil, Furudono-machi, Miharu-machi, Ono-machi 3/23～5/18 Aizuwakamatsu-shi, Bandai-machi, Inawashiro-machi, Kitakata-shi, Kitashiobara-mura, Nishiaizu-machi, Aizumisato-machi, Aizubange-machi, Yugawa-mura, Yanaizu-machi, Mishima-machi, Kaneyama-machi, Syouwa-mura, Minamiaizu-machi, Shimogou-machi, Hinoemata-mura, Tadami-machi 3/23～6/15 Shinchi-machi, Soma-shi, Minamisoma-shi (excluding area within 20 km radius from the TEPCO's Fukushima Daiichi Nuclear Power Plant and Planned Evacuation Zones), Fukushima-shi, Nihonmatsu-shi, Date-shi, Motomiya-shi, Kori-machi, Kunimi-machi, Kawamata-mura (excluding Yamakiya area), Otama-mura
	log-grown shiitake (grown outdoor)	–	***4/13～*** *Iidate-mura*
fishery product	sand lance (juvenile)	***4/20～***	

＊Instructions still imposed are expressed in Italic type.

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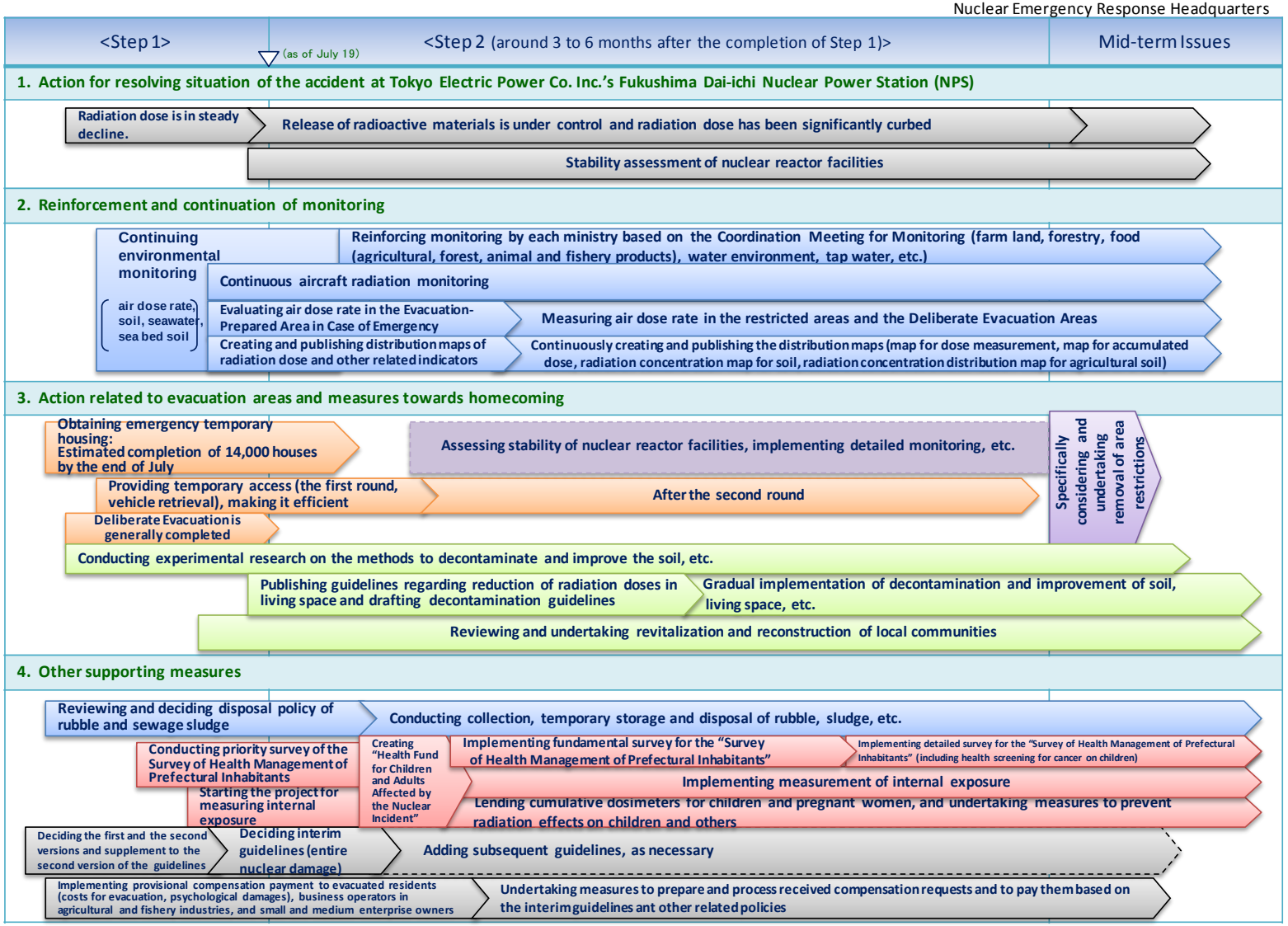
Roadmap for Immediate Action for the Assistance of Residents Affected by the Nuclear Incident (As of July 19)

July 19, 2011
Nuclear Emergency Response Headquarters



Attachment IV-1

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Main Points of the Progress Status of the "Roadmap for Immediate Actions for the Assistance of Residents Affected by the Nuclear Incident"

August 17, 2011
Nuclear Emergency Response Headquarters

Implementation timelines and achievement status of each action as of August 17

1. Reassessment of Evacuation Areas

•The instruction of all Evacuation-Prepared Areas in Case of Emergency will be lifted once municipalities have drafted a Recovery Plan
•Deliberate Evacuation Areas and Restricted Areas will be reassessed once Step 2 is complete

- On August 9, the Nuclear Emergency Response Headquarters signed off on "The Basic Approach to Reassessing Evacuation Areas".
- The plan is to lift the instruction of all Evacuation-Prepared Areas in Case of Emergency at same time in close consultation with the local governments involved, taking into account the drafting of Recovery Plans by the municipalities.
- Reassessment of Restricted Areas and Deliberate Evacuation Areas will take place following the completion of Step 2. Efforts geared towards decontamination and recovery of everyday life environment will, however, be pursued ahead of time.

Policy decided

2. Obtaining emergency temporary housing

Estimated completion of 15,200 houses by the first half of August

- As of August 8, construction has started 13,949 units (of these, construction is complete on 12,810 units).

Largely proceeding according to plan

3. Providing temporary access

Completion of the first round by the end of Step 1, including retrieval of vehicles and other property

- The headquarters are aiming for an August start for access to the 3km Zone, with all due safeguards taken for the safety of people entering the area.
- The first round of access for residents was completed on 8/12. Subsequently, for those who were not able to access the area for certain reasons and those who are to retrieve private vehicles, a first round of temporary access is scheduled no later than the beginning of September. A second round of temporary access is scheduled following the completion of the first round.

1st round of resident access is complete

4. Conducting Deliberate Evacuation

We are aiming for completion of deliberate evacuation by the end of Step 1.

- Resident evacuation is almost complete in all 5 municipalities that were wholly or partially designated as Deliberate Evacuation Areas.

Almost complete

- A response policy was decided on June 16, regarding specific spots ("Specific Spots Recommended for Evacuation") where the cumulative dose over a 1-year period following the accident is estimated to exceed 20mSv but are limited in geographic scope. 104 sites (113 households) in the city of Date were designated as specific spots and notified on June 30, 122 spots (131 households) in the city of Minamisoma on July 21 and August 3, and 1 spot (1 household) in the village of Kawauchi on August 3.

Currently being implemented

5. Maintaining order in evacuation areas

Implementation of a safety watch until controls on evacuation areas are removed

- A “Special Security Team” (of approximately 300 individuals) was organized to maintain public safety in evacuation areas, and are conducting questioning suspects, implementing movable checkpoints, etc.
- Neighborhood watch patrols are undertaken by residents of the Deliberate Evacuation Areas.

Currently being implemented

6. Managing the health of local residents

Estimation of the exposure dose of residents from Step 1 to the middle of Step 2

- In light of request from Fukushima Prefecture, about 78.2 billion yen from the secondary supplementary budget proposal was appropriated to the “Health Fund for Children and Adults Affected by the Nuclear Accident” created by Fukushima Prefecture in order to ensure health of residents, including children.
- Investigation to assess the method of evaluation of exposure levels has been conducted since June 27.

Currently being implemented

7. Disposal of rubble and sludge

Review of policy and beginning of step-by-step implementation of disposal

- Disposal policy for disaster-related waste in Naka-Dori and Hama-Dori areas (except for the evacuation areas and the Deliberate Evacuation Areas, and 10 villages that have already started disposal) was decided on June 23.
- Temporary measures for sludge and other byproducts of water and sewage treatment were determined on June 16.

Policy partly decided -> Implementation started

8. Managing schoolyard and playground soil

Sequential implementation of responses from Step 1 through Step 2

- Cumulative dosimeters were distributed to every school and other educational institutions throughout Fukushima Prefecture. Schools and other educational institutions with hourly air dose rate of 1 mSv or higher are subject to distribution of cumulative dosimeters even outside of Fukushima Prefecture.
- The secondary supplementary budget includes financial support (about 5 billion yen) for schoolyards, playgrounds, etc. (including those outside of Fukushima Prefecture) that may undergo soil dose reduction. In addition, about 18 billion yen is appropriated for payout to the “Health Fund for Children and Adults Affected by the Nuclear Accident” in order to support soil dose reduction projects in parks, school zones, etc.

Currently being implemented

9. Conducting environmental monitoring

Continuation of environmental monitoring and assessment, creation and publication of dose measurement map and other related maps

- A monitoring coordination meeting was held, and a "Total Monitoring Plan" was developed (on August 2).
- Air dose rate measurements and soil surveys were started on June 6 in order to create a distribution map of radiation dose and other related indicators (A map for air dose rate was released on August 2. A radiation concentration map for soil is scheduled for release in August.).
- Ongoing checks are being conducted for radioactive materials in food products and tap water.
- The secondary supplementary budget includes appropriations for funding needed to enhance environmental monitoring (approximately 23.5 billion yen).

Currently being implemented

10. Ensuring employment

Pursuit of the creation of about 20,000 jobs in Fukushima prefecture

- 26 economic organizations in manufacturing, retail and other sectors were strongly encouraged to create job opportunities in Fukushima Prefecture (on May 26). In addition, joint job fairs and other related events are being implemented in the prefecture.
- In Fukushima Prefecture, job creation fund projects have resulted in planned hiring of 11,000 and hiring of 4,428 as of end of July.

Currently being implemented

11. Agricultural, livestock and fishery industries, etc.

•Bridge loans by Japan Agricultural Co-operatives (JA) and Japan Fisheries Cooperatives (JF) groups
•Implementation of emergency support measures regarding the identification of cesium exceeding provisional limits in beef and rice straw

- Bridge loans are being offered by JA and JF groups to support the business operators in agricultural, forestry and fishery industries subjected to shipment suspension, and approximately 450 loans have been made as of August 8.
- In response to the identification of cesium exceeding provisional limits in beef and rice straw, emergency support measures were issued on July 26. As the number of prefectures ordered to suspend beef shipments rose to four, new measures including support for livestock producers' group in the concerned prefectures for virtually buying up beef that have become too old for shipment were issued on August 5.

Currently being implemented

12. Measures for small and medium enterprises

Recovery support and financing support for factories and stores, etc.

- As of August 5, the Organization for Small & Medium Enterprises and Regional Innovation received restoration requests from 30 locations in 13 cities, towns and villages. Work has begun on 12 locations, and of these, 2 had been completed on August 10.
- A special support system was established to provide small and medium enterprise owners with their place of business in the restricted area, with long-term no-collateral, no-interest loans. As of August 4, 225 applications have been received and the amount applied for has been about 5.5 billion yen.

Currently being implemented

13. Export assistance and measures defending against damaging rumors

Enhancement of inspection and analysis systems, and domestic as well as international communication of accurate information

- Domestic export professionals are being informed about regulations against Japanese products on a country-by-country basis, while also being served by a contact office that dispenses individual advice. A system of certificate issuance for countries that demand proof of geographic origin for products is also being organized.
- Domestic and international communication of accurate information is being implemented, as well as a subsidy for export inspection expenses, etc.

Currently being implemented

14. Measures for affected municipalities

Assistance for affected municipalities and those accepting residents affected by the nuclear incident

- The "Act on Measures Involving Residents with a Change of Address and Special Exemption from Administrative Processing of Evacuees, as a Means of Coping with the Nuclear Power Plant Accident Resulting from the Great East Japan Earthquake" came into effect on August 5, and a system was structured for receiving municipalities to provide proper government services to evacuees.

Currently being implemented

15. Compensation pursuant to the Act on Compensation for Nuclear Damage

•Guideline creation, and prompt enforcement of related laws
•Provisional payments by TEPCO to business operators and other parties concerned

- On August 5, the Dispute Reconciliation Committee for Nuclear Damage Compensation established interim guidelines which indicate the full scope of the nuclear damage.
- The "Act on the Nuclear Damage Compensation Facilitation Corporation" was enacted on August 3.
- The "Act on Emergency Measures Related to the Damage Due to the 2011 Nuclear Accident" was enacted on July 29.
- The secondary supplementary budget includes 120 billion yen in compensation based on the government compensation agreement.

Currently being implemented

- Tokyo Electric Power Company (TEPCO) started making provisional payments to agricultural, forestry and fisheries operators on May 31 (8.1 billion yen have been paid).
- TEPCO started making provisional payments to small and medium enterprise owners on June 10 (6.7 billion yen have been paid).
- TEPCO started making provisional payments to 50,000 evacuee households in April. Additional provisional compensation payments to 14,000 evacuees were started in July.

Currently being implemented

16. Working towards homecoming

Incremental implementation of measures such as a verification research of decontamination methods

- A decision was made to finalize a basic policy on decontamination during the month of August if possible, and carry out thorough and ongoing decontamination through a partnership of involved parties.
- A proposal was formulated on June 25 at discussions held by the Reconstruction Design Council in Response to the Great East Japan Earthquake.
- With enactment of the Basic Act on Reconstruction from the Great East Japan Earthquake (June 24), the Reconstruction Headquarters in Response to the Great East Japan Earthquake was established along with Local Reconstruction Headquarters in Iwate, Miyagi and Fukushima Prefectures.
- On July 29, a "Basic Policy on Reconstruction Following the Great East Japan Earthquake," is under consideration.

Currently being implemented

Attachment IV-3

23 MEXT SU No. 452
August 26, 2011

Governor of Fukushima Prefecture

School Superintendent, Fukushima Board of Education

President of the Act on National University Corporations having Attached Schools in Fukushima

President of National Technical Colleges

Head of Local Governments authorized under Paragraph 1, Article 12 of the Act on Special Districts for Structural Reform, having jurisdiction of school establishment companies for establishing elementary and junior high schools in Fukushima

Kumiko Bando
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On Reduction of Dose Rate in School Building and School Yard of School in Fukushima Prefecture (Notice)

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has just announced “Provisional Concept on Utilization of School Building and School Yard, etc. of Schools in Fukushima Prefecture” (Dated April 19, 2011, MEXT SU No. 134, hereinafter called “provisional concept”) upon receiving the concept of the Nuclear Emergency Response Headquarters in light of the advice from and statement made by the International Commission

on Radiological Protection (ICRP) and the advice from the Nuclear Safety Commission (NSC).

This is to make the new concept known based on the recent reduction in radiation dose in school building and school yard.

1. Recent actions

(1) Provisional concept

In the provisional concept dated April 19, having determined that the radiation dose that children receive must be reduced as much as possible, we announced that, based on the investigation results of the radiation doses at schools, the schools that recorded air dose rates of 3.8 μSv or more (per hour) at their yards should limit outdoor activities (*1) in and outside of the schools as much as possible, to about one hour per day, for example.

(2) Actions on soil contamination at school and kindergarten yards

Regarding actions on soil contamination at school and kindergarten yards, on May 11 MEXT showed two effective methods for lowering radiation dosages: (a) the method of placement under the ground in focused way and (b) up-and-down substitution method, based on the results of the field investigation by the Japan Atomic Energy Agency (JAEA) in collaboration with Fukushima University. Also, for the schools that measured an air dose rate of 1 μSv or more (per hour) at their yards, we will financially support the personnel who take actions to reduce the radiation dose that children receive at school and kindergarten yards, within the framework of the reconstruction of disaster stricken school facilities, in accordance with “Immediate Actions for Reducing Doses Received by Pupils and Students at School, etc. in Fukushima Prefecture” (administratively informed on May 27, 2011).

(3) Dosage monitoring in schools

Based on the provisional concept and advice from the Nuclear Safety Commission, in coordinate work with the JAEA, we have been conducting a dose rate check at schools, etc., where a spacial dose rate higher than a certain level was detected at the time of the Accident. As part of this check, we ask school teachers to carry simplified integrating dose rate meters to measure the dosage to which children are actually received. In addition, in June we started the same dosage measurement using

integrating dose rate meters at all elementary schools and junior high schools other than those mentioned above in Fukushima prefecture (*2).

(4) Other measures

MEXT has invited experts in protection against radiation, school hygiene, risk-handling communication, etc., to ask them to hold a hearing (Attachment 1) for discussing the use of school facilities, basic ideas of daily life, and current school activities and extracurricular activities. Meanwhile, the JAEA is holding a "Seminar on Radiation-Related Questions," where researchers and engineers answer questions from parents and school teachers of children in Fukushima prefecture. These measures are for helping people understand more about radiation.

2. Current situation and future policy

(1) Current situation

The provisional concept is the tentative policy aimed at the period between April and late August (end of summer vacation) in 2011, during which the measures described in Paragraph 1 above are put in practice. The dosage monitoring has brought a clear picture of radiation dose conditions and indicated a specific method of removing contaminated soil from school and kindergarten yards, thus contributed to the progress in soil removal work. Hence, in regions where schools have restarted, we now find that there are no schools with school and kindergarten yards, where a spacial dose rate of 3.8 μSv/hour or more is detected.

While a dose rate of 1 to 20 mSv per year is indicated by an ICRP recommendation as a post-emergency reference dose level, we have to make efforts to reduce this dose rate to 1 mSv per year. The Nuclear Emergency Response Headquarters set the basic policy on future decontamination efforts in all aspects of life including school activities, in the "Emergency Basic Policy on Decontamination" (issued on August 26) (Attachment 2), and also issued the "Guidelines for Decontamination Implemented by Municipalities" (on August 26) (Attachment 3), which concludes the role of the provisional concept. Under these circumstances, it is important to continue endeavoring to reduce the radiation dose at local schools where children spend much time.

(2) Future policy

1) Guide for the dosage to which children are received in schools and measures to take

Based on the facts described above, we have set a maximum dose to which children can be received after summer vacation ends. The allowable dose should in principle be within 1 mSv per year (*3). To achieve this, we have set a target spacial dose rate at school and kindergarten yards of 1 μSv/hour, taking the behavioral patterns of children (*4) into account.

Although a spacial dose rate of over 1 μSv/hour dose not lead to immediate restrictions on outdoor activities, such a condition calls for quick decontamination measures, etc., as a desirable step to take.

2) Ascertaining locations where dosage is concentrated and decontamination activities at such locations

Schools have locations where radiation dose is locally concentrated compared to school and kindergarten yards. This raises the issue of ascertaining such locations and decontaminating the locations as we proceed with the policy of reducing dosages as much as possible in a streamlined manner.

Therefore, in terms of providing children with a safe and secure school life, it is important to measure dose rates at school facilities to identify locations where radiation dose is locally concentrated and to prevent children from approaching the identified location until it is decontaminated.

Such decontamination activities can be carried out by school staff and local residents. There are publications helpful in carrying out dosage measurement and decontamination, which include the “Basic Idea Concerning Living Environment Cleaning Activities (Decontamination) in Fukushima Prefecture (Except Restricted Areas and Deliberate Evacuation Areas)” (issued on July 15 by the Nuclear Emergency Response Headquarters) and the “Guidelines for Reducing Radiation in Living Spaces” (issued on July 15 by the Fukushima Anti-Disaster Headquarters).

It is appropriate to implement such decontamination activities based on the ICRP concept that “Exposure to radiation should be kept to as low a level as can be achieved with social and economic elements taken into consideration” (principle of optimized protection from radiation exposure).

3) MEXT's next step

At the Ministry level, in addition to providing financial support to radiation reduction measures for the soil of school and kindergarten yards, we are scheduled to prepare and publish the "Guidance on radiation measurement at schools and other such facilities" in cooperation with the JAEA, which describes the measurement methods for average air dose rates at schools etc., and methods to keep track of micro-scale hotspots, which present high dose rates, such as areas under rain gutters and around plants. Further, we will install real-time radiation monitoring systems at schools etc., in Fukushima Prefecture, portable monitoring posts in Fukushima and its neighboring prefectures, and survey meters at municipalities in Fukushima Prefecture to reinforce the monitoring system. Please make full use of these systems in combination with resources including the "Health Fund for Children and Adults in Fukushima Prefecture Affected by the Nuclear Accident."

Based on the above, we would like to ask operators that establish schools to make efforts to reduce radiation doses received by children based on the principle of optimization of protection.

We also request that the Governor of Fukushima Prefecture, the Chairperson of the Fukushima Prefectural Board of Education, and the heads of local public bodies that were authorized under Paragraph 1, Article 12 of the Act on Special Districts for Structural Reform and that supervise the operators of institutions that establish elementary, junior high, and high schools in Fukushima Prefecture make sure that the Municipal Boards of Education and operators establishing schools such as incorporated educational institutions that operate private schools under the jurisdiction of the authorities are informed concerning the present notification (*5).

*Note 1: It has been determined that school buildings and school yards of schools located within Evacuation Area and Deliberate Evacuation Area should not be used.

*Note 2: The latest radiation monitoring information is updated on the MEXT website.

*Note 3: This includes internal and external exposures at schools, and does not include exposure to naturally occurring or medical radiation. The values are those after summer vacation.

*Note 4: The pattern is based on the total number of days of school attendance per year being 200 days, and the average number of hours at school being 6.5 hours (4.5 hours indoors and 2 hours outdoors).

* Note 5: It is desired that measures be taken for vocational schools and other miscellaneous categories of schools using Paragraphs 2 (1) and (2) above as a guide.

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Attachment IV-4

Children and Families Bureau Announcement: No. 0826-3
August 26, 2011

Governor of Fukushima Prefecture,
Mayor of Koriyama City, and
Mayor of Iwaki City

Director General,
Equal Employment, Children and Families Bureau,
Ministry of Health, Labour, and Welfare

Notice: Reducing radiation doses at child-care facility buildings and playgrounds in Fukushima Prefecture

Having received the opinion of the Nuclear Emergency Response Headquarters (which is based on advice and statements from the International Commission on Radiological Protection (ICRP) and advice from the Nuclear Safety Commission), the Ministry of Health, Labour, and Welfare has issued a notice entitled the Provisional Policy on the Use of Child-Care Facility Buildings and Playgrounds in Fukushima Prefecture (Children and Families Bureau Announcement No. 0419-4, April 19, 2011; hereinafter referred to as the "Provisional Policy").

This notice updates the previous policy based on the recent reduction in the radiation doses found at child-care facility buildings and playgrounds.

1. Responses up to this date

(1) Provisional Policy

In the Provisional Policy issued on April 19, the Ministry of Health, Labour, and Welfare stressed the importance of reducing children's exposure to radiation as much as possible. It also explained, based on a survey on radiation doses in child-care facilities, that it is important to restrict outdoor activities in and around child-care facilities that have playgrounds with an air dose rate (*1) of 3.8 μSv/hr or higher to, for example, one hour a day.

(2) Measures regarding soil in child-care facility playgrounds

Based on a survey conducted by the Japan Atomic Energy Agency (JAEA) with the cooperation of Fukushima University, the Ministry of Education, Culture, Sports, Science and Technology announced on May 11 two measures to reduce the radiation doses of soil in school and kindergarten playgrounds: the collection and concentrated storage of such soil underground; and the replacement of upper soil layers with lower soil layers. On May 27, the ministry also announced its Immediate Measures to Reduce Exposure Doses for Children and Students Attending Schools in Fukushima Prefecture. Accordingly, the Children and Families Bureau issued a notice entitled Immediate Measures to Reduce Exposure Doses for Children at Child Welfare Facilities in Fukushima Prefecture (Office Memo, June 6, 2011). In this notice, the bureau offered to provide financial support (through a framework for the provision of disaster recovery work for child welfare facilities) to child-care facilities that have playgrounds with an air dose rate of 1.0 μSv/hr or higher and that attempt to introduce measures that will reduce the exposure doses that children in their care are exposed to through soil in their playgrounds.

(3) Monitoring of radiation at child-care facilities

Based on the Provisional Policy and in accordance with the advice of the Nuclear Safety Commission, the bureau has carried out surveys continuously with the cooperation of the JAEA at child-care facilities where air dose rates in excess of a specified level had initially been observed, and has measured the actual exposure doses of children by asking nursery staff members to carry handy integrating dosimeters. Additionally, the bureau has been taking similar measurements with integrating dosimeters at other child-care facilities in Fukushima prefecture since June. (*2)

2. Current situation and future measures

(1) Current situation

The Provisional Policy was a temporary measure for April to the end of August 2011. The measures described in Paragraph 1 above were taken during this period. These activities clarified the situation with regard to radiation through monitoring of the environment, and also helped in the development of concrete methods for removing contaminated soil from child-care facility playgrounds. Thanks to these methods, the removal of such soil has been carried out extensively, such that there are presently no

longer any child-care facilities that have playgrounds with an air dose rate of more than 3.8 μSv/hr.

Meanwhile, the bureau needs to continue its efforts to reduce radiation doses to 1 mSv/year, given that the dose the ICRP gives as a reference level for what is acceptable in the aftermath of an emergency is 1 to 20 mSv/year. The Nuclear Emergency Response Headquarters established the Basic Policy for Emergency Response on Decontamination Work on August 26, 2011 to address the decontamination of not only schools and child-care facilities, but also other places that are important in peoples' everyday lives. This body stated in its Guidelines for Decontamination Work at Local Municipalities (August 26, 2011) that the Provisional Policy has put an end to its role. Nonetheless, it is still important for local communities to continue working to reduce radiation doses at child-care facilities and other facilities where children spend a lot of time.

(2) Future measures

1) Estimated radiation doses to which children are exposed at child-care facilities and measures to address the issue

Given the above, the maximum radiation dose that children should be exposed to at child-care facilities from now on is 1 mSv or less per year (*3). To achieve this target, the spatial dose rate at child-care facility playgrounds should, taking into account the action patterns of children (*4), be restricted to 1 μSv/hr or less.

Even if the rate exceeds 1 μSv/hr, outdoor activities do not need to be restricted, but the prompt implementation of measures such as decontamination is advisable.

2) Identification and decontamination of areas with high local radiation doses

Some child-care facilities may have areas with higher local radiation doses than their playgrounds do. Given this, identification and decontamination of such places may be necessary in the future in order to reduce radiation doses to as low as level as is reasonably possible.

To enable children to lead safer and more comfortable lives, it is therefore important that measures such as the following be implemented at child-care facilities with areas that may have relatively higher radiation doses: identification of such areas by measuring radiation doses within the facilities; decontamination of such areas; and restriction of access to such areas until decontamination has been completed.

It may be possible for such decontamination activities to be carried out by persons employed at the child-care facilities, local residents, or others. The following may prove useful with regard to the measuring of radiation doses and decontamination work: Basic Approach to Cleaning Activities (Decontamination) in Residential Areas of Fukushima Prefecture (with the exception of Restricted Area and Deliberate Evacuation Area) (established by the Nuclear Emergency Response Headquarters on July 15, 2011), Guidelines for Radiation Reduction Measures in Living Spaces (established by the Emergency Response Headquarters of Fukushima Prefecture on July 15, 2011), etc.

It is advisable that decontamination and other activities be conducted in accordance with the ICRP's belief that radiation exposure should be reduced to as low a level as is reasonably possible given the social and economic factors (protection optimization principle).

3) Future response by the Ministry of Health, Labour and Welfare

The Ministry of Health, Labour and Welfare will provide financial support for measures aimed at reducing the radiation doses of soil in child-care facility playgrounds, while also improving the monitoring system in conjunction with the Ministry of Education, Culture, Sports, Science and Technology. The use of these services in combination with other services such as the Fund for the Health of Nuclear Disaster Victims and Children in Fukushima Prefecture is advisable.

Given the above, it is preferable that all local governments prioritize the decontamination of child-care facilities within their jurisdictions, and that they reduce the radiation doses to which children are exposed to as low a level as is reasonably possible.

Please ensure that all the cities, towns and villages (excluding Iwaki City and Koriyama City) in Fukushima Prefecture are informed of these matters.

*Note 1: For child-care facilities located in restricted areas, deliberate evacuation areas, and evacuation-prepared areas set up in the event of an emergency, the use of child-care facility buildings and playgrounds should be prohibited.

*Note 2: For the information on radiation monitoring, the latest result is announced on the website of the Ministry of Education, Culture, Sports, Science and Technology.

*Note 3: Includes internal and external exposure at child-care facilities, but excludes natural radiation exposure and medical exposure. The figures provided are accurate as of August 26.

*Note 4: Number of days for attendance of child-care facilities: 250 days/year
Average time spent at child-care facilities per day: 8 hours
Indoor activity time: 7 hours for 0–1 year-olds, 6.5 hours for 2–3 year-olds, and 5.5 hours for 4–5 year-olds
Outdoor activity time: 1 hour for 0–1 year-olds, 1.5 hours for 2–3 year-olds, and 2.5 hours for 4–5 year-olds

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Basic Policy of the Nuclear Safety Commission of Japan on Radiation Protection for Termination of Evacuation and Reconstruction

19 July 2011
Nuclear Safety Commission

The Nuclear Safety Commission (NSC) has given various kinds of technical advices on radiation protection for the people in the affected areas by the accident on 11 March 2011 at the Fukushima Dai-ichi Nuclear Power Plant (NPP) of the Tokyo Electric Power Co., Inc. On 19 May 2011, the NSC made an announcement "Commission's views as the basis of advices on radiation protection" to achieve the commission's accountability on its basic policy on radiation protection. Hereby, noting the recent needs of new strategy on radiation protection, the NSC summarizes its basic policy on radiation protection for termination of the evacuation and restoration of normal life as follows:

1. Radiation protection actions according to exposure situations

(1) Emergency exposure situation

The International Commission on Radiological Protection (ICRP) defines the emergency exposure situation as a situation which requires urgent actions to avoid or reduce undesirable consequences under nuclear accidents or radiological emergencies. In the initial phase of the accidents at the Fukushima Dai-ichi NPP, the criteria[1] of projected dose provided in the "Regulatory Guide: Emergency Preparedness for Nuclear Facilities" (formulated and established by the NSC on 30 June 1980; hereinafter referred to as the Guide for Emergency Preparedness) were referred. The evacuation and sheltering were ordered on 11 and 12 March 2011, with the evacuation area gradually expanded to 20 km, from the precautional view of urgency and potential deterioration of the event. On 15 March the sheltering area was expanded from 20km to 30km from the Fukushima Dai-ichi NPP.

As it was observed that the integrated dose from deposited radioactive materials continued significantly increasing in some areas beyond the 20 km, based on the NSC's recommendation on 10 April, the Deliberate Evacuation Area was set

[1] Criteria of projected dose for sheltering: 10 to 50 mSv (effective dose due to external exposure) or 100 to 500 mSv (equivalent dose of childhood thyroid due to internal exposure), and criteria for evacuation: over 50 mSv (effective dose due to external exposure) or over 500 mSv (equivalent dose of childhood thyroid due to internal exposure)

on 22 April for the area beyond 20 km from the Fukushima Dai-ichi NPP where its integrated dose for one year after the accident may exceed 20 mSv. The sheltering order to the other areas has been partly lifted, but some areas have been designated as the Evacuation-Prepared Area due to the instability of accidental situation at the Fukushima Dai-ichi NPP.

The criteria for protection measures in the Guide for Emergency Preparedness was established based on the international criteria on evacuation and sheltering for a short period, while no criteria for a longer period protective measures has been defined yet in Japan. The NSC has applied 20 mSv per year, which is the lowest level of dose band of 20 to 100 mSv (acute or annual) for the reference level in emergency exposure situation of the ICRP 2007 recommendations, for the NSC's advice on the designation of the Deliberate Evacuation Area.

(2) Existing exposure situation

The ICRP defines the existing exposure situation as a situation that already exists when a decision on control has to be taken, including long term exposure situations after an emergency. No policy set up yet in Japan concerning the protection strategy for the situations where radioactive contamination remains in environments for a long period after a nuclear accident. The NSC has made the decision that it is appropriate to apply the concept of existing exposure situation to the present situation based on the ICRP 2007 recommendations.

The NSC considers that the areas in the emergency exposure situation can be shifted to the existing exposure situation when the release of radioactive materials from the Fukushima Dai-ichi NPP is under control and exposures due to residual radioactive materials in the areas can be managed to be a certain level or less. On the other hand, some areas have been under the existing exposure situations without passing through the emergency exposure situation due to the radioactive materials deposition. Hence, the areas around the Fukushima Dai-ichi NPP are currently considered to be under emergency exposure and existing exposure situations in parallel.

Transition from the emergency exposure situation into the existing exposure situation is one of the conditions required for termination of the evacuation. In order to make decisions on the transition into existing exposure situation (i.e. exposures due to residual radioactive materials can be managed at a certain level or less), a "indication level" for the exposures should be defined taking account of all possible exposure pathways (external exposure to deposited

radioactive materials on ground, internal exposure from inhalation of resuspended materials and ingestion of food and drink). The values of exposure rate (μSv/h), radioactive concentration of soils (Bq/kg) and surface deposit concentration (Bq/m^2) can be used to define the "indication level".

In areas to be shifted into the exiting exposure situation as well as in the areas already under the existing exposure situation, it is necessary to define the places where new protective actions (including decontamination and remediation of the places) are needed and to implement appropriate actions in timely manner. A reference level for optimization of the protective actions should be selected from the lower part of 1 to 20 mSv/year band recommended by the ICRP for the management of existing exposure situation. In order to improve the situation step by step, provisional reference level can be fixed between this band, but the target of the exposure dose in the long term should be 1 mSv/year. A certain attention and control by inhabitants on their exposure in the livelihood and social activities may be required as a part of the protective actions according to predicted exposure levels in the existing exposure situation. Planning and formulation of such radiation protection actions should be made as part of a comprehensive support program for the livelihood of inhabitants and industrial activities. For administrative decisions on radiation protection, the Japanese government and the local governments should ensure that the measures for radiation protection are implemented appropriately and reasonably through sufficient discussions with the stakeholders. All relevant aspects should be considered, as appropriate, such as health, environment, society, economy, ethics, psychology, and politics. Transparency of decision making processes is required.

2. Establishment of environmental monitoring system, individual dose estimation system and health assessment system

In order to make administrative decisions for implementation of protective actions including decontamination and remediation and for lifting the evacuation order, it is important to establish an environmental monitoring system and individual dose estimation systems as a scientific basis. Health assessment system should be also established based on these systems.

(1) Environmental monitoring system

The main purpose of environmental monitoring is to understand changes in time of radiation levels and radioactive material concentration levels and to provide

the basic references for the following matters:

- To make administrative decisions on health management, residency (including evacuation, sheltering and return), social and industrial activities for people in the affected areas, from the viewpoint of radiation protection.
- To decide appropriate measures to control and reduce radiation exposure (protective measures, decontamination, remediation, and restrictive actions on specified exposure pathways).
- To assess exposure levels of the habitants (external and internal exposures) and to estimate exposure doses at present and in the future (individual dose estimation).

In order to appropriately provide useful information on environmental monitoring for these purposes, it is necessary at planning stages of the monitoring to clarify the process to utilize the monitoring results based on the understanding of the needs of assessment and analysis. It is also inevitable, in order to achieve the effective monitoring system, to make effective and efficient use of the resources of the national and local governments, its specialized agencies, research institutions, universities etc. under the leadership of each Ministry in charge. Lastly, a unified system should be established by the national or local government to collect, store and utilize the monitoring data.

(2) Individual dose estimation system

Individual doses vary depending on the amount and scope of movements of each individual. It can be estimated by cross-checking results of environmental monitoring with results of investigation on individual movement after the accident. These estimated individual doses should be verified with actual measured values of individual dose. The dose estimation can be more reliable by combining such estimated data and the measured data.

Under the long term contamination situations, adequate protection strategy with decontamination and remediation should be formulated based on results of the environmental monitoring and the realistic dose estimation in order to make decisions to support daily life of the habitants and industrial activities and to lift the evacuation orders

(3) Health assessment system

It is important to mitigate health effects and people's concern for their potential health effects in the future by stress from the long term evacuation, sheltering or group living by the unprecedented disaster combined nuclear disaster with earthquake and tsunami. In this regard, an appropriate long-term health assessment system should be established. Not only illness clearly related to radiation effects but also other health conditions, including mental health, should be dealt with in this system. The above-mentioned individual dose estimation based on the environmental monitoring can be used as a basis of the health assessment in terms of radiation effects.

3. Implementation of protective actions

Effective protective actions should be implemented with harmonization between radiation protection technology and socio-economic factors.

(1) Decontamination and remediation actions

In deciding decontamination and remediation actions and selecting of technologies to be applied, it is necessary to create a detailed plan, taking account of real costs, social factors and relevant international standards, such as the IAEA safety standard "Remediation Process for Areas Affected by Past Activities and Accidents; WS-G-3.1". To select decontamination methods, not only averted dose but also their costs, exposed dose of decontamination workers and radioactive wastes generated from the decontamination should be considered. Comprehensive assessment is inevitable for each method.

It is also recommended to clarify the priority of each method in the decontamination programs according to the situations of each site, and to combine various kinds of methods for decontamination and remediation in the long term.

(2) Cooperation for radiation protection

The national and local governments should provide necessary information, materials, instruction, training opportunities, and specialized advisors in order to promote the habitants and workers in the affected areas to participate in the radiation protection measurements. It is important that these people are directly involved in the environmental and individual detailed monitoring program under their living environments, and play active roles in the radiation protection measurements by understanding and using the monitoring results. Since levels of exposure significantly vary depending on personal activities, individual dose can be

reduced by identifying places with higher dose rate and reducing the time to stay there, or recognizing possible internal exposure from dust and foods and taking appropriate actions to avoid it. Furthermore, it should be noted that the stakeholders, such as representatives of the inhabitants, should be involved in planning of radiation protection strategy in order to include more detailed and effective protective actions for decontamination and remediation by the national and local governments.

Standpoint of the Nuclear Safety Commission for the Termination of Urgent Protective Actions implemented for the Accident at Fukushima Dai-ichi Nuclear Power Plant

August 4, 2011
Nuclear Safety Commission

1. Basic Standpoint

(1) Conditions for the termination

The Nuclear Safety Commission (NSC) is of the opinion that discontinuation of the urgent protective actions implemented for the accident at Fukushima Dai-ichi Nuclear Power Plant (NPP) of the Tokyo Electric Power Co., Inc. (such as evacuation and sheltering, that are actions to be implemented in an emergency for radiation protection,) should be decided based upon the fulfillment of the following conditions.

- In light of the purpose of urgent protective actions, continuation of the actions is judged to be unnecessary or unjustified. In other words, it is expected with certainty that the criteria for the application of current actions are no more applicable and new criteria to be set for the termination of current actions are fulfilled.

(2) Adjustment with new protective actions

In the termination of the current urgent protective actions, it is often necessary to implement new protective actions, such as measures for proper control of exposure, decontamination, and improvement of situation. Attention should be paid to the following point.

- For the proper termination of urgent protective actions, necessary preparations for new protective actions should be made with the implementation period, method and practical contents, etc., in advance of the termination of the current actions.

(3) Coordination with local governments and residents

In order to terminate the current urgent protective actions and efficiently and effectively implement new protective actions, it is important to let the related local governments and residents participate in the decision-making

process. This will help local governments and residents understand the new protective actions more deeply, and it is expected that the new actions will be more effective and implemented more smoothly. Attention should be paid to the following point.

- In the termination of current urgent protective actions and the planning of new protective actions such as measures for proper control of exposure, decontamination and improvement of situation, a framework for involvement of related local governments and residents with the process should be constructed and utilized properly.

2. Standpoint for the termination of each urgent protective action

In accordance with the basic standpoint above, the following shows the standpoint for the termination of the major urgent protective actions that are currently implemented. The NSC is of the opinion that it is allowable that the areas are gradually narrowed for the urgent protective actions.

(1) Standpoint for the termination in the Evacuation-Prepared Area

The Evacuation-Prepared Area has been designated for smooth reaction of residents by letting them be "always prepared themselves for sheltering or evacuation in case of further emergency," because "for the area between 20 and 30 km radius from the power station, where residents have been advised to shelter, possibilities have still remained for emergency sheltering or evacuation since the plants have not yet reached stable conditions."

In light of the purpose of such designation, the NSC considers that the current protective actions in the Evacuation-Prepared Area can be terminated when the possibility to occur a situation that requires urgent sheltering or evacuation in this area is judged to be extremely small. The condition for termination is as follows.

- The possibility to occur a situation that requires urgent sheltering or evacuation is extremely small judged from conditions and situations of the Fukushima Dai-ichi NPP, and even if such an event should occur, it is judged that residents have enough time to react to the situation. In addition, in order to reduce residents' exposure (including internal exposure; the same hereafter), necessary decontamination and monitoring should be implemented.

(2) Standpoint for partial termination in the Evacuation Area (within a 20km-radius)

The area where the residents were ordered to be evacuated (the Evacuation Area) has been designated in order to avoid possible exposure with high doses to radioactive materials released in a large amount due to the accident at the Fukushima Dai-ichi NPP.

In light of the purpose of such designation, the NSC considers that the current evacuation can be partially terminated when the possibility to occur a situation that requires urgent sheltering or evacuation is judged to be extremely small with the exception of the condition for termination as follows. There are still some places in this area where the annual cumulative dose after the onset of the accident would be 20 mSv or more. It is necessary to treat these places in the same way as the "the Deliberate Evacuation Area" and continue the evacuation.

- The possibility to occur a situation that requires urgent sheltering or evacuation is extremely small judged from present conditions and situations of the Fukushima Dai-ichi NPP, and even if such a situation should occur, it is judged that residents have enough time to react to the situation.
- Residents' annual dose in the area after the termination of evacuation is expected with certainty to be 20 mSv or less, and efforts should be made to reduce the dose as low as reasonably achievable, with the reference level within the range of 1–20 mSv per year, and a long-term goal of 1 mSv per year. In addition, prior to the termination of evacuation, necessary decontamination should be implemented, and detailed monitoring should be carried out to estimate exposure dose that residents would receive.
- An optimized plan of protective actions to reduce exposure in the area is clearly made, including measures for proper control of exposure, decontamination and improvement of situation, etc. The plan should indicate that residents' annual exposure dose would be 1mSv or less in the long term with the efforts to reduce exposure.

(3) Standpoint for the termination in the Deliberate Evacuation Area

The Deliberate Evacuation Area has been designated in order to avoid residents being exposed to a high dose, since "relatively high cumulative doses have been recorded in some areas outside the 20 km radius of the

Fukushima Dai-ichi Nuclear Power Station due to local contamination of the ground, affected by the weather and geographical conditions, by radioactive materials released from the power plants."

In light of the purpose of such designation, the NSC considers that the current evacuation in this area can be terminated when residents are expected with certainty not to be exposed to a high dose (20 mSv per year or more) by effect of weathering and decontamination, etc. The condition for termination is as follows.

- Residents' annual dose in the area after the termination of evacuation is expected with certainty to be 20 mSv or less, and efforts should be made to reduce the dose as low as reasonably achievable, with the reference level within the range of 1-20 mSv per year, and a long-term goal of 1 mSv per year. In addition, prior to the termination of evacuation, necessary decontamination should be implemented, and detailed monitoring should be carried out, in order to estimate exposure dose that residents would receive.
- An optimized plan of protective actions to reduce exposure in the area is clearly made, including measures for proper control of exposure, decontamination and improvement of situation, etc. The plan should indicate that residents' annual exposure dose would be 1mSv or less in the long term with the efforts to reduce exposure.

(Reference) Standpoint of international standards for the termination of urgent protective actions.

(ICRP Pub.82)

・(122) The simplest basis for justifying the discontinuation of intervention after an accident is to confirm that the exposures have decreased to the action levels that would have prompted the intervention. If such a reduction in exposure is not feasible, the generic reference level of existing annual dose below which intervention is not likely to be justifiable could provide a basis for discontinuing intervention.

(ICRP Pub.109)

・(73) The termination of protective measures is another area where the interaction of urgent protective measures and later protective measures is particularly obvious. Withdrawing all urgent protective measures and then, sometime later, initiating new protective measures such as decontamination may, purely from consideration of future doses and dose rates, seem the optimum course of action. It may not be optimum from a practical and 'cost' viewpoint. For example, … decontamination may be carried out more efficiently in the absence of people living in the area.

・(103) The active participation of stakeholders will, in general, bring relevant local knowledge, experience, and values to decision-making processes such that the resulting detailed protection strategies are more likely to be well focused, understood, and supported.

・(106) It is important to involve, wherever possible, relevant stakeholders in discussions regarding termination of protective measures. While it will be difficult, if not impossible, to discuss decisions with populations sheltered at home, it will be essential to discuss decisions to return to evacuated areas with those who have been evacuated, and the termination of protective measures implemented at a later stage.

・(108) The involvement of relevant stakeholders is essential, and processes and procedures should be established to ensure that such involvement can take place efficiently.

・(115) The change from an emergency exposure situation to an existing exposure situation will be based on a decision by the authority responsible for the overall response. … The Commission recommends that planning for the transition from an emergency exposure situation to

an existing exposure situation should be undertaken as part of the overall emergency preparedness, and should involve all relevant stakeholders.

(ICRP Pub.111)

・(50) The Commission recommends that the reference level for the optimization of protection of people living in contaminated areas should be selected from the lower part of the 1–20 mSv/year band recommended in Publication 103 for the management of this category of exposure situation.

(IAEA BSS SSNo115)

・V.26. A protective action will be discontinued when further assessment shows that continuation of the action is no longer justified.

(DS379 (new BSS))

・4.5. (f) Optimized protection strategies for the implementation and termination of measures to protect members of the public who may be exposed in an emergency, including considerations for protection of the environment

(IAEA GS-R2)

・ 4.44. A protective action shall be discontinued when it is no longer justified.

・ 4.46. National guidelines in accordance with international standards shall be adopted for the termination of urgent protective actions.

・4.87. “A protective action [shall] be discontinued when further assessment shows that continuation of the action is no longer justified.”

The Basic Approach to Reassessing Evacuation Areas

August 9, 2011
Nuclear Emergency Response Headquarters

1. The Basic Approach

(1) The current evacuation orders implemented by the government consist of:
   1) Orders to evacuate or prepare to evacuate with the aim of securing a certain distance from the nuclear power station, based on unstable conditions in the NPS (Evacuation-Prepared Area in Case of Emergency, Restricted Area), and
   2) Orders to evacuate with the aim of reducing the impact of radiation based on the fact that the cumulative dose received by residents in the 1 year following the accident is estimated to exceed 20mSv (Deliberate Evacuation Area).

(2) Since these evacuation orders have a huge impact on residents' lives, it would be proper to speedily reassess them in the event of major changes to the reasons they are based on, such as verified safety of nuclear reactor facilities and better understanding of dose decrease through the accumulation of detailed monitoring data.

(3) Such a reassessment will be carried out:
   1) following a safety assessment of the nuclear reactor facility and determination of how much distance should be secured from the NPS,
   2) once it has been verified through detailed monitoring of radiation dose within the Area whether the safety of residents has been secured or not, and
   3) when the restoration of everyday life environment for the residents, including public services and infrastructure, can be foreseen in the not-too-distant future.

(4) In the coming days, area-designation reassessment will take place incrementally in those areas that meet the above conditions 1) through 3), and residents will begin the homecoming process.
However, the process is also likely to highlight the existence of areas for which homecoming will prove challenging for the long term, due

to reasons such as ongoing risk even following NPS stabilization (such as the impact of the reactor decommissioning process on the surrounding environment) and a significantly high dose.

We hope to explore a long-range response measure for these areas, through ample discussion with local governments on the form that such long-range rebuilding measures should take.

(5) In every area that saw dispersal of radioactive contamination from this accident, including both areas planned for lifting the instruction of evacuation orders and those planned for longer-term continuation, anxiety regarding radiological damage is growing daily, necessitating bold measures.

In order to respond to this need, a basic decontamination policy will be put together, before the end of August if at all possible, and thorough, ongoing decontamination implemented in partnership with relevant parties.

In terms of long-range goals, the aim is to keep additional radiation exposure below 1mSv annually, and implement measures with even greater speed, in particular for children, for whom the impact of radiation is greater than for adults.

2. Exploring the lifting the instruction of the Evacuation-Prepared Area in Case of Emergency

(1) The situation in the nuclear power plant has improved significantly with the recent completion of Step 1. Based on this, the possibility of lifting the instruction of the Evacuation-Prepared Area in Case of Emergency was explored as the first stage. Specifically, the following were assessed:

1) The possibility of a hydrogen explosion
2) The possibility as well as the effects of a reactor cooling failure (fuel heat-up, fuel melting and concrete reaction)
3) The possibility of a cooling failure for the spent fuel pool
4) The possibility of damage to the spent fuel pool due to earthquakes and tsunamis
5) The impact of radioactive materials which continue to be released by the reactors in steam and other forms

The assessment result validated the lifting the instruction of the

Evacuation-Prepared Area in Case of Emergency, in terms of reactor safety.

These assessment results were also reported to the Nuclear Safety Commission.

(2) In addition to regular monitoring such as the distribution map of radiation doses, monitoring was implemented on schools and public facilities in accordance with “The Radiation Monitoring Action Plan for Homecoming, regarding Evacuation-Prepared Areas in Case of Emergency” and in response to individual requests from municipalities. This means that the Evacuation-Prepared Areas in Case of Emergency are basically safe, as verified in terms of air dose rate.

(3) Area safety verification will continue in the future, through means such as additional monitoring in response to municipal requests. Municipalities themselves are asked to take into account the wishes of the residents and work with the prefecture to start drafting a Restoration Plan that responds to the unique realities of the area, and that covers aspects such as facilitation of a smooth relocation for residents, resumption of public services such as education and medical facilities, restoration of public infrastructure, and decontamination of schoolyards.

(4) The idea is to lift the instruction of all the Evacuation-Prepared Area in Case of Emergency at same time on a national level, once every municipality has carefully considered and finalized its Restoration Plan.

The municipalities in Evacuation-Prepared Areas in Case of Emergency run the gamut from areas where the entire village has been evacuated to areas where almost every resident has already returned home, and the actual homecoming timing is expected to vary widely from municipality to municipality.

The national government will provide the necessary support for homecoming, taking into account the individual municipality's evacuation situation, the existence of infrastructural restoration measures, the state of public service resumption, the progress of decontamination, and the residents' wishes, staying respectful of the individual municipality's wishes.

3. The Response in Restricted Areas and Deliberate Evacuation Areas

(1) In the future, the Japanese government as well as TEPCO will spare no effort to implement Step 2, bringing the release of radioactive materials under control and achieving a massive curb of radiation doses, through a transition to reactor cold shutdown, further stabilization of fuel pool cooling, and overall reduction in the volume of contaminated water.

(2) Ongoing assessment will be conducted on reactor facility safety and other aspects as the above tasks proceed. At the same time, there will be proactive exploration of the impact on the surrounding environment following NPS stabilization, such as in the course of post-Step 2 reactor decommissioning, with regular, ongoing and helpful information updates.

(3) The possibility (or not) of downsizing Restricted Areas and reassessing Deliberate Evacuation Areas will be explored after proceeding with these assessments and explorations and completing Step 2, once the release of radioactive materials has been brought under even tighter control through measures such as the achievement of reactor cold shutdown.

(4) Detailed radiation dose monitoring and other efforts aimed at restoration of the everyday life environment of theresidents will go ahead, without waiting for the completion of Step 2.

(5) Specifically, thorough monitoring such as 2km-mesh air dose survey and soil concentration mapping will be implemented, to gain a detailed understanding and assessment of the dose status in Restricted as well as Deliberate Evacuation Areas.

Also, in addition to promoting efficient and effective decontamination including the development of decontamination methods, work aimed at restoring the habitation environment will be implemented, such as rubble removal, and damage surveys and restoration of public infrastructure including waterworks, sewer systems, and electricity and gas lines.

(6) These explorations and undertakings will be carried out in close partnership with the local government involved, taking into account the realities of each locality and staying respectful of the views of individual areas.

Holding of Monitoring Coordination Meeting

July 4, 2011

Agreed among relevant ministries

1. The monitoring coordination meeting（hereinafter referred to as "coordination meeting"）will be held, in order to coordinate radiation monitoring which is being implemented by relevant ministries local government and nuclear operators, for the purpose of steady and systematically implementing radiation monitoring which is related to the accident at the Tokyo Electric Power company's Fukushima Nuclear Power Stations.

2. The members of the coordination meeting are listed as follows. Provided, however, that the chairpersons find it necessary, new members can be added.

Chairpersons Minister of State for Special Missions（in charge of the completion and the recurrence prevention of nuclear accidents）, Hosono
Senior Vice-Minister of Environment, Kondo
Parliamentary Secretary of Cabinet Office, Sonoda
Parliamentary Secretary for Education, Culture, Sports, Science and Technology, Hayashi
Vice Chairperson Deputy Minister of Education, Culture, Sports, Science and Technology,
Members Secretary General of the Nuclear Safety Commission, the Cabinet Office
Nuclear Emergency Response Headquarters, the Cabinet Office
Deputy Secretary General of the Nuclear Suffers Life Support Team
Director-General of the Science and Technology Policy Bureau, the Ministry of Education, Culture, Sports, Science and Technology
Director General for Technical Affairs, Secretariat of the Ministry of Health, Labour and Welfare
Director General of the Agriculture, Forestry and Fisheries Research Council, the Ministry of Agriculture, Forestry and Fisheries
Deputy Director General of the Fisheries Agency
Director of the Nuclear and Industrial Safety Agency, the Ministry of Economy, Trade and Industry
Deputy Vice-Minister for Security Policy and Transport Safety Policy, Secretariat of the Ministry of Land, Infrastructure, Transport and Tourism
Deputy-Director General of the Japan Meteorological Agency
Vice Commandant of the Japan Coast Guard
Director General of the Environmental Management Bureau, the Ministry of the Environment

Director General of the Bureau of Operational Policy, the Ministry of Defense
Relevant municipalities
Business operators

3. The general affairs of the coordination meeting should be conducted by the Ministry of Education, Culture, Sports, Science and Technology.

4. In addition to what is provided for in the preceding paragraph, matters which are related to the coordination meeting management and other matters should be prescribed by the chairpersons.

Comprehensive Monitoring Plan (Provisional translation)

August 2, 2011
Decision by the Monitoring Coordination Meeting

1. Basic Idea

Emergency monitoring has so far been conducted in response to a massive release of radioactive materials from Tokyo Electric Power Company's (TEPCO's) Fukushima Dai-ichi Nuclear Power Plant (NPP), but as the nuclear reactors have become relatively stabilized and the discharge of radioactive materials from nuclear facilities is considered to have reduced considerably, it is appropriate to move on to a new stage of radiation monitoring for the purpose of assessing the overall impact in the surrounding environment and contributing to the review of the future countermeasures to be taken.

Therefore, the national government will carry out more detailed monitoring so as to respond to people's demands for the recovery of the environment around TEPCO's Fukushima NPPs, and for children's health and people's peace and safety. At the same time, the national government will responsibly coordinate with local governments and nuclear operator and related company to avoid any omissions in carrying out radiation monitoring, for the purpose of providing information in an integrated and easy-to-understand manner. More specifically, the major objectives of radiation monitoring should be as follows.

(i) Estimation of current exposure (external and internal exposure) doses of people living in the affected regions and their potential exposure doses in the future
(ii) Consideration and planning of measures for reducing exposure doses in accordance with various circumstances
(iii) Consideration and judgment for removing the designation of protected areas, etc. through estimating future exposure as realistically as possible
(iv) Preparation of basic data for managing the health of people living in the affected regions
(v) Understanding of the movements of radioactive materials released in the environment

Through monitoring, data necessary for these purposes will be collected.

It is also important to develop an appropriate system for collecting and accumulating data to be obtained through radiation monitoring over a long period of time so as to utilize them as basic data for managing the health of people living in the affected regions.

Based on such basic idea, this plan compiles the details of the monitoring that is being carried out or is scheduled to be carried out in 2011 in close collaboration among related ministries and agencies, local governments, and nuclear operator and related company.

2. Allocation of Roles for Conducting Detailed Monitoring

○Concept for allocation of roles

- Under the initiative of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the government will responsibly coordinate with local governments and nuclear operator and related company.

MEXT:

Serving as the control tower for total coordination and information aggregation; Carrying out environmental radiation monitoring

Nuclear Safety Commission of Japan:

Giving advice to related ministries and agencies; Comprehensively assessing the measurements and the analysis of measurement results carried out in monitoring conducted by related ministries and agencies

Nuclear Emergency Response Headquarters (Local Nuclear Emergency Response Headquarters and Team in Charge of Assisting the Lives of Disaster Victims):

Carrying out and coordinating monitoring around TEPCO's Fukushima NPPs in cooperation with related ministries and agencies; Offering assistance to monitoring conducted by Fukushima prefecture

Related ministries and agencies:

Aggregating information on monitoring, offering assistance, and conducting analyses in line with administrative objectives

Local governments:

Carrying out community-based monitoring and transmitting information integrally, in collaboration with the national government and nuclear operator and related company

Nuclear operator and related company:

Under the initiative of the national government, carrying out monitoring together with local governments and transmitting information integrally with the national government

- This plan does not intend to change the system or content of monitoring currently conducted by related ministries and agencies and local governments independently in line with their own administrative objectives, but will give full consideration to ensure the smooth and prompt implementation of such monitoring. Prior to the implementation of respective monitoring, relevant organizations are to make collaboration as necessary.
- It should be noted that different types of consideration are required for environmental radiation monitoring and for the monitoring of foodstuffs, etc. in accordance with legislative regulations.

○Specific measures for radiation monitoring

- Under the initiative of MEXT, related ministries and agencies, local governments, and nuclear operator and related company will aggregate information on monitoring, offer assistance to local activities, and conduct analyses as follows.

Monitoring target	Information aggregation (Arrangement for survey and analysis concerning the implementation of monitoring, and the publication thereof, as well as compilation of the planning)	Carrying out measurement or offering assistance (Measurement of radiation doses, collection of samples, transportation, and outsourcing of measurement to the private sector, etc.) *○ shows responsible entities.	Conducting analysis (Organizations that can conduct radionuclide analysis)
General environmental monitoring (soil, water, and atmosphere, etc.), air space, sea areas, schools, and public facilities, etc.	MEXT	Response to regions around TEPCO's Fukushima NPPs ○Nuclear Emergency Response Headquarters (With participation of related ministries and agencies, local governments, and nuclear operator and related company) Response to regions other than the above ○MEXT ○Ministry of the Environment (MOE) Fisheries Agency <Sea areas> Japan Coast Guard <Sea areas> Ministry of Defense <Air space and sea areas> Local governments Nuclear operator and related company	・Independent administrative institution of MEXT ・Japan Coast Guard ・Meteorological Research Institute/Japan Meteorological Agency ・Technical Research and Development Institute of the Ministry of Defense ・Local governments ・Nuclear operator and related company ・Public testing institutions ・Private testing institutions
Ports, airports, parks, and sewage, etc.	MEXT (Aggregating information including that from the Ministry of Land,	Response to regions around TEPCO's Fukushima NPPs ○Nuclear Emergency Response Headquarters	・Independent administrative institution of MEXT ・Local governments ・Nuclear operator and related

	Infrastructure, Transport and Tourism (MLIT))	(With participation of related ministries and agencies, local governments, and nuclear operator and related company) Response to regions other than the above ○Local governments MLIT	company ・Public testing institutions ・Private testing institutions
Water environment (Water resources, rivers and lakes, groundwater, and bathing resorts), natural parks, and waste	MOE	Response to regions around TEPCO's Fukushima NPPs ○Nuclear Emergency Response Headquarters (With participation of related ministries and agencies, local governments, and nuclear operator and related company) Response to regions other than the above ○MOE ○Local governments Nuclear operator and related company, etc.	・Independent administrative institution of MEXT ・Independent administrative institution of MOE ・Local governments ・Nuclear operator and related company ・Public testing institutions ・Private testing institutions
Cultivated soil, forests, and pasture grass	Ministry of Agriculture, Forestry and Fisheries (MAFF)	Response to regions around TEPCO's Fukushima NPPs ○Nuclear Emergency Response Headquarters (With participation of related ministries and agencies, local governments, and nuclear operator and related company) Response to regions other than the above ○Local governments	・Independent administrative institution of MAFF ・Independent administrative institution of MEXT ・Local governments ・Nuclear operator and related company ・Public testing institutions ・Private testing institutions
Foodstuffs (Agricultural products, forestry products, livestock products, and fishery products, etc.)	Ministry of Health, Labour and Welfare (MHLW)	Response to regions around TEPCO's Fukushima NPPs ○Nuclear Emergency Response Headquarters (With participation of related ministries and agencies, local governments, and nuclear operator and related company) Response to regions other than the above ○MAFF ○Local governments, etc.	・Independent administrative institution of MHLW ・Independent administrative institution of MAFF ・Local governments ・Public testing institutions, etc.
Tap water	MHLW	Response to regions around TEPCO's Fukushima NPPs ○Nuclear Emergency Response Headquarters (With participation of related ministries and agencies, local governments, and nuclear operator and related company) Response to regions other than the above ○Local governments ○Water business operators, etc.	・Local governments ・Water utility company ・Public testing institutions, etc.

* The Meteorological Research Institute serves as an analytical body, collaborating with related ministries and agencies.

3. Implementation Plan

1) Plan for the monitoring of general environmental monitoring (soil, water, and atmosphere, etc.), air space, sea areas, schools, and public facilities, etc.

○Nationwide monitoring

<Monitoring of prefectures using monitoring posts, etc.>

- Measurement of air dose rates through the monitoring of environmental radioactivity levels (measurement using monitoring posts and at the height of 1 meter above the ground) by prefecture will be continued, while reviewing the past trends in air dose rates to reduce the frequency of publication of the results. At the same time, in order to strengthen the system to monitor air dose rates and radiation level of soil, etc., monitoring posts, one of which is now placed in each prefecture, should be increased up to around 250 units and a new system will be introduced within the current fiscal year to enable constant monitoring and publication of air dose rates in each prefecture, and efforts will also be made to equip each prefecture with sufficient sample analyzers (equipment such as germanium semiconductor detectors to analyze radioactive materials contained in soil, and survey meters to detect points showing higher dose rates compared with the surrounding areas). Analysis of monitoring results of environmental radioactivity levels (tap water and fallout) will be further refined to the standard equivalent to that prior to the occurrence of the accident to reduce the frequency of measurement. [To be conducted regularly] (MEXT and respective prefectures)
- Nationwide measurement of air dose rates at the height of 1 meter above the ground will be continued in cooperation with universities, etc., but less frequently in stages, as measured values have been stable without any significant fluctuations. [To be conducted regularly] (MEXT and universities, etc. nationwide)
- In order to help respective prefectures carry out monitoring in a more appropriate and effective manner, training on the analysis of environmental radiation will be continued for responsible local government staff. [To be conducted regularly] (MEXT)

<Wide-area monitoring using aircraft>

- Airborne monitoring will be conducted to ascertain the diffusion of radioactive materials over a wide area, from Aomori prefecture to Aichi prefecture. [Once / By the end of this year] (MEXT)

○Monitoring of the land area mainly around TEPCO's Fukushima NPPs

[Wide-area monitoring covering the entire Fukushima prefecture]

<Ascertaining air dose rates and accumulated doses>

- In addition to monitoring posts already equipped entire Fukushima prefecture, portable monitoring posts will be equipped in stages in all local governments (59 local governments) in Fukushima (350 units in total) and in neighboring prefectures (130 units in total). [To be equipped in stages] (MEXT, Fukushima prefecture, and neighboring prefectures)
- In the vicinity of TEPCO's Fukushima Dai-ichi NPP, continuous measurement will be conducted using integrating dosimeters, as well as potable monitoring posts that have already been equipped and will be newly equipped (60 units are planned to be newly equipped) to ascertain changes in air dose rates and accumulated doses, which will later be used as basic data for preparing an accumulated dose estimation map. In the light of with the installation of new monitoring posts, the measuring points and scale will be reviewed sequentially with regard to regular measurement using monitoring vehicles and survey meters, and measurement of accumulated doses using simple integrated dosimeters. [To be conducted regularly] (MEXT, Nuclear Emergency Response Headquarters, and Fukushima prefecture)
- At public facilities, etc. in Fukushima prefecture, air dose rates will be measured using survey meters, and the monitoring of soil, etc. will also be conducted. Continuous monitoring will be conducted mainly at houses, etc. where relatively high air dose rates have been detected in past monitoring. [To be conducted as needed] (Fukushima

prefecture)

・A distribution map of air dose rate, which shows the latest distribution of air dose rates, and an accumulated dose estimation map, which shows accumulated doses from the occurrence of the accident up to the latest point in time and estimated doses as of one year from the accident, will be prepared based on the results of the aforementioned air dose rate monitoring. [To be conducted as needed] (MEXT)

<Dust>

・Regarding dust in the air (air dust), monitoring will be conducted at schools and public facilities, etc., focusing on highly-accurate measurement of people's living environment. [To be conducted regularly] (MEXT, Nuclear Emergency Response Headquarters, and Fukushima prefecture)

<Environmental soil survey>

・ A soil concentration map will be prepared by the end of August by compiling the results of the survey for ascertaining the integration of radioactive materials on ground surface mainly in areas within 100km from TEPCO's Fukushima Dai-ichi NPP and surrounding areas within Fukushima prefecture. [Once /June to August] (MEXT, Fukushima prefecture, and universities, etc.)

・ Based on the results of the aforementioned soil survey, the radioactivity concentrations in soil in Fukushima prefecture will be measured continuously. [To be conducted as needed] (MEXT, Nuclear Emergency Response Headquarters, and Fukushima prefecture)

<Indicator plants>

・Emergency monitoring conducted so far for weeds will be changed into measurement of the radioactivity concentrations for designated indicator plants (such as pine needles). [To be conducted regularly] (MEXT, Nuclear Emergency Response Headquarters, and Fukushima prefecture)

<Airborne monitoring>

・ In order to ascertain chronological changes in radioactive materials, airborne monitoring will be conducted continuously in areas within 80km from TEPCO's Fukushima Dai-ichi NPP. [To be conducted as needed] (MEXT)

[Detailed monitoring targeting the emergency evacuation preparation areas]

・To enable residents to return to their homes in the emergency evacuation preparation areas, a distribution map of air dose rates will be prepared by mid-August, through integrating the results of the following three types of monitoring. Additional monitoring will also be conducted as needed [Once / By mid-August; To be conducted appropriately when necessary] (Nuclear Emergency Response Headquarters, MEXT, related ministries and agencies, Fukushima prefecture, and nuclear operator and related company)

(i) Monitoring of air dose rates at major points in elementary schools, junior high schools, high schools, kindergartens, nurseries, hospitals, libraries, children's centers, facilities for children with disabilities, and after-school children's clubs located in the emergency evacuation preparation areas

(ii) Wide-area monitoring of air dose rates utilizing a vehicle-borne survey around the facilities mentioned in (i) above (including school zones)

(iii) Monitoring of air dose rates in response to requests from respective local governments in the emergency evacuation preparation areas

・If there is any point outside the planned evacuation areas and the restricted areas where an annual accumulated dose is estimated to exceed 20mSv after the accident, a detailed monitoring of air dose rates will be conducted so as to obtain reference data for designating specific spots recommended for evacuation around the point in question. Monitoring

will be conducted regularly at specific spots recommended for evacuation designated as above. [To be conducted as needed] (MEXT, Nuclear Emergency Response Headquarters, and Fukushima prefecture)

[Detailed monitoring targeting the restricted areas (evacuation areas) and the planned evacuation areas]

- In order to help ascertain the current situation of the restricted areas (evacuation areas) and the planned evacuation areas and improve the environment of these areas, necessary monitoring surveys, such as the following, will be conducted sequentially. [To be conducted as needed] (Nuclear Emergency Response Headquarters, MEXT, related ministries and agencies, Fukushima prefecture, and nuclear operator and related company)
  - (i) A survey to supplement a 2×2km-grid soil survey will be conducted, and at the same time a wide-area monitoring will be conducted sequentially at appropriate measuring points selected based on basic data, such as air dose rates in various types of environment.
  - (ii) Air dose rates over roads will be measured to record the situation of the evacuation areas regularly.
  - (iii) The amount of dust will be measured at selected areas containing sources of dust (such as forests) and the results will be analyzed to ascertain movements of contaminated dust sources and assess the possibility of internal exposure.
  - (iv) Air dose rates (surface dose rates) and the radioactivity concentrations in dust and garden soil, etc. will be measured at selected measuring points in public facilities and houses. In addition, air dose rates and the radioactivity concentrations in dust will be measured continuously at representative points near such public facilities and houses.
  - (v) The concentration of accumulated radioactive materials will be measured at selected measuring points in rivers, wells, and drains.
  - (vi) Air dose rates (surface dose rates) and the radioactivity concentrations in soil will be measured at forests, schoolyards, from lands (bare land), grassland, and gardens, and the distribution of radioactive materials will be ascertained.

○Sea area monitoring

- Related organizations will continue to share roles in measuring the radioactivity concentrations in seawater, for the front sea area (within 30km in radius), coastal area (coastal area in Miyagi, Fukushima, and Ibaraki), off-shore area (around 30 to 90km from the coast line), and outer sea area (around 90 to 280km from the coast line). When carrying out monitoring, the nuclide to be analyzed, the number of measuring points, and the frequency will be reviewed, while reducing the lower detection limit. In the front sea area, costal area, and off-shore area, the radioactivity concentrations in marine soil should also be measured to ascertain the distribution of contaminated marine soil. Furthermore, measurement of the radioactivity concentrations in seawater should also be conducted for the pelagic area (280km or farther from the coast line), using seawater samples collected and offered by the Fisheries Agency. In order to continuously monitor the distribution and long-term behavior of radioactive materials in the sea around Japan, the radioactivity concentrations in seawater and marine soil will be measured. [To be conducted regularly (monitoring of the pelagic area will be conducted as needed)] (METI, MOE, nuclear operator and related company, the Fisheries Agency, and the Japan Coast Guard)
- The radioactivity concentrations in seawater will be measured at major ports in Fukushima prefecture, and that in seawater and marine soil will be measured at fishing grounds. [To be conducted regularly] (Fukushima prefecture)
- The radioactivity concentrations in fishery products will be measured in the monitoring of fishery product. [To be conducted as needed] (the Fisheries Agency, respective prefectures, and fishery unions)

○Schools, etc. (Schools and nurseries, etc.)

<Measurement of air dose rates at schoolyards, etc.>

- Installation-type small dosimeters with a data transfer function will be equipped sequentially at elementary schools, junior high schools, high schools, kindergartens, nurseries (including unauthorized facilities), and parks, etc. in Fukushima prefecture, and a system to transfer measurement data to related organizations through the Internet (real-time radiation monitoring system) will be established. [To be equipped in stages] (MEXT)
- Air dose rates will be measured at schoolyards every several months, targeting all elementary schools, junior high schools, high schools, kindergartens, and nurseries (including unauthorized facilities), etc. in Fukushima prefecture. At elementary schools and junior high schools, etc., where relatively high dose rates have been detected continuously since this April, detailed measurement of air dose rates will be conducted at schoolyards, paved sites, and the window side and the center of classrooms. Appropriate frequency of measurement should be reviewed in the future, in accordance with the progress of the introduction of the aforementioned real-time radiation monitoring system at schools, etc. [To be conducted regularly] (Fukushima prefecture and MEXT)
- Air dose rates will be measured at child welfare facilities and athletic facilities across Fukushima prefecture. [To be conducted as needed] (Fukushima prefecture)

<Measurement of accumulated doses of school staff who represent the behavior of students>

- At all elementary schools, junior high schools, high schools, kindergartens, and nurseries (including unauthorized facilities) in Fukushima prefecture, accumulated doses in school life will be ascertained through measurement using integrating dosimeters delivered by MEXT and worn by school staff. [To be conducted regularly] (MEXT and MHLW)

<Measurement of the radioactivity concentrations in water in outdoor swimming pools>

- The radioactivity concentrations in water in outdoor swimming pools will be surveyed at schools, etc. in Fukushima prefecture. [To be conducted regularly in August and September] (Fukushima prefecture)

2) Plan for the monitoring of ports, airports, parks, and sewage, etc.

<Measurement of sewage sludge>

- The radioactivity concentrations in sewage sludge in related local governments will be measured and ascertained. [To be conducted as needed] (MLIT (compilation of the results) and local governments)

<Monitoring of the atmosphere and seawater at ports and water ways>

- At ports in the Tohoku and Kanto regions, air dose rates in the atmosphere and the radioactivity concentrations in seawater will be measured. The radioactivity concentrations in seawater will also be measured around Uraga Channel in Tokyo Bay. [To be conducted as needed] (MLIT (compilation of the results and implementation of part of the measurement) and local governments, etc.)

<Measurement at airports>

- Air dose rates will be measured at measuring points near major airports. [To be conducted as needed] (MLIT (compilation of the results) and airport management companies, etc.)

<Measurement at city parks, etc.>

- Air dose rates will be measured at city parks across Fukushima prefecture. [To be conducted as needed] (Fukushima prefecture)

<Measurement at tourist spots>

・Air dose rates will be measured at tourist spots (tourist facilities, mountainous districts, natural scenic spots, and roadside stations) in Fukushima. [To be conducted as needed] (Fukushima prefecture)

3) Plan for the monitoring of water environment (water resources, rivers and lakes, groundwater, and bathing resorts), natural parks, and waste

○Monitoring of water environment

<Monitoring of rivers, water resources and lakes>

・From among water resources, rivers, and lakes located within an approximately 100km radius of TEPCO's Fukushima Dai-ichi NPP, areas necessary to identify the contaminated area will be extracted so as to measure air dose rates, water, bottom soil and the radioactivity concentrations in water environmental samples (soil and weeds, etc.). In particular, regarding water and bottom soil of water resources, rivers, and lakes in Fukushima prefecture, the radioactivity concentrations will be intensively measured. [To be conducted regularly from August] (MOE and Fukushima prefecture)

<Monitoring of ground water (including well water)>

・Regarding ground water within around 100km from TEPCO's Fukushima Dai-ichi NPP, the radioactivity concentrations will be measured at areas necessary to identify the contaminated area. In particular, the radioactivity concentrations in ground water in Fukushima prefecture will be intensively measured. . Furthermore, the radioactivity concentrations will be measured with regard to well water for drinking in Fukushima prefecture. [To be conducted regularly from August] (MOE and Fukushima prefecture)

<Monitoring at bathing resorts in Fukushima prefecture and neighboring prefectures>

・At bathing resorts and the coastal area in Fukushima prefecture and neighboring prefectures, the radioactivity concentrations in water and bottom soil will be measured at environmental reference points in the sea area. In particular, at bathing beaches and bathing lakes in Fukushima prefecture, air dose rates and the radioactivity concentrations in seawater, etc. will be measured intensively. [To be conducted as needed and regularly during August] (MOE and Fukushima prefecture)

○Monitoring at natural parks

・At natural parks within around 100km from TEPCO's Fukushima Dai-ichi NPP, measurement will be conducted for (i) spring water alongside trails that climbers and tourists may drink, and (ii) mountain water or mountain stream water used in parking lots or fields and that climbers and tourists may drink, and areas around intakes therefor. When collecting samples, air dose rates will also be measured. [To be conducted regularly from August] (MOE)

○Monitoring of waste

・Analyses will be conducted with regard to (i) ash, fly ash, emission gas, and sewer water from incineration facilities, as well as water discharged from final disposal sites, (ii) sludge, and (iii) disaster wastes from the evacuation areas and planned evacuation areas, in Fukushima prefecture. Air dose rates will also be measured at borders of the premises of incineration facilities and final disposal sites. [To be conducted regularly from August] (MOE and Fukushima prefecture)

4) Plan for the monitoring of cultivated soil, forests, and pasture grass

<Monitoring of cultivated soil>

- In order to ascertain distribution of radioactivity concentrations over cultivated soil in wide area, a distribution of concentration of radioactive Cesium (Cs) in cultivated soil will be prepared by the end of August, based on the results of soil analysis at around 500 points in Fukushima prefecture and neighboring prefectures. The map will be updated (refined) through conducting of monitoring by significantly increasing measuring points. [Once in June to August and once in August to December] (MAFF)

<Monitoring of forests and pasture grass, etc.>

- At forest areas in Fukushima prefecture, air dose rates and the radioactivity concentrations in timber will be measured. [To be conducted as needed within the year] (Forestry Agency)
- The radioactivity concentrations will be measured with regard to pasture grass, etc. in various parts of Fukushima prefecture. [To be conducted as needed in August to December] (Fukushima prefecture)

5) Plan for the monitoring of foodstuffs (agricultural products, forestry products, livestock products, and fishery products, etc.)

<Monitoring of foodstuffs in respective prefectures>

- Monitoring will be planned and conducted regularly in accordance with the status of production and shipments of each item. [To be conducted regularly] (MHLW (establishment of the inspection policy and compilation of the results) and respective prefectures)

<Monitoring at local governments that have experienced shipment restrictions>

- At local governments subject to the Prime Minister's instructions, and neighboring local governments (Fukushima, Ibaraki, Tochigi, Gunma, Chiba, Kanagawa, Miyagi, Yamagata, Niigata, Nagano, Saitama, Tokyo, Yamanashi, and Shizuoka prefectures)*, as well as local governments to be subject to instructions separately in accordance with the detection of radioactive materials, inspections will be conducted for items from which radioactive materials exceeding the government's provisional standard value were detected, as well as for major agricultural products, considering their production status based on the estimated intake of the general public. Items that are shipped only during a limited period of time should be inspected at an early stage on or after three days prior to the commencement of shipments, and other items should be monitored regularly. If any items show radiation levels over or very close to the provisional standard value, inspections should be strengthened. (Monitoring of fishery products has been mentioned above.) [To be conducted regularly] (MHLW (establishment of the inspection policy and compilation of the results) and relevant prefectures; Regarding fishery products, the Fishery Agency, relevant prefectures, and fishery unions will cooperate with each other to carry out the inspections.)

6) Plan for the monitoring of tap water

- Regarding tap water or purified water from treated water at water treatment plant collected at selected locations by relevant prefecture, where water for water utility is taken in, will be inspected using germanium semiconductor detectors, in principle. In Fukushima prefecture, the radioactivity concentrations will be measured for tap water by source of water. [To be conducted as needed for the time being] (MHLW (establishment of the inspection policy and compilation of the results), Nuclear Emergency Response Headquarters, and relevant prefectures)

* As of August 4, Iwate, Aomori, and Akita were added in accordance with the instruction from the Nuclear Emergency Response Headquarters

7) Crosscut matters

- MEXT will open a portal site on radiation monitoring in mid-August by compiling information on monitoring being conducted by related ministries and agencies in line with their own administrative objectives, and will update the site as needed. [To be conducted as needed] (MEXT)
- In order to aggregate and accumulate monitoring data and facilitate the utilization thereof, the Japan Atomic Energy Agency will take the initiative in creating a database linking to geographical information. When the database is completed, data will be updated continuously, while responding to new needs of users. English translation of data will also be promoted so as to deliver them internationally. [To be conducted as needed] (MEXT)

8) Matters to be noted

- In such cases as no abnormal values having been detected continuously, related organizations should consider the reduction of the lower detection limit for the measurement as necessary, based on the objectives of the monitoring.
- Related organizations should try to standardize measurement by communalizing measurement and collection methods, and calibrating equipment in accordance with the objectives. The need for cross checking among analytical bodies should be reviewed for each monitoring, and whether to carry out cross checking should be considered as necessary.
- Related organizations should promote efficient and effective use of analytical instruments by making them available for a wider range of environmental monitoring in response to the latest accident in TEPCO's Fukushima NPPs.

Decontamination Measures in Date City

1. Overview

   A decontamination project targeting the zone contaminated by the Fukushima Dai-ichi NPS accident (approx. 265 square kilometers) is underway in Date City. At present, verification tests are being carried out at an elementary school, a kindergarten, and some private houses with a view to creating the Date City Radiation Decontamination Plan. As part of the development of this plan, the city also plans to consult the national and prefectural governments with regard to the specific methods to be adopted to decontaminate roads, mountains, forests and other places.

2. Verification test results

   (1) School

   Verification tests have been conducted at the Tominari Elementary School and Kindergarten. A reduction in the radiation doses there was confirmed using methods such as the removal of soil, grass, etc.; surface delamination of concrete, asphalt, etc.; and high pressure washing.

   - Embankment: 3–5 μSv/h → 1–1.5 μSv/h
   - Rear of schoolhouse: 5 μSv/h → 1 μSv/h

   Waste is carefully managed (it is gathered and stored at the rear of the school in an area which is roped off to keep people away).

   (2) Swimming pool

   A swimming pool was decontaminated by means equipment that uses zeolite. This reduced the radiation dose of the water, which had been 650 Bq/kg, to less than 50 Bq/kg, and the water was then drained away. The side ditches of the pool were also decontaminated, reducing the radiation dose from 6–8 μSv/h to 1 μSv/h.

3. Project budget (provisional)

   - Topsoil removal from school facilities, etc.: 632.75 million yen; 61 facilities
   - Support for decontamination activities by neighborhood associations: 45 million yen; 50 organizations
   - Decontamination verification tests: 111 million yen; schools, private houses, farmlands, materials, etc.
   - Decontamination expenses: 3 million yen; commissioning of advisors

4. Advisors
    - Shunichi Tanaka, former vice-chairman of the Atomic Energy Commission of Japan and president of the Research Organization for Information Science & Technology
    - Professor Fumio Shishido, Department of Radiology, Fukushima Medical University School of Medicine

The Basic Approach to Cleanup Work (Decontamination) in Residential Areas (Except Restricted Area and Deliberate Evacuation Area) in Fukushima Prefecture

July 15, 2011
Nuclear Emergency Response Headquarters

Introduction

The radioactive materials released into the environment by the accident at Fukushima Dai-ichi NPS have been detected in soil, sand, and sludge removed from culverts in residential neighborhoods and in twigs and leaves gathered during everyday cleaning, even in areas of Fukushima prefecture beyond the Restricted Area and Deliberate Evacuation Area. Among these are soil and sand from locations which show a higher dose rate (hereinafter referred to as “identified radiation source”) than the surrounding areas, and these are causing unease among residents.

Some identified radiation sources can be removed by local residents themselves through daily cleanup work. Accordingly, this report will outline cautions for local residents during such cleanup work. This report will also summarize the basic approach to handling waste collected during such cleanup work in residential areas.

1. Verification test and model-based evaluation related to cleanup work (decontamination)

In order to understand the effectiveness of cleanup work (decontamination) in removing identified radiation sources, identified radiation sources were determined and measurements taken of changes in dose rate before and after the removal of such sources as well as the exposure dose during such removal work, as verification tests. (Refer to Reference 1.)

(1) Locations where radioactive materials tend to accumulate

Identified radiation sources with higher dose than the surrounding area were detected in soil, sand, and sludge that had accumulated in

locations that saw more concentration of rainwater, such as rain gutters and culverts.

(2) Effectiveness of cleanup work (decontamination) in reducing dose

The dose rate of those areas in which relatively high doses had been detected was effectively reduced by removing moss from gutters, stripping the soil on the surface near downspouts as well as cleaning culverts to remove soil, sand, and sludge.

In addition, the dose rate on the ground surface was reduced in those cases where soil under the eaves was removed. After restoring the original soil, the dose rate 1 meter above the ground was nearly equal to that observed before excavation.

On the other hand, power-washing of walls and fences showed only limited effectiveness at the verification test sites where the background dose rate was around 1.0 μSv/h.

(3) Exposure dose from cleanup work (decontamination)

Worker exposure was assessed using model-based evaluation for 1) gutter cleaning, 2) weed removal, 3) culvert cleaning, and 4) removal of dirt from under the eaves, which were performed on residences which showed relatively high radiation concentrations from identified radiation sources during verification testing. The results show an additional exposure of 0.05 to 0.5 μSv. Even if an individual performs all 4 cleanup activities to remove identified radiation sources, over more than 1 hour, the additional exposure dose would be approximately 1 μSv. (Refer to Reference 2.)

2. Cautions regarding cleanup work (decontamination)

Taking into account the results of the verification test and model-based evaluation, it is thought that the cleanup work (decontamination) to remove identified radiation sources will result in the addition of only relatively small exposure doses. Accordingly, it is concluded that there is no impediment to carrying out such cleanup work as long as the following cautions are observed.

1) Streamline the work as much as possible to avoid lengthy work.

2) Wear masks, rubber gloves, rubber boots, long-sleeved shirts and other protection
3) Afterwards, thoroughly wash any exposed parts of the body such as hands, feet and face, and gargle
4) Afterwards, avoid bringing mud, dust and dirt indoors by scraping mud off the shoes, changing clothes and taking other precautions

3. Handling of waste collected during cleanup work (decontamination)

(1) When waste can be temporarily stored or handled by municipal governments (cities, towns, villages, etc.)
If municipal governments (cities, towns, villages, etc.) are able to temporarily store or handle waste collected during cleanup work (decontamination), such waste should be dealt with in the same manner outlined in the “Policy to Deal with Waste due to the Disaster in Fukushima Prefecture” (issued by the Ministry of the Environment on June 23, 2011). However, non-combustibles with a radioactivity concentration exceeding 8,000 Bq/kg should not be disposed of in landfills as is but should rather be dealt with in the same manner as bottom ash generated by incineration.

It would be desirable for communities to coordinate the cleanup schedule and the waste collection scheme to space out the processing of waste generated by the decontamination work.

(2) When waste is to be temporarily stored by local communities
Should the response outlined in (1) be not possible, it would be desirable for the waste to be temporarily stored at sites such as property belonging to a party that carried out the cleanup work (decontamination), such as the local community (community associations, neighborhood associations, etc.).

4. Items related to interim waste storage

(1) Securing locations for interim waste storage

It would be desirable for local governments to secure locations for interim storage of waste collected during cleanup work (decontamination), in advance.
In areas where local governments have not been able to secure locations for interim storage of waste, it would be desirable for a party that carries out the cleanup work (decontamination) to secure locations for interim storage.

(2) Cautions for interim storage

If municipal governments (cities, towns, villages, etc.) temporarily store waste, such waste should be dealt with in the same manner as stated in the “Policy to Deal with Waste due to the Disaster in Fukushima Prefecture” (issued by the Ministry of the Environment on June 23, 2011). If the party that carried out cleanup work (decontamination), such as the local community, temporarily stores the waste, measures such as shielding as well as roping off the area and posting caution signs should be taken as needed to sufficiently reduce the impact on the surrounding environment and appropriately manage the waste. It would also be desirable to periodically monitor the dose rate. (Refer to the attachment.)

(3) Response policy after interim storage

The Japanese government is working towards presenting municipal governments with a scheme for the appropriate handling of temporarily stored waste. In order to ensure that municipal governments can smoothly collect the temporarily stored waste when an appropriate scheme has been presented, it would be desirable for municipal governments to keep a full record of information such as the types, quantities and locations of the temporarily stored waste.

Guideline on Disaster Waste Processing in Fukushima Prefecture

June 23, 2011
Ministry of Environment

The disaster waste in Fukushima Prefecture, which may have been contaminated by radioactive materials released from the Nuclear Power Station due to the accident, is requested to be treated as follows, based on the "Guideline on Processing of Disaster Waste Supposedly Contaminated by Radioactive Materials" that was established by the Study Group on Safety Assessment on Disaster Waste" on June 19, 2011.

The Study Group estimated the effect of dominant nuclides, cesium 134 and cesium 137, on the residents in environs and workers by setting a pathway which may be affected by the assumed processing method and radioactive materials, based on the results of on-site investigations conducted by the Ministry of Environment and the Nuclear and Industrial Safety Agency. The estimated results were compared with the idea, which was proposed in the "Immediate Approach on How to Ensure Safety for Processing of Waste Affected by the Accident at Fukushima Dai-ichi NPS of TEPCO" determined by the Nuclear Safety Commission on June 3 (hereinafter referred to as the "Determinations by NSC"), so that safety will be evaluated and a processing policy will be established.

(Note 1) The target areas do not include evacuation areas, deliberate evacuation areas, Aizu district, and 10 towns and villages that were determined to resume processing on May 27.
(Note 2) The term "processing" used in this document has the same meaning as "processing" in the Waste Processing Law, including the meanings of "disposal" and "recycling".

1. Basic Approach

The processing of disaster waste supposedly contaminated by radioactive materials shall be carried out on the major premise that safety must be ensured for the residents near incineration facilities and final disposal grounds and for workers, taking into account the Determinations by NSC. Based on this, the landfill amount would desirably be minimized through incineration and recycling as available as possible, because huge amounts of disaster waste have been generated.

If it is difficult to indicate a value that can immediately satisfy the “measure” specified in the Determinations by NSC based on the existing investigation results because the dispersion in the degree of contamination of disaster waste is large, or a long-term safety might not be ensured, the relevant national organizations will immediately consider a safe processing method while the waste is temporarily stored in an appropriate way.

Furthermore, as a precautious action, the spatial dose rate and underground water near the processing facilities, the exhaust gas emitted from the processing facilities, and drain will be monitored on a continuous basis. Except for the matters whose level is almost equivalent to or lower than the clearance level, these matters will be processed in Fukushima Prefecture for the time being, while appropriate coordination will be made among stakeholders.

2. Incineration of Combustibles

When combustibles such as sawdust are burned at a facility provided with an exhaust gas processing unit having sufficient capacity, the processing can be safely performed.

Specifically, incineration is possible at a processing facility equipped with a bug filter as an exhaust gas processing unit and having an ability of exhaust adsorption. For the facilities with other exhaust gas processing units such as an electric dust collector, safety will be evaluated by measuring the concentration of radioactive materials in the exhaust gas after disaster waste is incinerated on a trial basis.

(Note) Incineration is possible when the bug filter is provided with a blowing unit for materials capable of adsorbing, such as activated charcoal. Incineration is also possible when a wet-type exhaust gas processing unit, such as a wet-type desulfurization device, is equipped, in addition to a bug filter.

3. Processing of Main Ashes and Scattering Ashes Generated by Incineration

Regarding the main ashes and scattering ashes generated when combustibles such as sawdust are burned, the countermeasures against radiation exposure for workers will be taken; a safe landfill processing can be established by restricting the use of the site formerly used as a landfill. On the other hand, as verifications must be made on a long-term management and environmental protection at landfills with various conditions, ashes will be processed as follows for the time being:

(1) Main ashes

The main ashes, having the concentration of radioactive cesium (the total value of cesium 134 and cesium 137; this is applied to the rest) of less than 8,000Bq/kg, can be disposed at a landfill specified as a general waste disposal site (a managed final disposal site). A measure 8,000Bq/kg for the concentration of radioactive cesium is a concentration level at which safety of workers at landfills can be ensured, and is in accordance with the processing of byproducts generated from service water and sewerage processing which was separately reviewed by the Nuclear Emergency Response Headquarters. When the level exceeds 100,000Bq/kg, the ashes should desirably be stored at a facility capable of appropriately shielding from radiation, in the same way as the processing of byproducts generated from service water and sewerage processing.

Furthermore, the concentration of radioactive cesium in the main ashes may be affected by the amount of mixed waste other than disaster waste, in addition to the concentration of radioactive cesium in combustibles before incinerated.

For landfill processing, the site should be separated from other wastes as a precaution, and should be recorded accordingly. In addition, a layer of soil must be provided between the main ashes to be buried and a water-collecting and draining facility for the water contained. The site formerly used for landfill processing should not be used for residence and so on, unless sufficient safety is ensured.

When the concentration of radioactive cesium exceeds 8,000Bq/kg, the main ashes should not be subject to landfill processing; after the behavior of radioactive cesium contained in the main ashes is appropriately grasped, they should be temporarily stored until the safety of processing is confirmed by a relevant national organization. The temporary storage is a preprocessing phase before the final processing, and is divided into the following two:

1) Storage in drums, etc. at a place capable of shielding from radiation
2) Storage at a place for general waste final processing (a managed final processing)
    a) Landfills should be separated from other wastes and records should be kept.
    b) An isolated soil (such as bentonite) layer of approx. 30cm should be provided and the main ashes packaged with waterproof materials should be placed on it.
    c) The ashes should be covered by impervious sheet to protect from rain, or covered by tent or roof.
    d) The ashes should be covered by soil on the same day.

In the case of temporary storage, the main ashes should not be covered by soil of the same day after the day's work finishes, but should desirably be covered by soil more frequently. Furthermore, the working time of handing the main ashes may need to be limited for individual workers. (The safety assessment tentatively specifies that the method of soil covering is an intermediate soil covering, the working time is 8 hours/day, and a half of working hours in 250 days per year is applied to the work carried out near the main ashes.)

The site for temporary storage should be located at an appropriate distance from the residential areas in environs (see the Reference 5 attached at the end).

(2) Scattering Ashes

Scattering ashes emitted from a dust collector are likely to have higher concentration of radioactive cesium than the main ashes. It is also reported that the radioactive cesium contained in scattering ashes is likely to solve into water.

Consequently, it is appropriate that scattering ashes should be temporarily stored, just like the main ashes with the concentration of radioactive cesium exceeding 8,000Bq/kg, until the safety of processing is ensured by a relevant national organization. If the level is over 100,000Bq/kg, they should desirably be stored at a facility capable of appropriately shielding from radiation.

The scattering ashes generated when incineration ashes are melted should also be temporarily stored. Molten slug should also be temporarily stored in principle, but it can be subject to landfill processing if the concentration level of under 8,000Bq/kg is confirmed.

4. Direct Landfill Processing of Incombustibles

Incombustible disaster waste can be subject to landfill processing directly, or safely after broken. The landfill processing method or use of the site formerly used as a landfill is the same as that of the main ashes with the concentration level under 8,000Bq/kg.

Regarding the effects on the landfill workers, a mask must be put on just as in the case of processing usual waste; however, a special countermeasures focusing on the effect of radioactive materials is not required.

5. Recycling

Even if disaster waste is supposedly contaminated by radioactive materials generated from the accident at the Nuclear Power Station, it can be recycled if its radioactive concentration is appropriately controlled to be under the reference level (10μSv/year) used for establishing a clearance level, before put on the market.

Also, even if the clearance level is exceeded when the disaster waste is used, the waste can still be used under a controlled condition while a means is taken to lower the exposure dose to 10μSv/year or less. The use under a controlled condition includes the use for civil engineering materials such as roadbed materials on public sites; however, the waste should be limitedly used underground by appropriately covering it with soil.

Metals supposedly contaminated by radioactive materials can be reused after the contaminants on the surface are sufficiently washed out by water and so on, because contaminants usually remain on the metal surface. Furthermore, the wastes stored indoors until being delivered out to a temporary depot can also be reused. On the other hand, the broken concrete waste supposedly contaminated by radioactive materials should not be directly reused for residential buildings as concrete wall materials, unless safety is ensured.

Further reviews are required on the possibility of other uses and the use after decontaminated.

6. Necessary Investigations

The guideline on processing of disaster waste has been arranged based on the results of on-site investigations conducted by relevant national organizations, as well as on the results of safety assessment conducted by setting a pathway that could be affected by the assumed method of processing and radioactive materials. For precautions, however, a further investigation must be conducted to confirm the validity of safety assessment. Accordingly, the relevant national organizations will further confirm the situation of contamination by disaster waste with a relatively high spatial dose rate placed at a temporary depot, take measurements of the radioactive concentration of the main ashes and scattering ashes generated from incineration, exhaust gas, waste water, etc., and take measurements of spatial dose rate and the effluent at the site boundary in the final processing site.

Although it is estimated that the contamination level of sediments generated by the tsunami is almost equivalent to that of the surrounding soil, the concentration of radioactive materials will be measured

for precautions, in order to grasp the current situation.

7. Rules for Preventions of Hazards from Ionizing Radiation

To minimize the exposure on workers to a reasonably attainable level, and to appropriately carry out incineration, landfill processing, recycling and so on of the disaster waste, it is required to appropriately and periodically take measurements of the radioactive concentration of the exhaust from incineration and melting facilities, and of the waste water from controlled final processing facilities. In addition, stakeholders are required to take appropriate measures if necessary. The personnel in charge of managing incineration ashes is required to record the volume of incineration ashes to be temporarily stored and the radioactive concentration.

On the premises such as incineration facilities of disaster waste and controlled final processing facilities for landfill, if the effective dose from external radiation may exceed the criteria (1.3mSv (2.5μSv/h) every three months) specified in Article 3, paragraph 1 of the Rules for Preventions of Hazards from Ionizing Radiation (Rule No. 41, the Ministry of Labors, 1972; hereinafter referred to as the "Ionizing Rules"), or the incineration ashes correspond to the radioactive material defined in Article 2, paragraph 2 of the Ionizing Rules (in the case of radioactive cesium, when the total of concentrations of cesium 134 and cesium 137 exceeds 10,000Bq/kg), the relevant rules specified in the Ionizing Rules must be observed.

In addition, if the broken concrete of disaster waste corresponds to the radioactive material defined in Article 2, paragraph 2 of the Ionizing Rules, it must be noted that the Ionizing Rules may be applied even on the premises which accept the concrete as roadbed materials.

When the incineration ashes, whose radioactive concentration is close to the lower limit defined in Article 2, paragraph 2 of the Ionizing Rules, are processed, the exposure of workers should be measured and controlled, in light of "2. Processing, Transportation, and Storage" of the "Determinations of NSC".

Further, when the radiation dose of workers exceeds 1mSv/year, the relation between the radioactive concentration of incineration ashes and the radiation dose should be re-evaluated, based on the radioactive concentration detected from the incineration ashes, at a target timing of 6 months passed since processing of disaster waste is started, so that the radiation dose can be minimized to a reasonably attainable level.

8. Processing Method of Disaster Waste in Evacuation Areas and Deliberate Evacuation Areas

According to the results of investigations on the spatial dose rate and the radioactive concentration of disaster waste near a temporary depot, which were conducted in Hama-dori and Naka-dori, it turned out that the dispersion in the radioactive concentration of disaster waste is small in the areas of low spatial dose rate. Since the contamination pathway of disaster waste from radioactive materials is thought to be affected by the radioactive fallouts released into the atmosphere, the relation between the radioactive concentration and the spatial dose rate, that was obtained from these investigations, is also applicable to other areas in Fukushima Prefecture.

Consequently, in the areas whose spatial dose rate is supposedly almost equivalent to that of the outer areas, even in evacuation areas and deliberate evacuation areas, the processing method described in 1 through 7 above can be applied. For contributing to the processing plans to ensure a smooth processing of disaster waste in these areas, the relevant national organizations must conduct preliminary investigations regarding detailed studies on the spatial dose rate and the form in which disaster waste is present.

On the other hand, further considerations should be given to the processing method of disaster waste in the areas with high spatial dose rate. In these areas, investigations will be conducted in the future on the concentration of disaster waste for each type, and the processing method will be re-examined based on the current situation.

9. Others

(1) Monitoring

To ensure the safety of processing, monitoring must be conducted on a continuous basis for the spatial dose rate at processing facilities nearby, the groundwater near the facilities, exhaust gas and waste water from processing facilities, and so on. In the future, while the nation and municipalities will be required to carry out monitoring from their own viewpoint, a unified method of monitoring should be taken as much as possible. Therefore, the knowledge on the monitoring technique must immediately be collected, and the method of monitoring must be reviewed accordingly.

In the meantime, municipalities are required, when incinerating disaster waste, to measure the concentration of radioactive cesium of the main ashes and scattering ashes at an early stage.

(2) The Management Entity of Facilities

In this review, it was assumed that municipalities would mainly process disaster waste at their own incineration facilities and final processing facilities; however, in some cases, municipalities consign private operators for processing, and disaster waste is processed at the facilities managed by these private operators. Considering that the disaster waste supposedly contaminated by radioactive materials is likely to be managed in a long period, in the case of consigned processing, further considerations must be given to the roles of prefectures and cities specified by a government ordinance, which are authorized to direct and supervise the facilities at municipalities who are the consigner.

(Reference 1) Immediate Approach by Nuclear Safety Commission

The approach by NSC, stated in the “Immediate Approach on How to Ensure Safety for Processing of Waste Affected by the Accident at Fukushima Dai-ichi NPS of TEPCO” that was announced on June 3 by NSC, is outlined as follows:

(1) When recycling, it must be confirmed that the radioactive concentration is appropriately controlled for the products manufactured through recycling, so that the concentration will be under the criteria (10μSv/year) used for setting the clearance level, before they are put on the market.
(2) Regarding processing, transportation and storage, special considerations must be given to reduce the amount of radiation exposure to the residents in environs, so that the dose on the residents will not exceed 1mSv/year, by taking actions in parallel to improve the environment surrounding the processing facilities.
(3) It is desirable that the dose on the workers engaged in processing does not exceed 1mSv/year as much as possible. However, in the process of handling materials with a relatively high radioactive concentration, the radiation dose on the workers must be appropriately controlled by observing the “Rules for Preventions of Hazards from Ionizing Radiation” (Rule No. 41, the Ministry of Labors, 1972; hereinafter referred to as the “Ionizing Rules”).
(4) The safety of processing should be determined based on the “target” that the dose on the residents in environs, after the controlling period of the processing facilities expires, will be under 10μSv/year with reference to the assessment in the basic scenario, and will be under 300μSv/year with reference to the assessment in the variant scenario.

(Reference 2) Relation with Spatial Dose Rate

Based on the existing results of investigations, the relation between the spatial dose rate and the concentration of radioactive cesium in disaster waste is evaluated as follows:

(1) In the case the spatial dose rate is relatively low

When the spatial dose rate at points 1m distant from a temporary depot for disaster waste is relatively low, the concentration of radioactive cesium in disaster waste is relatively low, and dispersion is also small. For example, at a temporary depot with the spatial dose rate of approx. 0.2μSv/h, the concentration of radioactive cesium in disaster waste was roughly under 800Bq/kg.

When only disaster waste is incinerated, the concentration of radioactive cesium in the main ashes is thought to be about 10-fold of that of disaster waste at most, thus inferring that the average concentration of radioactive cesium in the main ashes is likely to be under 8,000Bq/kg. When disaster waste is incinerated together with the ordinary waste, the concentration would possibly become lower.

(2) In the case the spatial dose rate is relatively high

When the spatial dose rate at points 1m distant from a temporary depot for disaster waste is relatively high, the dispersion in the concentration of radioactive cesium in disaster waste is large. For example, when the spatial dose rate at points 1m distant from the temporary depot is approx. 0.8μSv/h, the average concentration of radioactive cesium in disaster waste is estimated to be approx. 3,000Bq/kg, but in some cases, this value might become up to approx. 6,000Bq/kg.

Consequently, the dispersion in the concentration of radioactive cesium in the main ashes when incinerated is also expected to be large.

(Reference 3) Calculation Examples for Safety Assessment

(1) Effects of incineration on the residents in environs

For the safety assessment on incineration, the following three cases were assumed.

	Volume of Incineration	Percentage of disaster waste in incinerated volume	Removal rate from exhaust gas
Combination Case A	150t/day	27%	99%
Combination Case B	390t/day	27%	99%
Temporary Incinerator Case	100t/day	100%	99%

Among these cases, the Combination Case A showed the least effect on the residents in environs, while the Combination Case B and Temporary Incinerator Case showed almost the same level. Therefore, the calculation results of the effects on the residents in environs in the latter case (Combination Case B and Temporary Incinerator Case) are outlined as follows:

1) Exposure from dust released from an incinerator

- The exposure dose of children per the concentration in waste per unit is 0.0000054mSv/y per Bq/g.
- For instance, the annual exposure dose of children when disaster waste with 3,000Bq/kg (3Bq/g) is incinerated is 0.000016mSv/y.
- This is under 1mSv/y, which is a measure specified by NSC.

Note) The value 3,000Bq/kg (3Bq/g) is estimated to be an average concentration of radioactive cesium in disaster waste, when the spatial dose rate at points 1m distant from a temporary depot for disaster waste is approx. 0.8μSv/h, based on the existing investigation results. (However, it must be noted that the dispersion in the concentration of radioactive cesium in disaster waste is large, even if the spatial dose rates are equivalent).

2) Exposure from the dust-built-up soil

- Assuming that the dust released with incineration in 10 years is all built up in the surrounding soil (from the viewpoint of safety), the exposure dose of children per the concentration in waste per unit is 0.00048mSv/y per Bq/g.
- For instance, the annual exposure dose of children when disaster waste with 3,000Bq/kg (3Bq/g) is incinerated is 0.0014mSv/y.
- This is under 1mSv/y, which is a measure for processing specified by NSC, and under 0.01mSv/y (10μSv/y), which is a measure for disposal specified by NSC.

(2) Effects on workers at landfills

The exposure dose of workers is calculated to be 0.78mSv/y, when the waste with 8,000Bq/kg (8Bq/g) is directly disposed at landfills, being under 1mSv/y that is a measure for workers specified by NSC. Thus, the value 8,000Bq/kg is the concentration level at which safety for workers is also ensured, and is regarded as the same as that of byproducts from service water and sewerage processing, which was separately reviewed by the Nuclear Emergency Response Headquarters.

For your information, this value is calculated assuming that workers are engaged in the work near waste in 8 hours/day, and in a half of the total working hours in 250 days a year; and assuming that an immediate soil covering at the end of one working day is not carried out, but only an intermediate soil covering is performed.

The exposure can be reduced by reducing the hours of working near waste. If soil covering is carried out immediately after landfill processing, the exposure from buried waste can also be reduced.

(3) Use of the site of former landfill

1) Residence at the site without covering-soil

When landfill processing is completed, the site is usually covered by more than 50cm of soil. Assuming that soil and incinerated ashes are mixed after the incinerated ashes in Combination Case B are processed in landfill, the exposure dose is calculated as follows when a residence is built on the mixed soil:

- The exposure dose of children per the concentration in waste per unit is 0.31mSv/y per Bq/g.

- For instance, the annual exposure dose of children when disaster waste with 3,000Bq/kg (3Bq/g) is incinerated and buried is 0.93mSv/y.
- This is over 0.01mSv/y (10μSv/y), which is a measure for disposal specified by NSC.

2) Use of parks with covering-soil

- Assuming that a park with 50cm of covering soil on the incinerated ashes in Combination Case B is used for 200 hours per year, the exposure dose of children per the concentration in waste per unit is 0.00016mSv/y per Bq/g.
- For instance, the annual exposure dose of children when disaster waste with 3,000Bq/kg (3Bq/g) is incinerated and buried is 0.00048mSv/y.
- This is under 0.01mSv/y (10μSv/y), which is a measure for disposal specified by NSC.

(4) Recycling

1) Effects on concrete-processing workers

- Assuming that the work for recycling concrete is performed in 1,000 hours/y, the exposure dose per the concentration in waste per unit is 0.033mSv/y per Bq/g.
- For instance, the annual exposure dose of workers when concrete with 3,000Bq/kg (3Bq/g) is recycled is 0.099mSv/y.
- This is under 1mSv/y, which is a measure for disposal specified by NSC.

2) Use of concrete as wall materials

- Assuming that living in a residence with wall materials of recycled concrete lasts for 6,000 hours per year, the exposure dose of children per the concentration in waste per unit is 0.11mSv/y per Bq/g.
- For instance, the annual exposure dose of children when concrete with 3,000Bq/kg (3Bq/g) is recycled as wall materials in a building is 0.33mSv/y.
- This is over 0.01mSv/y (10μSv/y), which is a measure for disposal specified by NSC.

3) Use of covering soil in a park as civil engineering materials

- Assuming that a park with concrete reused under 50cm of covering soil is used for 200 hours per year, the exposure dose of children per the concentration in waste per unit is 0.000060mSv/y per Bq/g.
- For instance, the annual exposure dose of children when disaster waste with 3,000Bq/kg (3Bq/g) is used is 0.00018mSv/y.
- This is under 0.01mSv/y (10μSv/y), which is a measure for disposal specified by NSC.

(Reference 4) Shielding of Radiation

In shielding radiation, it is specified that when covered by a concrete wall 15cm thick, the radiation dose rate becomes one tenth (1/10), and when covered by soil 30cm thick, the radiation dose rate becomes approximately one fortieth (1/40).

Source: A conversion factor of external exposure dose for evaluating the upper limit of concentration in landfill processing (2008, Japan Atomic Energy Agency)

(Reference 5) Distance from site boundaries including residential areas in temporary storage

Regarding the temporary storage of byproducts generated from service water and sewerage processing, which was separately reviewed, it is requested that an appropriate distance be kept from the site boundary, such as from residential areas, according to the following table. The distance is calculated assuming that huge amounts of sludge is temporarily stored day after day, and it should not be directly applied to the temporary storage of main ashes and scattering ashes generated from the incineration of disaster waste; however, the values shown in the following table are regarded to be sufficiently safe until a distance required for the latter case is calculated. These values are shown for reference.

Table

First Column	Second Column
A measure of distance from site boundaries	Total of cesium 134 and cesium 137
70m	Less than 100,000Bq/kg
50m	Less than 70,000Bq/kg
40m	Less than 60,000Bq/kg
20m	Less than 40,000Bq/kg
6m	Less than 20,000Bq/kg
Without limit	Less than 8,000Bq/kg

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Interim Storage for the Disposal of Disaster Waste in Fukushima Prefecture

July 28, 2011
Ministry of the Environment

The following is the outcome of a study on interim storage methods for bottom ash, fly ash, and welding slugs (referred to as “ash”), compiled on June 23, 2011 as “The Disposal Policy for Disaster Waste in Fukushima Prefecture” (referred to as “The Disposal Policy”).

1. Interim storage method (8,000 Bq/kg to 100,000 Bq/kg)

Interim storage will be carried out using one of the following (1) to (3) methods.

(1) Use drums, etc. for storage in places where radiation can be shielded.

1) “Places where radiation can be shielded” shall be located inside ferroconcrete buildings and other similar buildings. The air dose rate shall be measured and it must be confirmed that it is no higher than the background radiation level at the outside boundary line of the site.

2) Methods for shutting out the radiation is, for example, to enclose the material in a 15 cm thick concrete wall to reduce the radiation dosage equivalence rate to 1/10, and the use of 30 cm cover soil will be considered to reduce the level further down to 1/40.

3) Regarding “drums, etc.,” it is desired that, during the process of storing drums and flexible container bags etc., scattering and outflow are well controlled and drums are of a quality suitable for lasting a long time appropriate for the location stored.

(2) Storing at a general waste disposal site (controlled landfill final disposal site)

1) Separate disposal site from other waste.

2) After setting around a 30 cm isolated layer of bentonite, etc., place incineration ash wrapped with water-resistant material above.

3) Cover with liner sheets, tents or a roof for preventing rain water from entering.

4) The waste is to be covered with a layer of soil on the same day. Refer to the accompanying sheet for the appropriate distance from surrounding residential areas, for your reference.

(3) Other storage methods
Other than (1) and (2) above, it is possible to store waste material using drums, etc. in well-controlled areas where no one other than those authorized can enter without a valid reason. In this case, make sure that the air dose rate measured at the border of the site is almost the same as the background dose. However, in case it will be stored outside, make sure to take action for preventing rain water from entering by spreading a liner sheet etc. beforehand. Prevent storing waste material at locations where ground level is lower than the surrounding area and take measures to construct a roof or cover it with another method.

2. Interim storage method (over 100,000 Bq/kg)

(1) Store inside facilities where radiation will be appropriately shielded.

"Facilities where radiation will be appropriately shielded" is inside buildings made of ferroconcrete etc. The air dose rate shall be measured and it must be confirmed that it is no higher than the background dose of the outside boundary line of the site.

3. Maintaining interim storage records

The following items are to be recorded and kept when keeping records for interim storage.

- Name of the facility and address
- Date temporarily stored
- Kind, amount, and location ash was created
- Method of temporary storage (For example: drum, disposal site)
- Concentration of ash (Cesium-134, Cesium-137)
- Place (When storing at a general waste disposal site, location inside the disposal site)

And, if person in charge of discharging the ash and managing the place of interim storage differ, records shall be kept by both sides.

(Attached sheet)

For an interim storage, the distance from residential areas etc. and the border line of a site

In reference 5 of “The Disposal Policy,” the distance from the border line of a site of a residential area when discussing interim storage for secondary products such as water and sewage treatment etc. had been showed as a reference. This time, in order to create distance from the border line of a site of a residential area necessary for interim storage for the disposal of disaster waste, the results of the study are shown. It is best to maintain a distance as shown in Tables 1 and 2.

Table 1 Guidelines for the offset distance from the disposal area of ash

A total of Cesium-134 and Cesium-137	Thickness of same-day soil cover			
	15 cm	30 cm	50 cm	(Reference) Without same-day soil cover
100,000 Bq/kg and under	6 m	6 m	6 m	20 m
80,000 Bq/kg and under	6 m	6 m	4 m	15 m
60,000 Bq/kg and under	4 m	4 m	4 m	10 m
40,000 Bq/kg and under	4 m	4 m	4 m	6 m
20,000 Bq/kg and under	2 m	2 m	2 m	2 m
8,000 Bq/kg and under	2 m	2 m	2 m	2 m

Table 2 Guidelines for the offset distance from the disposal area of disaster waste (incombustible etc.)

A total of Cesium-134 and Cesium-137	Thickness of same-day soil cover			
	15 cm	30 cm	50 cm	(Reference) Without same-day soil cover
100,000 Bq/kg and under	8 m	6 m	6 m	50 m
80,000 Bq/kg and under	6 m	6 m	6 m	40 m
60,000 Bq/kg and under	6 m	4 m	4 m	30 m
40,000 Bq/kg and under	4 m	4 m	4 m	15 m
20,000 Bq/kg and under	2 m	2 m	2 m	4 m
8,000 Bq/kg and under	2 m	2 m	2 m	2 m

(Reference) Evaluation of the impact of radiation from interim storage

Offset distances in Table 1 and Table 2 were calculated based on the evaluation of the impact of radiation for residents living nearby general waste disposal sites, under the cooperation of the Safety Research Center, Japan Atomic Energy Agency (JAEA), and the following table describes the major evaluation parameters for these sites.

Table: Setting major evaluation parameters

Size of disposal site	Incineration ash	75 m × 75 m × 5.83 m (d)
	Direct disposal of disaster waste	200 m × 200 m × 10 m (d)
Area spread (per day)	Incineration ash	12 m × 12 m (thickness of spreading 30 cm)
	Direct disposal of disaster waste	15 m × 15 m (thickness of spreading 30 cm)
Bulk density	Incineration ash = 1.6 g/cm^3, concrete rubble = 1.6 g/cm^3, soil = 1.5 g/cm^3	
Evaluation time	2,000 hours. (Assuming residents will spend outside 20% of their resident time and indoor radiation exposure will be disregarded. The annual amount of radiation exposure should be 1,752 hours (8,760 × 0.2). 2,000 hours is estimated to be safe.)	
Means of covering with soil	The waste material shall be covered up the same day after the work is completed. Ash and disaster waste are to be spread evenly and exposed only the surface integral area.	

Source: Reference material 3: 4th Disaster Waste Safety Evaluation Commission

Incineration Facilities and Monitoring of Disaster Waste Disposal in Fukushima Prefecture

August 9, 2011
Ministry of the Environment

1. Incineration facilities

As outlined in the "Policy to Deal with Waste due to the Disaster in Fukushima Prefecture" issued on June 23 (hereinafter referred to as the "Policy to Deal with Waste"), safety was to be assessed by means of a test incineration of disaster waste and the measurement of the radioactive concentration in the exhaust gas in facilities equipped with other exhaust gas treatment systems, such as electric dust collectors. Based on the measurement results (separately attached) obtained with the cooperation of incineration facilities in the Prefecture, we present the following policies.

○ Electric dust collectors

Incineration facilities that are equipped with electric dust collectors and also have exhaust gas absorption capability, such as activated carbon injection systems, may incinerate disaster waste while ensuring safety by monitoring the exhaust gas concentration indicated in the following section, "2. Monitoring."

2. Monitoring

Since the monitoring method was subject to future examination in the "Policy to Deal with Waste", it is described below.

(1) Measurement items, locations, and monitoring frequency

i) In principle, the items listed below shall be monitored for the time being. Radioactive cesium (^{134}Cs and ^{137}Cs) shall be measured as a radioactive material.

ii) Monitoring locations shall be intermediate treatment facilities as well as temporary storage sites and landfill disposal sites specified in the manual published on July 28, 2011 entitled "Temporary storage of disaster waste in Fukushima Prefecture."

iii) Standard monitoring frequencies are listed below. Air dose rates can be monitored in more detail by taking measurements continuously and other techniques. If an air dose rate suddenly increases or if waste to be treated changes in type or property, measurements shall be taken immediately. For bottom ash, fly ash, molten slag, and molten fly ash, a lower frequency of monitoring is acceptable if the dose is sufficiently less than 8,000 Bq/kg.

<Monitoring items and standard monitoring frequency>

a) Intermediate treatment facilities
Air dose rate at site boundaries: Weekly
Radioactive material concentration in exhaust gas: Monthly
Radioactive material concentration in discharged water: Monthly
Radioactive material concentration in discharged sludge: Monthly
Radioactive material concentration in bottom ash: Monthly
Radioactive material concentration in fly ash: Monthly
Radioactive material concentration in molten slag: Monthly
Radioactive material concentration in molten fly ash: Monthly

b) Temporary storage sites other than those listed in (c)
Air dose rate at site boundaries: Weekly

c) Temporary storage sites
(storage at general waste final disposal sites [controlled final disposal sites])
Air dose rate at site boundaries: Weekly
Radioactive material concentration in discharged water: Monthly
Radioactive material concentration in discharged sludge: Monthly
Radioactive material concentration in underground water at the periphery of the site: Monthly

d) Landfill disposal sites
Air dose rate at site boundaries: Weekly
Radioactive material concentration in discharged water: Monthly
Radioactive material concentration in discharged sludge: Monthly
Radioactive material concentration in underground water at the periphery of the site: Monthly

iv) At facilities for the incineration of disaster waste and businesses such as controlled final disposal sites, if the effective doses of external radiation may exceed the standard (1.3 mSv/three months or 2.5 μSv/hour) stipulated in Article 3, Paragraph 1 of the Rules for the Prevention of Hazards from Ionizing Radiation (Labour Ministry Notice No. 41 issued in 1972; hereinafter called “Ionizing Radiation Rules”), or incinerated ash may fall under the definition of radioactive materials (for radioactive cesium, the total concentration of ^{134}Cs and ^{137}Cs exceeds 10,000 Bq/kg) stipulated in Article 2, Paragraph 2 of the Ionizing Radiation Rules, these facilities shall observe the relevant rules in the Ionizing Radiation Rules to ensure the safety of workers. Even in other cases, when handling incinerated ash that has a radioactive material concentration near the lower limit (about 80% of the lower limit or more; specifically, about 8,000 Bq/kg or more) defined in Article 2, Paragraph 2 of the Ionizing Radiation Rules, it is advisable to measure air dose rates at work environments (places where incinerated ash is handled) about once a week.

Table: List of monitoring items

	Intermediate processing facility	Temporary storing sites			Land-fill site
		Storing in drums in places where radiation can be shielded	Storing at general waste disposal sites (controlled final disposal sites)	Other storing methods	
Air dose rate at site boundaries	○	○	○	○	○
Radioactive material concentration in exhaust gas	○				
Radioactive material concentration in discharged water	○*		○		○
Radioactive material concentration in discharged sludge	○*		○		○
Radioactive material concentration in bottom ash	○				
Radioactive material concentration in fly ash	○				
Radioactive material concentration in molten slag	○*				
Radioactive material concentration in molten fly ash	○*				
Radioactive material concentration in underground water at the periphery of the site			○		○

○: To be measured in principle
○*: To be measured when objects that fall under the rules are found

(2) Analysis method

i) The measurement of radioactive material concentrations shall comply with “Gamma Ray Spectrometry with a Germanium Semiconductor Detector,” series 7 of the Education Ministry’s radiation measurement method (revised in 1992). For sampling methods for bottom ash and fly ash, refer to the cone and quartering method in “Particulate materials—General rules for methods of sampling,” JIS M 8100. Sampling methods for exhaust gases and discharged water shall continue to be studied. It is appropriate to determine detection limit levels for each measurement purpose.

ii) Nal scintillation survey meters shall be used to measure air dose rates. Carry out measurements at a height of 1 m near compound boundaries.

<Appendix>

Measurement results from incineration facilities equipped with electric dust collectors

1. Outline

The concentration of radioactive materials was measured at general waste incineration facilities in Fukushima Prefecture during refuse incineration and during mixed incineration of disaster waste. Based on the results, the influence that incineration of disaster waste has was assessed as follows.

2. Method of measuring the concentration of radioactive materials

(1) Sampling method
The amounts of bottom ash and fly ash required to perform measurements by using germanium semiconductor detectors were sampled. Analysis samples of the exhaust gas were collected in accordance with JIS Z 8808 “Methods of measuring dust concentrations in flue gas”. Silica fiber with 0.3 μm DOP and a capturing efficiency of 99.9% or higher (ADVANTEC cylindrical filter paper No. 88RH) was used to suction exhaust gas of approx. 1 m^3N in about one hour.

(2) Measuring method
Samples were measured by using the germanium semiconductor detectors.

(3) Measured by
Japan Chemical Analysis Center

3. Target facilities

(1) Cleaning Center of Date Local Hygienic Treatment Association

① Overview of facility
Incinerator: Semi-continuous stoker type incinerator (50 t/16 hours × 3 units)
Dust collector: Electric dust collector (with activated carbon blow-in). No other exhaust gas treatment device is available.
Fly ash treatment method: Chemical treatment
Industrial effluent: No external effluent

② Date on which analysis samples were taken
July 5, 2011 (refuse incineration) and July 6, 2011 (mixed incineration of disaster waste)
Disaster waste mixing rate in incineration was about 10%.

③ Analysis samples
The materials sampled were bottom ash, fly ash (after chemical treatment), exhaust gas analysis samples, as well as sludge and water after waste water treatment at a final disposal site.
This facility has a controlled type final disposal site on the premises, and water after waste water treatment is used for cooling the exhaust gas from the incineration facility.

(2) Sukagawa Local Hygiene Center of Sukagawa Local Health and Environment Association

① Overview of facility
Incinerator: Semi-continuous stoker type incinerator (50 t/16 hours × 2 units)
Dust collector: Electric dust collector (with activated carbon blow-in). No other exhaust gas treatment device is available.
Fly ash treatment method: Chemical treatment
Industrial effluent: No external effluent (waste water is sprayed inside the incinerator).

② Date on which analysis samples were taken
July 7, 2011 (refuse incineration) and July 8, 2011 (mixed incineration of disaster wastes)
Disaster waste mixing rate in incineration was about 10%.

③ Analysis samples
The materials sampled were bottom ash, fly ash (after chemical treatment) and exhaust gas analysis samples.

4. Measurement results

The concentration of radioactive cesium in the exhaust gas is tabulated as follows.

Table: Measurement results for radioactive substances in exhaust gas

		^{134}Cs[Bq/m^3]	^{137}Cs[Bq/m^3]
Date Regional Sanitary Processing Association Disposal Center	Pre-disaster waste input	0.83±0.026	0.89±0.022
	Post-disaster waste input	1.4±0.03	1.5±0.02
Sukagawa Regional Health and Environment Association Sukagawa Sanitation Center	Pre-disaster waste input	0.34±0.016	0.35±0.013
	Post-disaster waste input	0.36±0.015	0.35±0.011

5. Discussion

In its document dated June 3, 2011, "On the Present Policy for Securing Safety Related to the Processing and Disposal of Waste Resulting from the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station," the Nuclear Safety Commission emphasizes the need to verify that the exhaust and wastewater from treatment facilities have a radiation concentration below the limit defined in the "Notification for Dose Equivalent Limits on the Basis of the Rules for Commercial Power Reactors" (hereinafter called "Dose Notification"), for example. The defined concentration limits for outside the Environmental Monitoring Area are 20 Bq/m^3 for ^{134}Cs and 30 Bq/m^3 for ^{137}Cs. The obtained measurement results are all below these concentration limits. The largest sum of the proportion of each measurement with respect to the limit is 0.12*, which is still below 1.

* The concentration reading for the exhaust gas from the Date Regional Sanitary Processing Association Disposal Center (after disaster waste input) was 1.4 Bq/m^3 for ^{134}Cs and 1.5 Bq/m^3 for ^{137}Cs. The Notice for Dose Equivalent Limits defines the concentration limits of 20 Bq/m^3

In reference to the findings of the impact assessment reported at the 3rd Disaster Waste Safety Assessment Committee Meeting (Reference 4), the exposure dose to residents in the vicinity is considered sufficiently low given the current level of exhaust gas concentration in the measurement results (see reference materials).

It is concluded, therefore, that incineration facilities equipped with electrical dust collectors with activated carbon insufflations can safely process the disaster waste when it is mixed in at a volume of around 10% of the entire waste being incinerated.

for ^{134}Cs and 30 Bq/ m^3 for ^{137}Cs. The sum of the proportion of each measurement with respect to the limit is 0.12 according to the following formula: 1.4/20+1.5/30=0.12

Reference:

Impact Assessment Findings for the Incineration Scenario

At the 3rd Disaster Waste Safety Assessment Committee Meeting (Reference 4), an impact assessment was performed for residents in the vicinity and for workers associated with the processing and treatment of disaster waste who were at risk of contamination by radioactive substances. The assessment findings for the incineration scenario are as follows.

1. If waste with a radioactive cesium concentration of 1,000 Bq/kg is incinerated, the exhaust gas in the smokestack has a concentration of 1 Bq/ m^3N.

(Assuming that the radioactive cesium concentration in the waste is 1,000 Bq/kg (1,000,000 Bq/ton), that the volume of air needed to incinerate 1 ton of waste is 5,000 m^3N, and that the proportion of the cesium remaining after the main ash is 50%, the concentration of radioactive cesium entering the exhaust gas processing unit is 100 Bq/ m^3N (＝1,000,000 / 5,000 × 0.5).

Assuming that 99% of this is removed by the exhaust gas processing unit, the concentration of the exhaust gas in the smokestack is 1 Bq/ m^3N.)

2. The corresponding annual exposure dose for residents in the vicinity is*:

16. Dust exposure for person residing near the incinerator (adult): 3.0×10^{-8} mSv/y
17. Dust inhalation for person residing near the incinerator (adult): 2.0×10^{-5} mSv/y
18. Dust exposure for person residing near the incinerator (child): 4.0×10^{-8} mSv/y
19. Dust inhalation for person residing near the incinerator (child): 5.3×10^{-6} mSv/y
20. Soil exposure for person residing near the incinerator (adult): 3.7×10^{-4} mSv/y
21. Soil exposure for person residing near the incinerator (child): 4.8×10^{-4} mSv/y

* The assessment findings for the incineration processing scenario are based on the assumption that a temporary incinerator is used (100 t/day per incinerator)

Attachment IV-15

Administrative Circular

June 28, 2011

To: Administrative departments (agencies)
for waste disposal in the prefectures concerned

Proper Processing and Illegal Dumping Measures Office

Waste Management Division

Waste Management and Recycling Department,
Minister's Secretariat, Ministry of the Environment

Measurement of Incineration Ash and Interim Handling Thereof at Incineration Facilities for General Waste

As levels of radioactive cesium (cesium-134 and cesium 137) in access of 8,000 Bq/kg have been detected in fly ash from Tokyo's incineration facilities for general waste, we are asking such facilities in the Tohoku, Kanto and other regions to measure the levels of radioactive contamination in incineration ash (bottom ash and fly ash). We are also notifying such facilities regarding the interim handling of such ash. We ask concerned parties in all prefectures for their understanding of the above matters and that they circulate this information to the municipalities, etc. under their jurisdiction.

In addition, please also refer to the appendix, “Guideline on Disaster Waste Processing in Fukushima Prefecture” (June 23, 2011), which is attached.

(1) Measurement of incineration ash
The levels of radioactive cesium contained in fly ash from all incineration facilities for general waste are being measured. It is desirable that bottom ash be also measured for reference. Further, in cases where it is feared that cesium levels exceed 8,000 Bq/kg, the measuring of bottom ash will be carried out.
In addition, in cases where the measured levels exceed 8,000 Bq/kg, or where they are close to 8,000 Bq/kg, it is desirable that measurement continues at fixed intervals (of approximately one month).
Further, once the results of these measurements have been collated at the Ministry of the Environment, it is planned that they will be announced. We ask that dates be set for measurements to be carried out at municipalities, etc, under your jurisdiction, and that once each prefecture has collated these dates, that the schedules be reported to the person in charge at the Ministry of the Environment no later than July 8 by fax or e-mail. Afterwards, upon the confirmation of the results of measurements at each municipality, etc., we ask that once the results have been collated at each prefecture, that they are submitted to the person in charge at the Ministry of the Environment using the accompanying form.

(2) Handling for the present of contaminated ash
We at the Ministry of the Environment have received the results of the latest survey carried out by the Tokyo 23 Wards Incineration Plants Partial-Affairs Association, and are urgently discussing methods of handling incineration ash. Until the collation of the discussion results is complete, incineration ash is to be handled as described below:

A. Bottom ash or fly ash with levels of radioactive cesium exceeding 8,000 Bq/kg are to be temporarily stored at locations set at final treatment sites for general waste (controlled final landfill sites). The temporary storage method shall comply with "Guideline on Disaster Waste Processing in Fukushima Prefecture" (June 23, 2011).

B. Bottom ash or fly ash with levels of radioactive cesium not exceeding 8,000 Bq/kg are to be disposed of by landfill at final treatment sites for general waste (controlled final landfill sites). As a precautionary measure, to the extent possible, fly ash and bottom ash are to be disposed of by landfill in separate locations, and measures are to be taken to identify each location.

C. In addition, in cases where it has been confirmed that bottom ash or fly ash have levels of radioactive cesium exceeding 8,000 Bq/kg, monitoring shall be carried out of the vicinity of the temporary storage locations with regard to atmospheric dose rate and of waste water from landfills.

D. Depending on the concentration of radioactive cesium in bottom ash or fly ash disposed of by landfill, there will be cases where limits will be imposed on the redevelopment of the landfill site.

(Reference) The standards for temporary storage at final treatment sites for general waste (controlled final landfill sites) provided in "Guideline on Disaster Waste Processing in Fukushima Prefecture."

1. Locations where disaster waste is disposed of by landfill shall be separate from the disposal locations for other kinds of waste and shall be recorded.

2. Once an isolation layer composed of soil (bentonite, etc.) approximately 30 cm deep has been established, disaster waste will be placed packed, etc. in a water-proof material.

3. The temporary storage location shall be covered with an impermeable sheet to protect from the intrusion of rainwater, or shall be covered with a tent, roof, etc.

4. The temporary storage location shall be covered with earth daily.

(3) Ensuring worker safety

When radioactive cesium is contained within general refuse, the burning process will cause it to be concentrated in the bottom ash or in the fly ash, so precautions are needed to ensure worker safety when handling bottom ash or fly ash, depending on the concentration level.

A. The 8,000 Bq/kg shown in the "Guideline on Disaster Waste Processing in Fukushima Prefecture" as the level that ensures worker safety.

B. The 10,000 Bq/kg concentration of radioactive cesium covered in the Rules for Preventions of Hazards from Ionizing Radiation (Ionizing Rules).

When the levels exceed 8,000 Bq/kg, it is best to cover the area with soil as often as possible when burying the waste. In addition, when it exceeds 10,000 Bq/kg, worker safety must be ensured in accordance with the Ordinance on Ionization.

<Submit to>
Nomoto, Iwakawa, & Shimizu: Proper Processing and Illegal Dumping Measures Office, Industrial Waste Section, Waste Management and Recycling Dept., Ministry of the Environment
Ph.: 03-5501-3157 Fax: 03-3593-8264
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Shikita, Toyomura: Waste Management Division
Ph.: 03-5501-3154 Fax: 03-3593-8263

Attachment IV-15

<Attached Forms>

________________ Metropolis / Prefecture

Name of Municipality	Name of Measuring Facility	Address	Date of Measure-ment	Contents of Measure-ment	Measurement Results [Bq/kg]		Detected Limits [Bq/kg]	
					Cesium 134	Cesium 137	Cesium 134	Cesium 137

Attachment IV-15

<Example>

XXX Prefecture

Name of Municipality	Name of Measuring Facility	Address	Date of Measure-ment	Contents of Measure-ment	Measurement Results [Bq/kg]		Detected Limits [Bq/kg]	
					Cesium 134	Cesium 137	Cesium 134	Cesium 137
XXX City	XXX Clean Center	1-1-1 ZZZ-machi XXX City	July 1	Fly ash	8.1×10^2	8.1×10^2	1.0×10^2	1.0×10^2
As above	As above	As above	July 1	Bottom ash	8.1×10^1	8.1×10^1	1.0×10^2	1.0×10^2
YYY Partial-Affairs Association (QQQ-machi, ZZZ Village, YYY Town)	XXX	9-9-9 QQQ-machi	July 1	Fly ash	4.1×10^3	4.1×10^3	1.0×10^2	1.0×10^2
...								

Attachment IV-15

Guideline on Disaster Waste Processing in Fukushima Prefecture

June 23, 2011
Ministry of the Environment

The disaster waste in Fukushima Prefecture, which may have been contaminated by radioactive materials released from the Nuclear Power Station due to the accident, is requested to be treated as follows, based on the "Guideline on Processing of Disaster Waste Supposedly Contaminated by Radioactive Materials" that was established by the Study Group on Safety Assessment on Disaster Waste on June 19, 2011.

The Study Group estimated the effect of dominant nuclides, cesium 134 and cesium 137, on the residents in environs and workers by setting a pathway which may be affected by the assumed processing method and radioactive materials, based on the results of on-site investigations conducted by the Ministry of the Environment and the Nuclear and Industrial Safety Agency. The estimated results were compared with the idea, which was proposed in the "Immediate Approach on How to Ensure Safety for Processing of Waste Affected by the Accident at Fukushima Dai-ichi NPS of TEPCO" determined by the Nuclear Safety Commission on June 3 (hereinafter referred to as the "Determinations by NSC"), so that safety will be evaluated and a processing policy will be established.

(Note 1) The target areas do not include evacuation areas, deliberate evacuation areas, Aizu district, and 10 towns and villages that were determined to resume processing on May 27.

(Note 2) The term "processing" used in this document has the same meaning as "processing" in the Waste Disposal Act, including the meanings of "disposal" and "recycling."

1. Basic Approach

The processing of disaster waste supposedly contaminated by radioactive materials shall be carried out on the major premise that safety must be ensured for the residents near incineration facilities and final disposal grounds and for workers, taking into account the Determinations by NSC. Based on this, the landfill amount would desirably be minimized through incineration and recycling as available as possible, because huge amounts of disaster waste have been generated.

If it is difficult to indicate a value that can immediately satisfy the "measure" specified in the Determinations by NSC based on the existing investigation results because the dispersion in the degree of contamination of disaster waste is large, or a long-term safety might not be ensured, the relevant national organizations will immediately consider a safe processing method while the waste is temporarily stored in an appropriate way.

Furthermore, as a precautious action, the spatial dose rate and underground water near the processing facilities, the exhaust gas emitted from the processing facilities, and drain will be monitored on a continuous basis. Except for the matters whose level is almost equivalent to or lower than the clearance level, these matters will be processed in Fukushima Prefecture for the time being, while appropriate coordination will be made among stakeholders.

2. Incineration of Combustibles

When combustibles such as sawdust are burned at a facility provided with an exhaust gas processing unit having sufficient capacity, the processing can be safely performed.

Specifically, incineration is possible at a processing facility equipped with a bug filter as an exhaust gas processing unit and having an ability of exhaust adsorption. For the facilities with other exhaust gas processing units such as an electric dust collector, safety will be evaluated by measuring the concentration of radioactive materials in the exhaust gas after disaster waste is incinerated on a trial basis.

(Note) Incineration is possible when the bug filter is provided with a blowing unit for materials capable of adsorbing, such as activated charcoal. Incineration is also possible when a wet-type exhaust gas processing unit, such as a wet-type desulfurization device, is equipped, in addition to a bug filter.

3. Processing of Bottom Ashes and Fly Ashes Generated by Incineration

Regarding the bottom ashes and fly ashes generated when combustibles such as sawdust are burned, the countermeasures against radiation exposure for workers will be taken; a safe landfill processing can be established by restricting the use of the site formerly used as a landfill. On the other hand, as verifications must be made on a long-term management and environmental protection at landfills with various conditions, ashes will be processed as follows for the time being:

(1) Bottom ashes

The bottom ashes, having the concentration of radioactive cesium (the total value of cesium 134 and cesium 137; this is applied to the rest) of less than 8,000 Bq/kg, can be disposed of at a landfill specified as a general waste disposal site (a managed final disposal site). A measure 8,000 Bq/kg for the concentration of radioactive cesium is a concentration level at which safety of workers at landfills can be ensured, and is in accordance with the processing of byproducts generated from service water and sewerage processing which was separately reviewed by the Nuclear Emergency Response Headquarters. When the level exceeds 100,000 Bq/kg, the ashes should desirably be stored at a facility capable of appropriately shielding from radiation, in the same way as the processing of byproducts generated from service water and sewerage processing.

Furthermore, the concentration of radioactive cesium in the bottom ashes may be affected by the amount of mixed waste other than disaster waste, in addition to the concentration of radioactive cesium in combustibles before incinerated.

For landfill processing, the site should be separated from other wastes as a precaution, and should be recorded accordingly. In addition, a layer of soil must be provided between the bottom ashes to be buried and a water-collecting and draining facility for the water contained. The site formerly used for landfill processing should not be used for residence and so on, unless sufficient safety is ensured.

When the concentration of radioactive cesium exceeds 8,000 Bq/kg, the bottom ashes should not be subject to landfill processing; after the behavior of radioactive cesium contained in the bottom ashes is appropriately grasped, they should be temporarily stored until the safety of

processing is confirmed by a relevant national organization. The temporary storage is a preprocessing phase before the final processing, and is divided into the following two:

1) Storage in drums, etc. at a place capable of shielding from radiation

2) Storage at a place for general waste final processing (a managed final processing)

    a) Landfills should be separated from other wastes and records should be kept.

    b) An isolated soil (such as bentonite) layer of approx. 30 cm should be provided and the bottom ashes packaged with waterproof materials should be placed on it.

    c) The ashes should be covered by impervious sheet to protect from rainwater, or covered by a tent, roof, etc.

    d) The ashes should be covered by soil daily.

In the case of temporary storage, the bottom ashes should not be covered by soil of the same day after the day's work finishes, but should desirably be covered by soil more frequently. Furthermore, the working time of handing the bottom ashes may need to be limited for individual workers. (The safety assessment tentatively specifies that the method of soil covering is an intermediate soil covering, the working time is eight hours/day, and a half of working hours in 250 days per year is applied to the work carried out near the bottom ashes.)

The site for temporary storage should be located at an appropriate distance from the residential areas in environs (see the Reference 5 attached at the end).

(2) Fly Ashes

Fly ashes emitted from a dust collector are likely to have higher concentration of radioactive cesium than the bottom ashes. It is also reported that the radioactive cesium contained in fly ashes is likely to solve into water.

Consequently, it is appropriate that fly ashes should be temporarily stored, just like the bottom ashes with the concentration of radioactive cesium exceeding 8,000 Bq/kg, until the safety of processing is ensured by a relevant national organization. If the level is over 100,000 Bq/kg, they should desirably be stored at a facility capable of appropriately shielding from radiation.

The fly ashes generated when incineration ashes are melted should also be temporarily stored. Molten slug should also be temporarily stored in principle, but it can be subject to landfill processing if the concentration level of under 8,000 Bq/kg is confirmed.

4. Direct Landfill Processing of Incombustibles

Incombustible disaster waste can be subject to landfill processing directly, or safely after broken. The landfill processing method or use of the site formerly used as a landfill is the same as that of the bottom ashes with the concentration level under 8,000 Bq/kg.

Regarding the effects on the landfill workers, a mask must be put on just as in the case of processing usual waste; however, a special countermeasures focusing on the effect of radioactive materials is not required.

5. Recycling

Even if disaster waste is supposedly contaminated by radioactive materials generated from the accident at the Nuclear Power Station, it can be recycled if its radioactive concentration is appropriately controlled to be under the reference level (10 μSv/year) used for establishing a clearance level, before put on the market.

Also, even if the clearance level is exceeded when the disaster waste is used, the waste can still be used under a controlled condition while a means is taken to lower the exposure dose to 10 μSv/year or less. The use under a controlled condition includes the use for civil engineering materials such as roadbed materials on public sites; however, the waste should be limitedly used underground by appropriately covering it with soil.

Metals supposedly contaminated by radioactive materials can be reused after the contaminants on the surface are sufficiently washed out by water and so on, because contaminants usually remain on the metal surface. Furthermore, the wastes stored indoors until being delivered out to a temporary depot can also be reused. On the other hand, the broken concrete waste supposedly contaminated by radioactive materials should not be directly reused for residential buildings as concrete wall materials, unless safety is ensured.

Further reviews are required on the possibility of other uses and the use after decontaminated.

6. Necessary Investigations

The guideline on processing of disaster waste has been arranged based on the results of on-site investigations conducted by relevant national organizations, as well as on the results of safety assessment conducted by setting a pathway that could be affected by the assumed method of processing and radioactive materials. For precautions, however, a further investigation must be conducted to confirm the validity of safety assessment. Accordingly, the relevant national organizations will further confirm the situation of contamination by disaster waste with a relatively high spatial dose rate placed at a temporary depot, take measurements of the radioactive concentration of the bottom ashes and fly ashes generated from incineration, exhaust gas, waste water, etc., and take measurements of spatial dose rate and the effluent at the site boundary in the final processing site.

Although it is estimated that the contamination level of sediments generated by the tsunami is almost equivalent to that of the surrounding soil, the concentration of radioactive materials will be measured for precautions, in order to grasp the current situation.

7. Rules for Preventions of Hazards from Ionizing Radiation

To minimize the exposure on workers to a reasonably attainable level, and to appropriately carry out incineration, landfill processing, recycling and so on of the disaster waste, it is required to appropriately and periodically take measurements of the radioactive concentration of the exhaust from incineration and melting facilities, and of the waste water from controlled final processing facilities. In addition, stakeholders are required to take appropriate measures if necessary. The personnel in charge of managing incineration ashes is required to record the volume of incineration ashes to be temporarily stored and the radioactive concentration.

On the premises such as incineration facilities of disaster waste and controlled final processing facilities for landfill, if the effective dose from external radiation may exceed the criteria (1.3 mSv (2.5 μSv/h) every three months) specified in Article 3, paragraph 1 of the

Rules for Preventions of Hazards from Ionizing Radiation (Rule No. 41, the Ministry of Labors, 1972; hereinafter referred to as the "Ionizing Rules"), or the incineration ashes correspond to the radioactive material defined in Article 2, paragraph 2 of the Ionizing Rules (in the case of radioactive cesium, when the total of concentrations of cesium 134 and cesium 137 exceeds 10,000 Bq/kg), the relevant rules specified in the Ionizing Rules must be observed.

In addition, if the broken concrete of disaster waste corresponds to the radioactive material defined in Article 2, paragraph 2 of the Ionizing Rules, it must be noted that the Ionizing Rules may be applied even on the premises which accept the concrete as roadbed materials.

When the incineration ashes, whose radioactive concentration is close to the lower limit defined in Article 2, paragraph 2 of the Ionizing Rules, are processed, the exposure of workers should be measured and controlled, in light of "2. Processing, Transportation, and Storage" of the "Determinations by NSC."

Further, when the radiation dose of workers exceeds 1 mSv/year, the relation between the radioactive concentration of incineration ashes and the radiation dose should be re-evaluated, based on the radioactive concentration detected from the incineration ashes, at a target timing of six months passed since processing of disaster waste is started, so that the radiation dose can be minimized to a reasonably attainable level.

8. Processing Method of Disaster Waste in Evacuation Areas and Deliberate Evacuation Areas

According to the results of investigations on the spatial dose rate and the radioactive concentration of disaster waste near a temporary depot, which were conducted in Hama-dori and Naka-dori, it turned out that the dispersion in the radioactive concentration of disaster waste is small in the areas of low spatial dose rate. Since the contamination pathway of disaster waste from radioactive materials is thought to be affected by the radioactive fallouts released into the atmosphere, the relation between the radioactive concentration and the spatial dose rate, that was obtained from these investigations, is also applicable to other areas in Fukushima Prefecture.

Consequently, in the areas whose spatial dose rate is supposedly almost equivalent to that of the outer areas, even in evacuation areas and deliberate evacuation areas, the processing method described in 1 through 7 above can be applied. For contributing to the processing plans to ensure a smooth processing of disaster waste in these areas, the relevant national organizations must conduct preliminary investigations regarding detailed studies on the spatial dose rate and the form in which disaster waste is present.

On the other hand, further considerations should be given to the processing method of disaster waste in the areas with high spatial dose rate. In these areas, investigations will be conducted in the future on the concentration of disaster waste for each type, and the processing method will be re-examined based on the current situation.

9. Others

(1) Monitoring

To ensure the safety of processing, monitoring must be conducted on a continuous basis for the spatial dose rate at processing facilities nearby, the groundwater near the facilities, exhaust

gas and waste water from processing facilities, and so on. In the future, while the nation and municipalities will be required to carry out monitoring from their own viewpoint, a unified method of monitoring should be taken as much as possible. Therefore, the knowledge on the monitoring technique must immediately be collected, and the method of monitoring must be reviewed accordingly.

In the meantime, municipalities are required, when incinerating disaster waste, to measure the concentration of radioactive cesium of the bottom ashes and fly ashes at an early stage.

(2) The Management Entity of Facilities

In this review, it was assumed that municipalities would mainly process disaster waste at their own incineration facilities and final processing facilities; however, in some cases, municipalities consign private operators for processing, and disaster waste is processed at the facilities managed by these private operators. Considering that the disaster waste supposedly contaminated by radioactive materials is likely to be managed in a long period, in the case of consigned processing, further considerations must be given to the roles of prefectures and cities specified by a government ordinance, which are authorized to direct and supervise the facilities at municipalities who are the consigner.

(Reference 1) Immediate approach by nuclear safety commission

The approach by NSC, stated in the “Immediate Approach on How to Ensure Safety for Processing of Waste Affected by the Accident at Fukushima Dai-ichi NPS of TEPCO” that was announced on June 3 by NSC, is outlined as follows:

(1) When recycling, it must be confirmed that the radioactive concentration is appropriately controlled for the products manufactured through recycling, so that the concentration will be under the criteria (10 μSv/year) used for setting the clearance level, before they are put on the market.

(2) Regarding processing, transportation and storage, special considerations must be given to reduce the amount of radiation exposure to the residents in environs, so that the dose on the residents will not exceed 1 mSv/year, by taking actions in parallel to improve the environment surrounding the processing facilities.

(3) It is desirable that the dose on the workers engaged in processing does not exceed 1 mSv/year as much as possible. However, in the process of handling materials with a relatively high radioactive concentration, the radiation dose on the workers must be appropriately controlled by observing the “Rules for Preventions of Hazards from Ionizing Radiation” (Rule No. 41, the Ministry of Labors, 1972; hereinafter referred to as the “Ionizing Rules”).

(4) The safety of processing should be determined based on the “target” that the dose on the residents in environs, after the controlling period of the processing facilities expires, will be under 10 μSv/year with reference to the assessment in the basic scenario, and will be under 300 μSv/year with reference to the assessment in the variant scenario.

(Reference 2) Relation with spatial dose rate

Based on the existing results of investigations, the relation between the spatial dose rate and the concentration of radioactive cesium in disaster waste is evaluated as follows:

(1) In the case the spatial dose rate is relatively low

When the spatial dose rate at points 1 m distant from a temporary depot for disaster waste is relatively low, the concentration of radioactive cesium in disaster waste is relatively low, and dispersion is also small. For example, at a temporary depot with the spatial dose rate of approx. 0.2 μSv/h, the concentration of radioactive cesium in disaster waste was roughly under 800 Bq/kg.

When only disaster waste is incinerated, the concentration of radioactive cesium in the bottom ashes is thought to be about 10-fold of that of disaster waste at most, thus inferring that the average concentration of radioactive cesium in the bottom ashes is likely to be under 8,000 Bq/kg. When disaster waste is incinerated together with the ordinary waste, the concentration would possibly become lower.

(2) In the case the spatial dose rate is relatively high

When the spatial dose rate at points 1 m distant from a temporary depot for disaster waste is relatively high, the dispersion in the concentration of radioactive cesium in disaster waste is large. For example, when the spatial dose rate at points 1 m distant from the temporary depot is approx. 0.8 μSv/h, the average concentration of radioactive cesium in disaster waste is estimated to be approx. 3,000 Bq/kg, but in some cases, this value might become up to approx. 6,000 Bq/kg.

Consequently, the dispersion in the concentration of radioactive cesium in the bottom ashes when incinerated is also expected to be large.

(Reference 3) Calculation examples for safety assessment

(1) Effects of incineration on the residents in environs

For the safety assessment on incineration, the following three cases were assumed.

	Volume of Incineration	Percentage of disaster waste in incinerated volume	Removal rate from exhaust gas
Combination Case A	150 t/day	27%	99%
Combination Case B	390 t/day	27%	99%
Temporary Incinerator Case	100 t/day	100%	99%

Among these cases, the Combination Case A showed the least effect on the residents in environs, while the Combination Case B and Temporary Incinerator Case showed almost the same level. Therefore, the calculation results of the effects on the residents in environs in the latter case (Combination Case B and Temporary Incinerator Case) are outlined as follows:

1) Exposure from dust released from an incinerator

- The exposure dose of children per the concentration in waste per unit is 0.0000054 mSv/y per Bq/g.
- For instance, the annual exposure dose of children when disaster waste with 3,000 Bq/kg (3 Bq/g) is incinerated is 0.000016 mSv/y.
- This is under 1 mSv/y, which is a measure specified by NSC.

Note) The value 3,000 Bq/kg (3 Bq/g) is estimated to be an average concentration of radioactive cesium in disaster waste, when the spatial dose rate at points 1 m distant from a temporary depot for disaster waste is approx. 0.8 μSv/h, based on the existing investigation results. (However, it must be noted that the dispersion in the concentration of radioactive cesium in disaster waste is large, even if the spatial dose rates are equivalent).

2) Exposure from the dust-built-up soil

- Assuming that the dust released with incineration in 10 years is all built up in the surrounding soil (from the viewpoint of safety), the exposure dose of children per the concentration in waste per unit is 0.00048 mSv/y per Bq/g.
- For instance, the annual exposure dose of children when disaster waste with 3,000 Bq/kg (3 Bq/g) is incinerated is 0.0014 mSv/y.
- This is under 1 mSv/y, which is a measure for processing specified by NSC, and under 0.01 mSv/y (10 μSv/y), which is a measure for disposal specified by NSC.

(2) Effects on workers at landfills

The exposure dose of workers is calculated to be 0.78 mSv/y, when the waste with 8,000 Bq/kg (8 Bq/g) is directly disposed of at landfills, being under 1 mSv/y that is a measure for workers specified by NSC. Thus, the value 8,000 Bq/kg is the concentration level at which safety for workers is also ensured, and is regarded as the same as that of byproducts from service water and sewerage processing, which was separately reviewed by the Nuclear Emergency Response Headquarters.

For your information, this value is calculated assuming that workers are engaged in the work near waste in eight hours/day, and in a half of the total working hours in 250 days a year; and assuming that an immediate soil covering at the end of one working day is not carried out, but only an intermediate soil covering is performed.

The exposure can be reduced by reducing the hours of working near waste. If soil covering is carried out immediately after landfill processing, the exposure from buried waste can also be reduced.

(3) Use of the site of former landfill

1) Residence at the site without covering-soil

When landfill processing is completed, the site is usually covered by more than 50 cm of soil. Assuming that soil and incinerated ashes are mixed after the incinerated ashes in Combination Case B are processed in landfill, the exposure dose is calculated as follows when a residence is built on the mixed soil:

- The exposure dose of children per the concentration in waste per unit is 0.31 mSv/y per Bq/g.

- For instance, the annual exposure dose of children when disaster waste with 3,000 Bq/kg (3 Bq/g) is incinerated and buried is 0.93 mSv/y.

- This is over 0.01 mSv/y (10 μSv/y), which is a measure for disposal specified by NSC.

2) Use of parks with covering-soil

- Assuming that a park with 50 cm of covering soil on the incinerated ashes in Combination Case B is used for 200 hours per year, the exposure dose of children per the concentration in waste per unit is 0.00016 mSv/y per Bq/g.

- For instance, the annual exposure dose of children when disaster waste with 3,000 Bq/kg (3 Bq/g) is incinerated and buried is 0.00048 mSv/y.

- This is under 0.01 mSv/y (10 μSv/y), which is a measure for disposal specified by NSC.

(4) Recycling

1) Effects on concrete-processing workers

- Assuming that the work for recycling concrete is performed in 1,000 hours/y, the exposure dose per the concentration in waste per unit is 0.033 mSv/y per Bq/g.

- For instance, the annual exposure dose of workers when concrete with 3,000 Bq/kg (3 Bq/g) is recycled is 0.099 mSv/y.

- This is under 1 mSv/y, which is a measure for disposal specified by NSC.

2) Use of concrete as wall materials

- Assuming that living in a residence with wall materials of recycled concrete lasts for 6,000 hours per year, the exposure dose of children per the concentration in waste per unit is 0.11 mSv/y per Bq/g.

- For instance, the annual exposure dose of children when concrete with 3,000 Bq/kg (3 Bq/g) is recycled as wall materials in a building is 0.33 mSv/y.

- This is over 0.01 mSv/y (10 μSv/y), which is a measure for disposal specified by NSC.

3) Use of covering soil in a park as civil engineering materials

- Assuming that a park with concrete reused under 50 cm of covering soil is used for 200 hours per year, the exposure dose of children per the concentration in waste per unit is 0.000060 mSv/y per Bq/g.

- For instance, the annual exposure dose of children when disaster waste with 3,000 Bq/kg (3 Bq/g) is used is 0.00018 mSv/y.

- This is under 0.01 mSv/y (10 μSv/y), which is a measure for disposal specified by NSC.

(Reference 4) Shielding of radiation

In shielding radiation, it is specified that when covered by a concrete wall 15 cm thick, the radiation dose rate becomes one tenth (1/10), and when covered by soil 30 cm thick, the radiation dose rate becomes approximately one fortieth (1/40).

Source: A conversion factor of external exposure dose for evaluating the upper limit of concentration in landfill processing (2008, Japan Atomic Energy Agency)

(Reference 5) Distance from site boundaries including residential areas in temporary storage

Regarding the temporary storage of byproducts generated from service water and sewerage processing, which was separately reviewed, it is requested that an appropriate distance be kept from the site boundary, such as from residential areas, according to the following table. The distance is calculated assuming that huge amounts of sludge is temporarily stored day after day, and it should not be directly applied to the temporary storage of bottom ashes and fly ashes generated from the incineration of disaster waste; however, the values shown in the following table are regarded to be sufficiently safe until a distance required for the latter case is calculated. These values are shown for reference.

Table

First Column	Second Column
A measure of distance from site boundaries	Total of cesium 134 and cesium 137
70 m	Less than 100,000 Bq/kg
50 m	Less than 70,000 Bq/kg
40 m	Less than 60,000 Bq/kg
20 m	Less than 40,000 Bq/kg
6 m	Less than 20,000 Bq/kg
Without limit	Less than 8,000 Bq/kg

Reference Materials
(Materials Issued by Tokyo Metropolis)

June 27, 2011
Bureau of Environment

Responses to Landfill Areas that Received the Results of Radiation Measurements for Incineration Plants in the Tokyo 23 Wards Area

The Partial-Affairs Association (hereafter, "PAA") for incineration plants in the 23 Tokyo wards area has carried out measurements of radiation concentrations for ash caused by incineration processes in the 23 wards. (Refer to the separate PAA press materials.)

Burnt ash arising in the 23 wards area is processed at landfills managed by Tokyo Metropolis, but the national government does not provide any standards for processing normal waste products that include radioactive materials in areas outside Fukushima Prefecture. As a result, Tokyo has, in negotiation with the Ministry of the Environment, decided for the time being to treat disposal methods for burnt ash produced by incineration plants in the 23 wards area as follows.

We will today request that the national government urgently provide us with standards for dealing with the processing of burnt ash that includes radioactive materials in areas outside of Fukushima Prefecture.

In addition, we will request that measurements of radiation concentration in burnt ash, etc. be conducted in the municipalities of the Tama region.

Provisional Handling of Burnt Ash

○ Until the national government determines how to handle fly ash, we shall use the following methods:

A. Fly ash that exceeds 8,000 Bq/kg will have locations within final processing sites for general waste products (managed final processing sites) and the PAA will prepare temporary storage locations where they will be temporarily stored.

   The method for temporary storage shall comply with "Guideline on Disaster Waste Processing in Fukushima Prefecture" (June 23, 2011).

   Note that until the temporary storage location is prepared, the ash shall be stored within the incineration plants.

B. Fly ash under 8,000 Bq/kg will have locations within final processing sites for general waste products (managed final processing sites) separated out from bottom ash and Tokyo Metropolis shall dispose of it in landfills.

- Tokyo Metropolis shall carry out monitoring of airborne radiation amounts in areas near landfills and temporary storage locations, as well as leach water from landfills.

- Note that the bottom ash is under 8,000 Bq/kg so it shall continue to be disposed of by Tokyo Metropolis in final processing sites for general waste products (managed final processing sites), as before.

(NB) Bottom ash refers to combustion residue.
Fly ash refers to dust contained within the exhaust gases caught by dust filters, etc.

(Reference) Standards for temporary storage in final processing sites for general waste products (managed final processing sites) as defined in “Guideline on Disaster Waste Processing in Fukushima Prefecture”

1. The landfill site must be separate from other waste products and the landfill site location recorded.
2. After covering it with an isolation layer of soil (bentonite, etc.) around 30 cm thick, it shall be encased in waterproof materials before the ash is placed over it.
3. It shall be covered with a waterproof sheet or similar, or with a tent or roof structure, to prevent rainwater from seeping in.
4. It shall be buried the same day.

Reference

June 27, 2011
Tokyo 23 Wards Incineration Plants Partial-Affairs Association

Radiation Measurement Results and Temporary Storage of Burnt Fly Ash

The PAA has carried out an investigation into the radiation concentrations for ash, etc. produced by incineration in order to check the effects on general waste processing within the 23 Tokyo wards as a result of the accident at TEPCO's Dai-ichi Fukushima Nuclear Power Plant caused by the Great East Japan Earthquake of March 11.

The results of this investigation are show in "Results of Radiation Concentration Measurements of Burnt Ash, etc."

In addition, the national government has not created any standards for processing general waste that contains radioactive materials in areas outside Fukushima Prefecture. Therefore, as a result of negotiations between the Ministry of the Environment and Tokyo Metropolis, we have decided for the time being to deal with the disposal of burnt ash produced by incineration plants within the Metropolis as noted below.

The PAA will continue to carry out monitoring and publish the results on its website.

NOTE

1 Fly ash(NB) that exceeds 8,000 Bq/kg will be temporarily stored in locations within final processing sites for general waste products (managed final processing sites) managed by Tokyo Metropolis.
The method for temporary storage shall comply with "Guideline on Disaster Waste Processing in Fukushima Prefecture" (June 23, 2011).
Note that until the temporary storage location is prepared, ash exceeding 8,000 Bq/kg shall be stored in the ash storage pits, etc. in the relevant incineration plants.

2. Fly ash under 8,000 Bq/kg will have locations within final processing sites for general waste products (managed final processing sites) managed by Tokyo Metropolis, separated out from bottom ash, and disposed of in landfills.

3. The temporary storage period shall be until the national government determines the handling of fly ash.

4. The national government shall be requested to create a new policy on handling fly ash.

END

(NB) Fly ash refers to dust contained within the exhaust gases caught by dust filters, etc.
* Bottom ash is below 8,000 Bq/kg, so it shall be disposed of based on "Guideline on Disaster Waste Processing in Fukushima Prefecture."

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Attached (1/3)

Radioactivity Measurement Results of Incinerated Ash, etc.

Chart 1 Radioactivity Concentration of Bottom Ash

Measuring Institute: Chugai Technos Corporation reported on June 27

Sampling Period: June 16–24, 2011

Measuring Method: The Manual for Measuring Radioactivity of Foods in Case of Emergency (March 2002, Safety Monitoring Section, Food Sanitation Division, Pharmaceutical and Food Safety Bureau, Ministry of Health, Labour and Welfare)

Unit: Bq/kg

Incineration Plant	Bottom Ash			
	Radioiodine 131	Radiocesium 134	Radiocesium 137	Total Radiocesium
Chuo	Undetected	75	85	160
Minato	Undetected	53	60	113
Kita	Undetected	119	131	250
Shinagawa	Undetected	99	106	205
Meguro	Undetected	73	82	155
Ota	Undetected	94	104	198
Tamagawa	Undetected	162	173	335
Setagaya*	-	-	-	-
Chitose	Undetected	101	109	210
Shibuya*	-	-	-	-
Suginami	Undetected	61	68	129
Toshima*	-	-	-	-
Itabashi	Undetected	241	262	503
Hikarigaoka	Undetected	134	146	280
Sumida	Undetected	186	203	389
Shinkoto	Undetected	149	169	318
Ariake	Undetected	47	52	99
Adachi	Undetected	334	368	702
Katsushika	Undetected	610	680	1290
Edogawa	Undetected	280	312	592
Incombustible Waste Processing Center*	-	-	-	-

* Measuring Instrument: Geranium Semiconductor Detector 7500SL, CANBERRA (France)
Plants with * mark do not discharge bottom ash

○ Bottom ash is the non-combustible residues of combustion accumulated at the bottom of incinerator.

Attached (2/3)

Chart 2 Radioactivity Concentration of Fly Ash

Measuring Institute: Chugai Technos Corporation reported on June 27

Sampling Period: June 16–24, 2011

Measuring Method: The Manual for Measuring Radioactivity of Foods in Case of Emergency (March 2002, Safety Monitoring Section, Food Sanitation Division, Pharmaceutical and Food Safety Bureau, Ministry of Health, Labour and Welfare)

Unit: Bq/kg

Incineration Plant	Fly Ash			
	Radioiodine 131	Radiocesium 134	Radiocesium 137	Total Radiocesium
Chuo	25	966	1020	1986
Minato	Undetected	872	955	1827
Kita	95	1540	1620	3160
Shinagawa	Undetected	643	709	1352
Meguro	Undetected	2000	2180	4180
Ota	30	2920	3110	6030
Tamagawa	Undetected	1480	1600	3080
Setagaya	Undetected	1480	1630	3110
Chitose	Undetected	1420	1520	2940
Shibuya	Undetected	471	510	981
Suginami	Undetected	1920	2100	4020
Toshima	11	477	523	1000
Itabashi	Undetected	1270	1360	2630
Hikarigaoka	Undetected	2210	2400	4610
Sumida	Undetected	1440	1560	3000
Shinkoto	Undetected	2320	2530	4850
Ariake	Undetected	1810	1950	3760
Adachi	Undetected	2050	2230	4280
Katsushika	Undetected	3180	3430	6610
Edogawa	Undetected	4700	5040	9740
Incombustible Waste Processing Center	Undetected	298	324	622

* Measuring Instrument: Geranium Semiconductor Detector 7500SL, CANBERRA (France)

○ Fly ash is dust (soot) contained in exhaust fume collected with air-purifying dust collector

Chart 3 Radioactive Concentration of Molten Slag

Measuring Institute: Hitachi Kyowa Engineering

Reporting Date: June 27, 2011

Sampling Period: May 23–June 21, 2011
(* Measurement sample for before earthquake was taken from the molten slag produced before March 11th)

Measuring Method: The Manual for Measuring Radioactivity of Foods in Case of Emergency
(March 2002, Safety Monitoring Section, Food Sanitation Division, Pharmaceutical and Food Safety Bureau, Ministry of Health, Labour and Welfare)

Unit: Bq/kg

Incineration Plant	Radioiodine 131		Radiocesium 134		Radiocesium 137		Total Radiocesium	
	Before earthquake	After earthquake	Before earthquake	After earthquake	Before earthquake	After earthquake	Before earthquake	After earthquake
Shinagawa	Undetected	Undetected	Undetected	Undetected	Undetected	16	Undetected	16
Setagaya	Undetected	Undetected	Undetected	34	Undetected	54	Undetected	88
Katsushika	Undetected	Undetected	Undetected	30	Undetected	31	Undetected	61
Adachi	Undetected	Undetected	Undetected	24	Undetected	22	Undetected	46
Chubo Haiyoyu	Undetected	Undetected	Undetected	17	Undetected	Undetected	Undetected	17

* Measuring Instrument: Germanium Semiconductor Detector GEM-35200-P by SEIKO EG&G

○ Molten slag is the glass substance resulting from heating burned ash at temperature above 1,200 degrees, cooled and solidified.

[Emergency Measurement]

The measurement reported was conducted using GM survey meter against results shown in the attached due to the urgent need to check the safety of incineration plants.

Measurement result differs from the result of measurement conducted with scintillation survey meter.

Measurement hereon forward will be conducted with scintillation survey meter and disclosed in the organization's website.

Result of interspace radiation dose rate measured at incineration plant site and around ash treatment equipment in the plant

Unit: μSv/h

Incineration Plant	Date of measuring	Site boundary				Ash treatment equipment in the plant
		East	West	South	North	
Chuo	June 26	0.13	0.11	0.20	0.13	0.07–0.11
Minato	June 25	0.13	0.17	0.14	0.20	0.09–0.23
Kita	June 25	0.12	0.14	0.12	0.14	0.06–0.22
Shinagawa	June 25	0.20	0.16	0.14	0.17	0.15–0.44
Meguro	June 26	0.14	0.17	0.13	0.10	0.16–0.46
Ota	June 25	0.22	0.16	0.22	0.18	0.11–0.30
Tamagawa	June 26	0.18	0.15	0.18	0.12	0.11–0.16
Setagaya	June 26	0.16	0.12	0.10	0.20	0.12–0.19
Chitose	June 26	0.18	0.15	0.11	0.20	0.08–0.15
Shibuya	June 26	0.15	0.15	0.17	0.16	0.08–0.13
Suginami	June 26	0.15	0.15	0.14	0.15	0.10–0.15
Toshima	June 25	0.11	0.13	0.10	0.11	0.08–0.10
Itabashi	June 26	0.16	0.21	0.20	0.15	0.08–0.09
Hikarigaoka	June 26	0.21	0.15	0.16	0.16	0.10–0.26
Sumida	June 25	0.25	0.14	0.14	0.18	0.12–0.32
Shinkoto	June 26	0.14	0.16	0.14	0.19	0.09–0.48
Ariake	June 26	0.12	0.11	0.14	0.15	0.11–0.14
Adachi	June 25	0.21	0.17	0.15	0.15	0.07–0.40
Katsushika	June 25	0.28	0.23	0.20	0.15	0.12–0.68
Edogawa	June 25	0.21	0.23	0.24	0.24	0.07–0.16
Incombustible Waste Processing Center	June 26	0.13	0.09	0.11	0.16	0.09–0.15

* Measuring Instrument: GM Survey Meter B20-ER（with γ-line measuring filter）by ThermoScientific (USA)* Measured value is the average of 10 seconds measurement done three times

* Height of measured point is 1 meter

* Measured value differs according to weather condition

Measuring Institute: Ito Kougai Chosa Kenkyusho Co., Ltd,
reported June 27, 2011

Sampling Period: June 25–26, 2011

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Promotion of Regional Disposal of Disaster Waste

(Guidelines for the Promotion of Regional Disposal of Disaster Waste Due to the Great East Japan Earthquake)

August 11, 2011
Ministry of the Environment

I Concept of Safety in Regional Waste Disposal

1. Policies on Disposal of Disaster Waste That May Have Been Contaminated by Radioactive Materials

According to the "Disposal Policy for Disaster Waste in Fukushima Prefecture" issued on June 23, 2011, disaster waste that may have been contaminated by radioactive materials may also be incinerated safely. The bottom and fly ash generated by such incineration may be safely disposed of by burial disposal. The policy concerned incorporates the following specific points.

- Combustible materials, such as wood debris, may be safely disposed of when incinerated in facilities equipped with exhaust gas treatment equipment having sufficient capacity.

- Bottom ash containing radioactive cesium of a concentration of 8,000 Bq/kg or less (the total concentration of Cesium-134 and Cesium-137; hereafter, "concentration") may be disposed by burial disposal at general waste final disposal sites (controlled landfill final disposal site). This criterion regarding the concentration of radioactive cesium (8,000 Bq/kg) is set to a level in which the safety of landfill workers is also ensured.

- When the concentration of radioactive cesium exceeds 8,000 Bq/kg, burial disposal is not permitted. In this case, the behavior of the concentration of the radioactive cesium in buried bottom ash shall be properly grasped while the bottom ash is stored temporarily until the government has confirmed the safety of disposal.

2. Concept of Regional Disposal of Disaster Waste Depending on Radioactive Concentration Levels

According to the "Radioactive Measurement and Immediate Handling of Incinerated Ash at General Waste Treatment Facilities," which was released to 16 prefectures on June 28, 2011 on the basis of the above policy, incineration ash generated in general waste incineration facilities shall be treated in the following manner for the time being.

- Bottom or fly ash containing radioactive cesium of a concentration exceeding 8,000 Bq/kg will be stored temporarily in specified locations at general waste final disposal sites (controlled landfill final disposal site). This interim storage shall be carried out in accordance with the "Disposal Policy for Disaster Waste in Fukushima Prefecture" (issued on June 23, 2011).

- Bottom or fly ash containing radioactive cesium of a concentration of 8,000 Bq/kg or less shall be disposed of by burial disposal at general waste final disposal sites (controlled landfill final disposal site). As a precautionary measure, bottom and fly ash shall be buried separately as much as possible such that their buried locations can be easily identified.

  Accordingly, to carry out regional waste disposal, for the time being, consideration must be given to ensure that the concentration of radioactive cesium contained in the ash generated by incineration of disaster waste is 8,000 Bq/kg or less at the accepting locations. Thus, the accepting parties can dispose of the ash in landfills without trouble.

  For burial disposal of incineration ash containing radioactive cesium of a concentration of 8,000 Bq/kg or less, such ash shall be collectively buried as much as possible such that the burial locations can be easily identified. However, it is not necessary to bury incineration ash by physically separating it from other wastes if the future use of the landfill site is restricted and thus there is no possibility that the site may be used for housing, etc.

II Assessment of the Results of Measuring Radioactive Materials Contained in Disaster Waste in Iwate Prefecture

In Iwate prefecture in July 2011, in order to establish policies on future disaster waste disposal while taking into consideration the concept of regional waste disposal, the radioactive concentration of disaster waste was measured at temporary storage yards in Rikuzentakata City and Miyako City. Thereafter, assessment of the results[1] was carried out.

1. Assessment policies

- The measurement of the radioactive concentration of disaster waste was carried out in Rikuzentakata City (in southern Iwate Prefecture) and Miyako City (in central Iwate Prefecture). The assessment was carried out using these measurement results[1].

- The assessment targets were the mixtures of combustible materials to be incinerated for disposal. Their composition was specified using the known survey results[2] regarding disaster waste at Noda Village in Iwate Prefecture.

- To conduct safe-side assessment, the assessment was carried out on the assumption that only disaster waste not containing other waste (garbage form homes, etc.) were incinerated.

- In addition, the radioactive concentration of the fly ash portion (where radioactive cesium tends to be concentrated) of the incineration ash was estimated based on the assumption that all radioactive materials were completely contained in the fly ash.

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1 Commissioned Research Report on Radioactivity in Temporary Storage Sites for Disaster Waste (July 2011, Iwate Prefecture)

2 Report on the Disaster Waste Combustion Test (August 2011, Japan Society of Material Cycles and Waste Management (JSMCWM))

- If the radioactive concentration of a certain type of disaster waste was lower than the lower limit of detection, the corresponding radioactive concentration was not regarded as zero but instead regarded as the lower limit of detection for the safe side.

2. Formula for Calculating Radioactive Concentration of the Fly Ash of Incinerated Disaster Waste

The radioactive concentration of the fly ash of incinerated disaster waste was calculated as follows:

Radioactive concentration of fly ash = radioactive concentration of disaster waste $\alpha \times$ *radioactive concentration rate of fly ash* β

In this case, the radioactive concentration of disaster waste is represented as a weighted average according to the composition ratio of each type of waste.

Radioactive concentration of disaster waste α *= radioactive concentration of wood waste* $\alpha_1 \times$ *composition ratio of wood* θ_1 *+ radioactive concentration of paper waste* $\alpha_2 \times$ *composition ratio of paper* θ_2 *+ radioactive concentration of fiber waste* $\alpha_3 \times$ *composition ratio of fibers* $\theta_3 + \ldots$

- Radioactive concentration of disaster waste α: the weighted average according to the composition ratios determined by using the radioactive concentration for each type of disaster waste. The values listed in the investigation[2] conducted by JSMCWM on Noda Village in Iwate Prefecture were used as the composition ratios.

- Radioactive concentration rate of fly ash β: the concentration rate based on the assumption that radiocesium was contained entirely in the fly ash. Since the fly ash was approximately 3%[3] of the total amount of incinerated waste, the concentration rate was assumed to be 33.3 times.

3. Calculated results

The radioactive concentrations of the fly ash of the incinerated disaster waste of Rikuzentakata City and Miyako City are calculated as shown below by using the measured radioactive concentrations of these cities based on the above-mentioned evaluation policies and formula.

Table 1 Radioactive concentration by type of disaster waste (incinerated waste) (Rikuzentakata City)

Type	Wood	Paper	Fiber	Plastic	Straw	Fine Dust (<5 mm)
Radioactive concentration (Bq/kg)	69	38	1,480	510	177	134

[3] Tokubetsukanri Ippanhaikibutsu Baijin Shori Manual (Manual for treating dust from specially-controlled general waste) (1993, *The Chemical Daily*)

Table 2 Radioactive concentration by type of disaster waste (incinerated waste) (Miyako City)

Type	Wood	Paper	Fiber	Plastic	Straw	Fine Dust (<5 mm)
Radioactive concentration (Bq/kg)	70.7*[1]	22.8*[2]	41.0*[2]	42.0	39.0*[2]	39.6

*1 ..... The average value was calculated using the lower limit of detection for the portion of the data which was detected as being below the lower limit.

*2 ..... The lower limit of detection was assumed for this data because the data was detected as being below the lower limit.

Table 3 Composition of disaster waste (incinerated waste) (Noda Village)

Type	Wood	Paper	Fiber	Plastic	Straw	Fine Dust (<5 mm)	Incombusti-bles
Composition ratio among combustibles	76.7%	0.6%	3.8%	1.4%	16.1%	0.6%	0.8%

Table 4 Radioactive concentration of waste (incinerated waste) (calculated results)

Region	Rikuzentakata	Miyako
Radioactive concentration (Bq/kg)	147.0*[3]	63.5*[3]

*3 ..... Since data on the radioactive concentration of incombustibles is not available, these concentrations are calculated using all composition ratios except for those of the incombustibles.

Table 5 Radioactive concentration of the fly ash of incinerated disaster waste (calculated results)

Region	Rikuzentakata	Miyako
Radioactive concentration (Bq/kg)	4,895	2,115

4. Evaluation

The fly ash generated from the incineration of disaster waste was calculated as in Table 5. The table shows that the highest concentration only increased to 4,895 Bq/kg even for the measurement results of disaster waste in Rikuzentakata City, which so far has measured the highest for radioactive concentration among those measurements conducted in Iwate Prefecture. This value is far below 8,000 Bq/kg, the benchmark level for radioactive cesium concentration that permits disposal by burial in the same manner as ordinary waste. Considering this benchmark was originally set fairly conservatively, it is reasonable to

conclude that such wastes, despite displaying the radioactivity shown above, may be disposed of by burial without causing any undue burden to the waste receivers, such as an obligation to temporarily store the incinerated ash, so long as the waste is put to wide-area disposal, i.e., the waste is distributed to various parts of the country for disposal.

Note that the values shown in Table 5 show no major differences from the level of radioactive concentration[4] of fly ash actually detected at incineration plants in the Tokyo metropolitan (23-ku) area (622 to 9,720 Bq/kg; average of approx. 3,500 Bq/kg).

This evaluation was made according to a scenario developed based on a fairly conservative (safe-side) assumption. Using this result as a baseline, it is desirable to conduct an evaluation according to a more rational scenario that appropriately considers the variable factors as the accumulated data continues to increase in the future.

III. Confirmation on the Delivery Side in Wide-area Disposal of Disaster Waste

It is indispensable to understand the receivers (from the viewpoint of safety) to actually promote wide-area disposal. In consideration of this idea, this chapter discusses how to confirm the disaster waste to be distributed to various parts of the country for disposal. In chapter II, it was concluded that the disaster waste generated in Iwate Prefecture may be disposed of by burial throughout various parts of the country without causing waste receivers any undue burden, such as an obligation to temporarily store the incinerated ash. Given this conclusion, this chapter focuses in particular on how to confirm the waste to be disposed of outside Iwate Prefecture.

Since there is understanding that disaster waste should be accepted by disposers in various parts of the country outside the prefecture for disposal, the idea proposed here first promotes the principle of very meticulous pre-distribution confirmation. In addition to such confirmation on the distributor side, the conduct of monitoring on the receiver side is also considered important. It should therefore be understood that the implementation of the confirmation procedure should be checked from time to time depending on the data accumulated on both sides, revising the procedure accordingly to make it more appropriate and efficient in a timely manner. To this end, it is important to understand the origin of and other data related to the disaster waste to be distributed for wide-area disposal.

1. Basic Concept of Distributor-side Confirmation of Disaster Waste

- Radioactive materials have been spread unevenly, depending on the distance from the NPS. Radioactive concentrations vary greatly depending on the area. Considering this, the basic principle should be to measure the radioactive concentration of disaster waste at the primary storage sites of those municipalities that request wide-area disposal for their waste.

- In addition, when disaster waste is stored at a secondary storage site in a port area in order to be moved outside the prefecture, the entirety of the disaster waste should be

[4] Regarding the Response to Landfill Disposal in Response to the Measurement Results of Radiation at the Incineration Plants in the 23 Cities of Tokyo (data announced by the Tokyo Metropolitan Government on June 27, 2011)

examined and the air dose rate in the neighborhood measured before relocation to ensure that the air dose rate does not rise significantly higher than the background rate.

- In the event that any waste is confirmed to have an air dose rate significantly higher than the background rate, such waste should not be relocated and should be disposed of within the original area.

2. Method for measuring radioactive concentration in disaster waste at primary temporary storage sites

- Measure radioactive concentration for each type of disaster waste to verify the radioactive concentration of the disaster waste at primary temporary storage sites.

- Conduct composition analysis as needed depending on the affected area and the situation. Use any useful composition data.

- The measurement is intended for those primary temporary storage sites planned for the upcoming wide-area processing and associated discharge. The primary storage sites where almost no radioactive concentration has been detected by prior measurements are not subject to this planned measurement; it suffices for the moment to verify when the discharge to second temporary storage sites is performed.

- In the event that there is more than one primary temporary storage site in a single area, one primary temporary storage site may be chosen for the area for the purpose of measuring the radioactive concentration.

- Given the accumulated and existing knowledge on the air dose within the prefecture, it is desirable to take a reasonable approach in sampling the temporary storage sites for measurement by making use of such data to select the target areas.

- The sampling for measurement shall be performed in compliance with the following points in reference to the “Commissioned Research Report on Radioactivity in Temporary Storage Sites for Disaster Waste” (July 2011, Iwate Prefecture), which outlines a practical sampling method.

  - ✓ Avoid sampling only the surface of the disaster waste. Dig into and mix the disaster waste with heavy equipment in advance to ensure the sampling of parts other than only the surface.

  - ✓ Sampling should target the combustible objects among the disaster waste according to the following categories: “wood,” “fine dust (< 5 mm),” “paper,” “fiber,” “plastic,” and “straw.”

  - ✓ In order to measure the average radioactive concentration, each category of disaster waste (i.e., the categorized disaster waste) shall be sampled in more than 10 different spots.

  - ✓ Such sampling spots should be selected to realize as even a distribution as possible with regard to the disaster waste.

3. Measurement results evaluation method

The radioactive concentration measured at temporary storage sites according to 2 above shall be evaluated according to the evaluation performed in II. More precisely, in view of avoiding the creation of any undue burden on the receiving facilities related to temporary storage, one of the interim targets is a radioactive cesium concentration of less than 8,000 Bq/kg in the incineration ash of the disaster waste.

As mentioned previously, however, the evaluation performed in II is based on a scenario making substantially conservative safety assumptions. It is therefore desirable to perform an evaluation based on a more reasonable scenario relying on data compiled at a later stage.

When the proportion of mixed incineration at a receiving facility, along with the radioactive concentration of fly ash is given, it is also possible to evaluate the situation using the following calculation method, apart from the evaluation method described in II.

Radioactive concentration of fly ash =

Radioactive concentration of disaster waste α × concentration rate with respect to fly ash β × mixed incineration rate δ + radioactive concentration of fly ash at the receiving facility θ × (1 – mixed incineration rate δ)

- Mixed incineration rate δ: The proportion of disaster waste in the incinerated waste in the case when such incineration is mixed with that of ordinary waste (including household waste) at the receiving facility
- Radioactive concentration of fly ash at the receiving facility θ: The radioactive concentration of fly ash associated with the incineration of ordinary waste (including household waste) at the receiving facility

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Attachment 1

June 16, 2011

(Via the Director-Generals of Tohoku, Kanto, Hokuriku, Chubu Regional Development Bureaus)
(Appendix 1) Mr. / Ms. Governor
(Appendix 2) Mr. / Ms. Mayor

Ministry of Land, Infrastructure, Transport and Tourism
Director-General of City and Regional Development Bureau

Regarding "The Approach to Immediate Handling of Secondary Byproducts of Water and Sewage Treatment in which Radioactive Materials were Detected"

With respect to the heading, we inform that we have received a notice from the Nuclear Emergency Response Headquarters today (June 16), of having complied "The Approach to Immediate Handling of Secondary Byproducts of Water and Sewage Treatment in which Radioactive Materials were Detected" as in the accompanying sheets.

I urge you to make sure that the municipalities in your jurisdiction (except ordinance-designated cities) are well informed about it.

(Appendix 1)
Yamagata Prefecture
Fukushima Prefecture
Ibaraki Prefecture
Tochigi Prefecture
Gunma Prefecture
Saitama Prefecture
Chiba Prefecture
Tokyo
Kanagawa Prefecture
Yamanashi Prefecture
Niigata Prefecture
Nagano Prefecture
Shizuoka Prefecture

(Appendix 2)
Saitama City
Chiba City
Kawasaki City
Yokohama City
Sagamihara City
Niigata City
Shizuoka City
Hamamatsu City

Attachment IV-17

June 16, 2011

Ministry of Health, Labor and Welfare
Ministry of Agriculture, Forestry and Fisheries
Ministry of Economy, Trade and Industry
Ministry of Land, Infrastructure, Transport and Tourism
Ministry of Environment

Nuclear Emergency Response Headquarters

Regarding "The Approach to Immediate Handling of Secondary Byproducts of Water and Sewage Treatment in which Radioactive Materials were Detected"

In light of investigations conducted by relevant ministries, we have compiled "The Approach to Immediate Handling of Secondary Byproducts of Water and Sewage Treatment in which Radioactive Materials were Detected" as in the accompanying sheets. Based on this, appropriate guidance/advice will be given to the relevant local authorities and business operators.

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Attachment

The Approach to Immediate Handling of Secondary Byproducts of Water and Sewage Treatment in Which Radioactive Materials Were Detected

June 16, 2011
Nuclear Emergency Response Headquarters

On May 12, "The Approach to Immediate Handling of Secondary Byproducts of Sewage Treatment in Fukushima Prefecture" was put together in response to the fact that radioactive materials had been identified in dewatered sludge and other substances in facilities including sewage treatment plants in Fukushima Prefecture. Since then, radioactive materials have been detected in waterworks and sewage sludge in prefectures other than Fukushima, primarily in East Japan. For this reason, and taking into account the aforementioned approach document, the recommendation made by the Nuclear Safety Commission at the time of its drafting as well as ""Near-term policy to ensure the safety for treating and disposing contaminated waste around the site of Fukushima Dai-ichi Nuclear Power Station of Tokyo Electric Power Company" (6/3/2011 Nuclear Safety Commission decision; hereinafter referred to as "Regarding the Ensuring of Safety", attachment 1), we have organized the results of inquiries by relevant ministries and agencies on the immediate handling policy for waterworks sludge (including those generated by industrial waterworks), dewatered sludge generated by sewage treatment plants and community waste water treatment facilities, as well as the results of incinerating or melting this dewatered sludge (hereinafter referred to as "dewatered sludge, etc."), as follows.

1. Treatment, Transport, Storage and Disposal of Dewatered Sludge, etc.
   (1) It is important to work to reduce the amount of radiation that area residents and workers are exposed to, based on the below approach outlined in "Regarding the Ensuring of Safety"
      ① In treating, transporting and storing, there is a need to ensure that exposure dose for area residents does not exceed 1mSv/year,

while also taking extraordinary care to limit the exposure dose for area residents by making additional improvements to the environment around the treatment plant

② It would also be desirable to limit the exposure dose of workers who conduct treatment and other operations to under 1mSv/year where possible. In processes where material with relatively high concentration of radioactive substances is handled, there is a need to appropriately manage the amount of exposure for workers by taking measures such as strict adherence to "The Ordinance on Prevention of Ionizing Radiation Hazards" (Ministry of Health and Welfare order #41, 1972; hereinafter referred to as "Ionizing Radiation Rule").

③ Disposal safety should be judged according to these guideline values: Following the end of the disposal facility's controlled management, exposure dose for area residents should be under 10μSv/year as assessed according to a basic scenario and under 300μSv/year as assessed according to variable scenario.

Dewatered sludge, etc. should be handled appropriately based on this approach, and according to their concentration of radioactive materials.

Incineration and Melting

(2) Material capable of compaction through incineration, melting or other means should be compacted as needed, while being appropriately managed in observance of "Regarding the Ensuring of Safety" in (1). For example, when proceeding to incinerate dewatered sludge with high concentration of radioactive cesium (over 500,000Bq/kg[1] as a rule), measures such as ensuring the appropriate capability for the facility's particulate trap should be taken. In addition, a system to seal the resulting ash in a container is needed, in order to prevent dispersal.

Storage

(3) Dewatered sludge, etc. should be compacted as needed, then stored in an appropriate facility such as water supply facility, sewage treatment plant and community waste water treatment facility. Cautions to be taken in storing dewatered sludge, etc. are noted in Attachment 2.

(4) In addition to the above, landfill sections of controlled disposal facilities that normally dispose of dewatered sludge, etc. in its landfill may be used for provisional storage, as long as an appropriate distance is maintained from property lines of residential and similar areas, according to the below chart. In addition, in those cases where the combined concentration of ^{134}Cs and ^{137}Cs in the dewatered sludge has dropped as a result of solidification or dilution, the material will be assessed according to the end concentration (applies hereinafter).

Chart[2]

Column 1	Column 2
Rough distance from the property line	^{134}Cs and ^{137}Cs combined
70m	Under 100,000Bq/kg
50m	Under 70,000Bq/kg
40m	Under 60,000Bq/kg
20m	Under 40,000Bq/kg
6m	Under 20,000Bq/kg
No restrictions	Under 8,000Bq/kg

(5) For dewatered sludge for which the combined total for ^{134}Cs and ^{137}Cs exceeds 100,000Bq/kg, it would be desirable to store them if at all possible within the prefecture where the dewatered sludge was generated, in a facility where radiation can be appropriately shielded.

Disposal

(6) Calculations show that if dewatered sludge with combined ^{134}Cs and ^{137}Cs concentration of under 100,000Bq/kg[3] is disposed in a landfill accompanied by appropriate long-range measures and with no residential or similar use allowed for the site, the resulting exposure dose for area residents would be less than 10μSv/year. However, long-term management as well as investigation into the environmental conservation approach is needed for sites where landfill disposal took place under differing conditions. Given this fact, landfill sites for dewatered sludge with combined ^{134}Cs and ^{137}Cs concentration of under 8,000Bq/kg[4] will not be open to

residential or similar use for the present. Landfill disposal itself is permitted, in accompaniment with appropriate measures such as installation of soil strata and measures for watertightness.

In addition, when disposing dewatered sludge with combined ^{134}Cs and ^{137}Cs concentration of under 8,000Bq/kg and using the site as farmland or residence, and when disposing dewatered sludge with concentration of over 8,000Bq/kg and under 100,000Bq/kg, landfill disposal is possible following individual safety assessment on whether the disposal meets (or not) the guideline value indicated in "#3: Regarding Disposal" in "Regarding the Ensuring of Safety", and after exploring methods of long-term management.[5]

If implementing landfill disposal by either method, prefectures and other governments where the controlled disposal facility is located should perform necessary measures such as monitoring[6] and facility deployment management until the safety of the controlled disposal facility site can be secured.

As for disposal without additional individual safety assessment of dewatered sludge having combined ^{134}Cs and ^{137}Cs concentration between 8,000Bq/kg and 100,000Bq/kg in a controlled disposal facility, with no residential or similar use allowed for the site, we will continue to weigh the environmental conservation approach.

(7) In terms of the dewatered sludge, etc. stored under (5), the rule will be to meet the guideline value for disposal indicated in "Regarding the Ensuring of Safety". The specifics of disposal will continue to be weighed.

(8) Emitting operators who seek to dispose dewatered sludge, etc. should publicly release the method of landfill disposal (the method to be used by the contractor if subcontracting to waste disposal operator), verify that disposal is being implemented properly, and report to the prefecture on a regular basis. On receiving these reports, the prefecture should release them to the public without delay.

(9) When implementing landfill disposal of dewatered sludge, etc., should a waste disposal operator be unable to perform the work, the

prefecture and the emitting operator of dewatered sludge, etc. will manage the dewatered sludge, etc. that has been disposed of in a landfill.

2. Use of Secondary Byproducts That Use Dewatered Sludge, etc.
   (1) Given reduction of concentration of radioactive substances in the incoming dewatered sludge, etc. to below certain levels, or aggregation or dilution with other raw materials, there is no impediment to using those products manufactured through reuse of dewatered sludge, etc. whose concentration is reasonably assured to have been reduced to under the clearance level prior to market distribution.[7]
   (2) One example is the use of cement for raw concrete or foundation reinforcement, a process which is controlled up to the stage where the cement is mixed with raw concrete or soil. Given that the cement will be diluted to at least double the volume, the permitted concentration at the cement stage would be double that of the clearance level. However, if the product is to be bagged and sold on the open market as cement, it needs to be brought under the clearance level at the cement stage, before being distributed to stores.
   (3) Regarding products such as gardening soil, for which assessment regarding reuse has not been finalized, the proper course would be to voluntarily refrain from distributing the product for the time being. Distribution will resume in the future, after safety has been assessed by the relevant ministries and agencies according to the way in which these products are being used.
   (4) In order to properly implement the use of secondary byproducts, it would be appropriate to take ongoing measurements of the concentration of radioactive substances in dewatered sludge, etc. at water supply facilities, sewage treatment facilities and community waste water treatment facilities for communities where concentration above a certain level was detected.

3. Worker Safety and Health Management
   (1) Appropriate and regular measurement of radiation concentration

should be taken for exhaust from dewatered sludge incineration and melting treatment plants and waste water from landfill disposal facilities, and any suitable measures taken as needed by the relevant party, in order to reduce exposure to the lowest level reasonably achievable, and to properly implement landfill disposal and secondary byproduct use. Operators who emit dewatered sludge, etc. should record the amount as well as the radiation concentration of dewatered sludge to be provisionally stored.

(2) Should there be a risk that the effective dose from external radiation within sewage treatment facilities, waterworks, waste disposal facilities exceed the standard (1.3mSv over 3 months or 2.5μSv/h) set by Article 3 Paragraph 1 of "The Ordinance on Prevention of Ionizing Radiation Hazards" (Ministry of Health and Welfare order #41, 1972; hereinafter referred to as "Ionizing Radiation Rule"), or if the dewatered sludge, etc. qualifies as radioactive material as defined by Article 2 Paragraph 2 of the Ionizing Radiation Rule, the relevant provisions of the Ionizing Radiation Rule should be strictly adhered to in order to secure the safety of the workers.

In addition, it should be noted that if dewatered sludge, etc. qualifies as radioactive material as defined by Article 2 Paragraph 2 of the Ionizing Radiation Rule, the Rule may also come into effect for facilities that take receipt of these as cement or paving material. Furthermore, when handling dewatered sludge with radioactive substance concentration near the lower limit set in Article 2 Paragraph 2 of the Ionizing Radiation Rule, it would be desirable to measure and control the exposure of workers, in observance of "2) Regarding Treatment, Transport and Storage" of "Regarding the Ensuring of Safety".

(3) For cases where dose received by workers exceeds 1mSv/year, in order to reduce exposure to the lowest level reasonably achievable, the relationship between the radioactive concentration of dewatered sludge etc. and the dose received by workers should be reassessed around 6 months following the accident, based on the radioactive concentration detected in dewatered sludge at this point.

4. Notes

(1) The radioactive concentration of dewatered sludge, etc. is thought to

undergo daily changes according to regional differences and presence of precipitation. In addition, given the nature of the material, it is difficult for sewer operators or cement operators to control the concentration of radioactive substances, beyond diluting the generated sludge. The upper limit of radioactive concentration, set by logarithmically transforming calculation results, is simply a guideline, and even values that exceed the limit but have the same number of digits may not necessarily represent a significant difference in safety from a radiological protection perspective. Even in cases where the measured value exceeds the radioactive concentration given as a guideline, an appropriate response may be mounted without necessarily resorting to recovery, depending on the result of an assessment using detailed calculation of the radiation dose.

(2) Should there be any changes in the future, such as the detection of radioactive concentration far exceeding those recorded so far in dewatered sludge, etc., a suitable response, including a reassessment of this approach, will be implemented.

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[1] Assessed based on "Regarding the Technological Exploration Towards the Deployment of a Clearance System in Radiation Hazard Prevention Law" (The Working Group on Clearance Technology, Radiation Safety Regulations Exploratory Committee of the Ministry of Education, Culture, Sports, Science and Technology; called "RI Clearance Report" as of January 2010), an existing waste-related exposure assessment based on the Nuclear Safety Commission's approach.

[2] The effect of skyshine was assessed during operation, in accordance with "Regarding the Upper Limit of Concentration of Radioactive Materials as It Relates to Landfill Disposal of Low-Level Radioactive Solid Waste" (Nuclear Safety Commission, 05/21/2007)

[3] The concentration of radioactive material that would result in a dose of less than 10μSv/year for area residents was assessed based on "RI Clearance Report", assuming that residential or similar use was disallowed for the site.

[4] This is the concentration of radioactive material for which test calculations show that the dose received by landfill workers will not exceed 1mSv/year, as a result of an assessment based on the "RI Clearance Report".

[5] Ultimately, safety will be assessed according to the nature and volume of the dewatered sludge, etc. to be disposed (if these are in provisional mixed storage in the same controlled disposal facility with other waste that includes admixture or adhesion of radioactive substances, these other waste are also included), type and concentration of radioactive material, and the conditions set by the unique natural and social environment of the controlled disposal facility site, and the following points verified:

a. The lead entity for the control and monitoring of dewatered sludge, etc.

b. The duration for which radiological protection control is needed
c. The final depth of the covering soil
d. The treatment measures for radioactive substances at seepage water treatment plant
e. Site use conditions for the final disposal site following its shutdown
f. Other points necessary for radiological protection
g. Measures to be undertaken by the prefecture or the emitting operator of dewatered sludge, etc. in order to ensure strict adherence to A through F

[6] Includes measuring the concentration of radioactive substances in the seepage water or the ground water, to verify that it falls below the concentration limit indicated in Attached Table 1 in "Notice of Dose Limit, etc., Based on Provisions of Regulations Related to Nuclear Fuel Material Fabrication Operations" (Science and Technology Agency Notice #13, 2000)

[7] The clearance-level concentration of radioactive substances for metal and concrete pieces pursuant to the provisions of Article 61-2-4 of Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors, "Regulation on Verifying the Concentration of Radioactive Substances Contained in Materials Used in Refinery Plants and Other Facilities" (2005 METI ordinance #112) is 0.1Bq/g for ^{134}Cs and 0.1Bq/g for ^{137}Cs, and is set such that the sum of percentages yielded by dividing the concentration value with the clearance concentration level according to each radioactive nuclide does not exceed the integer 1.

Near-term policy to ensure the safety for treating and disposing contaminated waste around the site of Fukushima Dai-ichi Nuclear Power Plants

June 3, 2011
Nuclear Safety Commission

Introduction

As to the materials which were affected by the accident at Fukushima Dai-ichi Nuclear Power Plant of Tokyo Electric Power Co. (TEPCO) and which are to be disposed of (materials such as debris, sludge from the water and sewerage treatment, incinerated ash, trees and plants and soil resulted from the decontamination activity, etc.), it is necessary that the disposal of those materials be finally accomplished after the safety of residents living in the vicinity of the facilities and workers are fully considered, and after the treatment and storage of these materials are pursued under the proper management.

The treatment and disposal of materials affected by this accident are one of the most important activities to improve the life environment of inhabitants who are currently living under the existing exposure situation. On carrying out these activities, it is important to; define clearly the responsibility and role of TEPCO and the government (relevant ministries and agencies); fully perform information exchange, exchange of opinions and consultation with the local governments, local people and the associated organizations including companies, and; establish a proper operating system and a safety confirmation system.

This document describes the near-term policy to ensure safety for the treatment and disposal of materials concerned. This policy is issued on the basis of advice provided at this accident and a set of regulatory guides issued in the past by the Nuclear Safety Commission (NSC).

1. Reusing

A part of the above mentioned materials affected by this accident is considered to supply for reusing. As to the products manufactured from these reused materials, it is necessary to check that the concentration of radioactive materials is managed appropriately, before the products are circulated in the market, so that the concentration is lower than the standard level corresponding to 10μSv/year employed for the clearance level[1].

[1] The clearance level is set forth to determine whether the certain material contaminated by radioactive substance can be given back to the general community and reused or not. Usually it is used as a standard

The approach of reusing by applying the concept of above mentioned clearance level is a possible measure in consideration of the peculiarity that influence of the accident is found in general environment itself, although the degree of influence is different from area by area. Taking into account the general concept that reusable materials are desirable to be reused as resources, this approach shall be allowed only under the regulated conditions that; the concentration of radioactive materials provided for reusing in recycling facilities is managed appropriately, and that of products is confirmed to be less than the standard level employed as the clearance level.

2. Treatment, Transportation, and Storage

When the materials concerned is treated in recycling, incineration and melting facilities, and temporary storage facilities or areas, it is important to take measures in consideration of the particularity of this accident that the level of radiation exposure dose of residents living in the vicinity of the facilities and the workers engaged in the treatment of contaminated materials should be kept as low as reasonably achievable, based on the fundamental idea of the radiation protection indicated by NSC(1).

In particular, special care is necessary to prevent radiation exposure of the residents living in the vicinity of the facilities caused by the treatment of contaminated materials from exceeding 1mSv/year, by performing the improvement measures of environment for the periphery of treating facilities. Furthermore, the radiation dose of workers exposed by the treatment of those materials is desirable to be controlled possibly less than 1mSv/year. It is considered that the waste of relatively high radioactivity concentration is generated in the processes such as incineration and melting, therefore such processes should be performed under the proper management of radiation protection for the worker, in compliance with "The Ordinance on Prevention of Ionizing Radiation Hazards (Ordinance of the Ministry of Labor No.41 of September 30, 1972)".

Furthermore, for the exhaust and drainage from treating facilities, it is important to confirm that the level of radioactivity concentration is less than the limit shown in "Public Notices which include the Dose Limit based on the Provision of the Rule about Establishment and Operation of the Practical Nuclear Reactors for Electricity Generation (Public notice of Ministry of Economy, Trade and Industry No.187 of March 21, 2001)".

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to exclude certain material, which does not need to be treated as radioactive material, from the category under the regulation relating to radiation protection.

3. Disposal

In the final disposal, based on full understanding of the basic information such as shape and quantity of the waste, type of radioactive material and radioactivity concentration, it is necessary to select a proper method of disposal depending on radioactivity level, to set a method and a period of necessary management depending on the type and concentration of radioactivity, and to evaluate the long-term safety of disposal facilities.

The safety assessment of disposal facilities should be conducted according to the proper scenario by taking into account various phenomena that may give health impact to residents living in the vicinity of the facilities, based on natural and social environmental conditions which are peculiar to the location of facility and also the engineering countermeasures employed to ensure the safety. It is essential to confirm that the assessment result satisfies the "target dose" for each scenario.

Considering the safety standards in the International Atomic Energy Agency (IAEA), International Commission on Radiological Protection (ICRP) and various foreign countries, NSC has studied commonly important issues(2) for the safety of disposal of radioactive waste generated from the nuclear facilities, and also has indicated the idea of the safety assessment after the management period and the "target dose" to evaluate the validity of the assessment result for disposal methods (trench, pit, and sub-surface disposal) applied to Category 2 radioactive burial projects(3)(4)(5).

Specifically, NSC demands that the radiation dose of residents exposed should be less than 10μSv/year as a result of assessment (the assessment of likely scenarios) based on the scenario assumption which seems to be possible scientifically, and also the radiation dose which residents receive should be less than 300μSv/year as a result of assessment in consideration of the variable factor and uncertainty against the basic scenario (assessment of less-likely scenarios)(3)(4)(5).

In a series of previous studies conducted, NSC has indicated that, although the scenarios of the assessment vary depending on the disposal method, the "target dose" to evaluate the validity of an idea of the long-term safety assessment and the assessment result is applicable uniformly regardless of the disposal methods[2].

[2] The ideas of the safety assessment for the underground disposal of the high-level radioactive waste have not yet been determined. Therefore, when waste of high radioactivity concentration to be handled by underground disposal is generated, a study is necessary separately.

Therefore, even when disposing waste affected by this accident, NSC considers that there are scientific basis of ensured safety after the terminating active control, if scenario depending on an adopted disposal method is set followed by conducting proper assessment, and if the result of the assessment satisfies the "target dose" for each scenario indicated in "Basic Guide for Safety Review of Category 2 Radioactive Waste Disposal "[(3)].

References

(1) Commission’s views as the basis of advices on radiation protection (May 19, 2011 the Nuclear Safety Commission)
http://www.nsc.go.jp/NSCenglish/geje/doc_dis/2011_33rd/2011_0519_33rd_doc6.pdf

(2) Commonly Important Issues for the Safety Regulations of Radioactive Waste Disposal (Approved by the Nuclear Safety Commission on June 10, 2004)
http://www.nsc.go.jp/haiki/page3/050728.pdf

(3) Basic Guide for Safety Review of Category 2 Radioactive Waste Disposal (Decision by the Nuclear Safety Commission on August 9, 2010)
http://www.nsc.go.jp/NSCenglish/guides/facilities/F-RW-I.02.pdf

(4) Policy of the Safety Assessment of Sub-surface Disposal after the Period for Active Control (approved by the Nuclear Safety Commission on April 1, 2010)
http://www.nsc.go.jp/NSCenglish/topics/radioactive_waste/20100401_e.pdf

(5) Technical Document on the Safety Assessment of Sub-surface Disposal after the Period for Active Control (in Japanese, approved by the Special Committee on Radioactive Waste and Decommissioning in Nuclear Safety Commission on August 5, 2010)
http://www.nsc.go.jp/shinsashishin/pdf/3/ho100805.pdf

Attachment 2

Cautions to Observe in Storage, Provisional Storage and Transport of Dewatered Sludge, etc.

In performing storage, provisional storage (hereinafter referred to as "storage, etc.") or transport of dewatered sludge, etc., care should be taken to refer to documents such as "Basic Approach for Safety Assessment of Radioactive Waste Management Facilities" (Nuclear Safety Commission decision, 3/27/1988), "Basic Approach to Safety Assessment Related to Category 2 Waste Disposal Business" (Nuclear Safety Commission decision, 8/9/2010) and "Near-term policy to ensure the safety for treating and disposing contaminated waste around the site of Fukushima Dai-ichi Nuclear Power Station of Tokyo Electric Power Company" (Nuclear Safety Commission decision, 6/3/2011) while also strictly observing the provisions of legislations regarding the "Waste Disposal and Public Cleaning Act" in controlled waste disposal facilities (hereinafter referred to as "waste treatment laws"), as the below procedure is followed.

1. Application of the "The Ordinance on Prevention of Ionizing Radiation Hazards"

When dewatered sludge applies to the radioactive materials (ones with the sum of the fraction of the concentration of each radioisotope on the left column of the table over the concentration on the right column of the same table exceeds 1) defined in Article 2, paragraph 2 of the Ordinance on Prevention of Ionizing Radiation Hazards (hereinafter, "Ionizing Radiation Rule"), the pertinent regulations of Ionizing Radiation Rule should be strictly adhered.

Attached table (extract)

Type of Radioisotope	Concentration (Bq/kg)
^{134}Cs	1×10^{4}
^{137}Cs	1×10^{4}

*For example, if radioactive materials contained in dewatered sludge etc. were ^{134}Cs:4,500Bq/kg, ^{137}Cs:5,000Bq/kg, then
4500/10000 + 5000/10000 = 0.95 < 1

Therefore, it does not apply to the radioactive materials defined in Article 2, paragraph 2 of Ionizing Radiation Rule.

2. Enhanced Confinement Function

When storing dewatered sludge etc at a provisional storage site, or transporting it, dewatered sludge etc. should be contained in such a way, such as sealing in containers, so that it does not scatter around.

3. Radiation Shielding

(1) Sufficient radiation shielding should be provided in consideration of the surrounding environment of the facilities for provisional storage (hereinafter referred to as 'facilities') and the working environment of the radiation workers.

Also as for means of radiation shielding, for example, when covered with 15cm thick concrete walls, radiation dose equivalent rate becomes 1/10 of the original, when covered 30 cm with soil, the dose equivalent rate is believed to be 1/40 of the original1[i].

(2) When provisionally storing dewatered sludge etc. on soil, impermeable tarpaulins or the like should be placed in advance. On the top of that, appropriate measures should be taken such as wrapping the object with water resistant material etc. and cover it with impermeable tarpaulins or the like or clad it with tent or roofs and the like to prevent rainwater.

4. Radiation Monitoring

(1) Prefectures, where facilities are located (hereinafter referred to as facility location prefecture), should measure and record radiation dose equivalent rate on the sides of radiation shielding object or containers sealing dewatered sludge and such, once a day or when bringing dewater sludge etc. into the facilities.

(2) Facility location prefectures should measure and record concentration of radiation of exhaust from facilities for incineration/melting etc once a week.

(3) Facility location prefectures should measure and record radiation concentration of treated water and influent and seeping water at the

provisionally located controlled waste disposal facilities once a week.

(4) Facility location prefectures should take necessary measures, including enhanced radiation shielding as necessary based on the measurement results of (1) and (2).

(5) Facility location prefectures are allowed to entrust the facility manager with measurement of (1) and (2). Facility location prefectures also take measures of (4) along with the facility manager.

(6) As to frequency of measuring (1) to (3), actions should be taken flexibly in response to measurement results.

5. Establishment of Management Framework

(1) Operators that discharge dewatered sludge and such should record the weight of dewatered sludge etc and radiation concentration per weight, as well as provisional storage sites, and store the records.

(2) Facility operators should immediately report to the facility location prefecture (but when the concerned facility is the facility that has a permission of an ordinance-designated city as provided in Waste Disposal and Public Cleaning Act, it should report to the prefecture and the concerned ordinance-designated city) the situation and measures taken against it when falling under the following items, and the facility location prefecture should ask the national government for advice and promptly take measures with operators that discharge dewatered sludge and the facility manager.

a. When dewatered sludge is missing
b. When facilities are obstructed to manage dewatered sludge and such due to events, like a fire.
c. When radiation concentration measured in 4. (2) and (3) exceed the concentration limit provided in Article 9 of Notification for Dose Limits on the Basis of the Rules for Commercial Power Reactors concerning the Installation, Operation, etc.(METI Notification No.187 2001.)
d. When dewatered sludge and such are leaked at the facilities.

6. Cautions to Observe for Provisional Storage in Controlled Waste Disposal Facility

(1) Operators that discharge dewatered sludge etc. and the facility

managers should consult with the facility location prefectures in advance before provisionally storing waste like dewatered sludge.

(2) It should be provisionally stored all together in distinction in order not to get mixed with other waste materials.

(3) When covering waste like dewatered sludge to prevent scattering, soil-covering is allowed. When covering with soil, the measurement of 4. (1) should be implemented 1 m above the top of the soil-covering.

(4) At the site for provisional storage of dewatered sludge and such, while paying special attention to controlling land subsidence, appropriate measures should be taken, including placement of the objects wrapped with materials like, water resistant material, immediately followed by covering with soil and covering with water shielding tarpaulins or cladding with tent or roofs to prevent seeping of rainwater after placing impermeable linens etc before installing an isolating layer of about 30 cm think soil (bentonite).

Furthermore, when provisionally storing dewatered sludge, it may possibly generate gas, like methane and hydrogen sulfide thus gas-vent lines should be installed as needed, and also when covered with tent and such, adequate ventilation and the like should be provided and subsidence etc. of soil-covering should be appropriately dealt with.

Keep in mind not to prevent rainwater from penetrating the existing waste layer.

(5) Facility location prefectures and operators that discharge dewatered sludge etc. should manage waste, including dewatered sludge that have been provisionally stored, when waste disposers have become unable to carry out the operation.

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[i] Source: External Effective Dose Conversion Factors for Activity Concentration Limit Evaluation for Disposal of Radioactive Waste (2008, Japan Atomic Energy Agency)

Parameters used for the evaluation of treatment and disposal of dehydrated sludge

(With Cooperation of Japan Atomic Energy Agency)

1. Evaluation method

The assumed scenario for processing of the combustible materials contaminated with radioactive materials as well as the evaluation of the radiation exposure processes are indicated in "A technical study for introduction of the clearance system to Laws Concerning the Prevention of Radiation Hazards due to Radioisotopes and Others" reported by The Working Group for Technical Study on Clearance System, Radiation Safety Regulation Review Commission, MEXT, in January 2010. Based on this evaluation method, the evaluation results of radiation effects of the processing and disposal of dehydrated sludge are shown below. Where, the abundance ratio of Cs-134 and Cs-137 is conservatively set as 1:1 in accordance with measurement results.

2. Incineration processing of dehydrated sludge

The main parameters were set as follows;

Parameters	Unit	Value	Setting basis
The dilution factor of the dehydrated sludge fed into an incinerator	-	1	It is presupposed that incineration processing only of the dehydrated sludge with uniform radioactive material concentration is carried out.
The dispersion coefficient in the atmosphere	g/s	5E-6	Diffusion coefficient in 60m of height of stack and 5m/s of the wind speed indicated in EUR-16198 is used.
The rate of the cesium which shifts during an exhaust gas by incineration processing	-	0.05	Dust-collecting efficiency of an electric dust collector is set as 90% conservatively, and the distribution coefficient is set as 0.5 [1]. 0.5×(1-0.9) = 0.05
Incineration capacity	g/s	1.2E+3	Based on the national average value, 115t/day [2], incineration capacity is calculated with 100t/day and 24 hours operation per day.
The radiation shield coefficient of house building	-	0.2	The rate of the being outdoors is assumed to be 20% referring to IAEA-TECDOC-401.
Annual habitation time	h/y	8,760	Staying in 365 days per year, 24 hours per day, is considered.

3. The neighboring residents of the temporary work field of dehydrated sludge

The main parameters are set as follows;

Parameters	Unit	Value	Setting basis
Annual working time	h/y	2,000	It is assumed that the work for 8 hours per day and 250 days per year.
Area of a temporary storage place	m×m	200× 200	It is assumed that temporary storage of all the contaminated materials estimated with the clearance evaluation should be carried out.
Density of dehydrated sludge	g/cm^3	2.0	It is set Based on IAEA-tecdoc-401.

4. Land-filling work of dehydrated sludge

The main parameters were set as follows;

Parameter		Unit	Value	Setting basis
Annual working time		h/y	1,000	It is assumed that the work is carried out near the dehydrated sludge for 8 hours per day and 250 days per year.
The dilution factor during the reclamation work.		-	1	It is assumed that only the contaminated dehydrated sludge should be treated.
The radiation shield coefficient during the reclamation work.		-	0.4	Shielding effect at the time of using a heavy industrial machine is taken into consideration.
Dose conversion coefficient by external exposure.	Cs-134	μSv/h per Bq/g	4.7E-01	It is set based on the clearance evaluation.
	Cs-137		1.7E-01	

5. Reuse of the disposal place

The main parameters were set as follows;

Parameter		Unit	Value	Setting basis
Thickness of cover soil		m	0.5	It is set based on the technical standard for final disposal.
Staying time on the reclaimed disposal place.		h/y	200	It is calculated having conservatively assumed that people stay in the reclaimed disposal place for 30 minutes every day.
The radiation shield coefficient during stay on the reclaimed disposal place.		-	1	It is conservatively assumed that it does not have any shield.
Time from closing of the reclaimed disposal place to the evaluation time.		y	10	It is set based on IAEA-TECDOC-401.
Dose conversion coefficient by external exposure.	Cs-134	μSv/h per Bq/g	1.9E-03	It is calculated having assumed that 10-m-thick dehydrated sludge is under 50-cm-thick soil.
	Cs-137		5.5E-04	

[1] Hirofumi Sakanakura, Masahiro Oguchi, Atsushi Terazono, "Distribution and change of 54 elements of rare metal in the practical incineration and melting process", Japan Society of Material Cycles and Waste Management, Vol.21, pp.198-199, 2010 (in Japanese)

[2] Garbage incineration facility ledger (All the continuous combustion systems) FY-1998 editions, Japan Waste Research Foundation (in Japanese)

Temporary treatment of waste detected radioactive material

Concentration of sum of Cs-134 and Cs-137[2)]	Storage/Disposal	Level of Radiation Exposure for land utilizers	Level of Radiation Exposure for Worker	Level of Radiation Exposure for residents at treatment	Reuse
Above 0.1MBq/kg	•**Storage within Prefecture** •Disposal(under examination)	（Not yet evaluated）	（Not yet evaluated）	（Not yet evaluated）	Confirm under the clearance level, before market circulation.
8k～ 0.1MBq/kg	•**Temporary storage managed landfil site** •（Safety of sewage sludge will be assessed each, and the sludge would be utilized as landfill with the long-term management）	Under 10μSv/year[1)]	Over 1mSv/year in certain cases	Take a safe distance to keep under 1mSv/year	
Under 8kBq/kg	•Landfills disposal is possible under certain circumstances, e.g. non-residence use[4)]	Under 10μSv/year	Under 1mSv/year[3)]	Under 1mSv/year[3)]	

1) Rubble、ash of life garbage、sewage sludge, earth and sand from trench, etc.
2)Based on NSC Decision June 3,2011

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Measurement Results for the Concentration of Radioactive Cesium in Incinerated Ash at General Waste Treatment Facilities

1. Measurement Request

In response to the detection of an amount of radioactive cesium (^{134}Cs and ^{137}Cs) of over 8,000 Bq/kg in fly ash at a general waste treatment facility in Tokyo, we sent a notice to 16 prefectures[*1] in the Tohoku and Kanto regions on June 28, 2011 entitled "The Radioactive Measurement and Immediate Handling of Incinerated Ash at General Waste Treatment Facilities" (hereinafter called the "Handling Policy for Incinerated Ash") and requested that incinerated ash and other materials discharged from general waste treatment facilities be measured in the prefectures.

*1 Iwate, Miyagi, Akita, Yamagata, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa, Niigata, Yamanashi, Nagano, and Shizuoka

2. Facilities and materials to be measured

Facilities subjected to the request: General waste treatment facilities in 16 prefectures

Materials to be measured: Bottom ash[*2], fly ash[*3], and other materials discharged in the incineration of general waste

Measurement period: From June 28, 2011 onward

*2 Bottom ash: Ash which falls to the bottom of incinerators in the course of incineration

*3 Fly ash: Ash included in incinerated gas and collected by a dust collector at an exhaust gas outlet

3. Measurement Results

On August 24, we requested a report with regard to the measurement of radioactive cesium in incinerated ash in accordance with the above request, and 469 facilities in 16 prefectures reported their measurement results. Table 1 shows the results for each prefecture.

Of the 469 facilities, 42 confirmed an amount of radioactive cesium of over 8,000 Bq/kg in incinerated ash, which will have to be temporarily stored at the

facilities pursuant to the Handling Policy for Incinerated Ash. This was confirmed at 26 facilities in 6 prefectures other than Fukushima.

According to the Handling Policy for Incinerated Ash, if the measurement result is close to or over 8,000 Bq/kg, the incinerated ash should be measured at regular intervals (about once a month). As some facilities are planning continuous measurements, the results will be released accordingly on receipt of the reports.

Table 1 Measurement results for incinerated ash in general waste treatment facilities (overview)

	No. of facilities which reported their results	Mesurement results (Bq/kg)	Over 8,000 Bq/kg		Over 100,000 Bq/kg	
			Bottom ash*4	Fly ash*5	Bottom ash*4	Fly ash*5
Iwate	19	ND to 30,000	NO	2	NO	NO
Miyagi	18	ND to 2,581	NO	NO	NO	NO
Akita	16	ND to 196	NO	NO	NO	NO
Yamagata	14	ND to 7,800	NO	NO	NO	NO
Fukushima	22	ND to 95,300	7	16	NO	NO
Ibaraki	30	42 to 31,000	NO	10	NO	NO
Tochigi	18	217 to 48,600	NO	3	NO	NO
Gunma	24	20 to 8,940	NO	2	NO	NO
Saitama	48	93 to 5,740	NO	NO	NO	NO
Chiba	58	ND to 70,800	NO	8	NO	NO
Tokyo	54	ND to 12,920	NO	1	NO	NO
Kanagawa	39	ND to 3,123	NO	NO	NO	NO
Niigata	35	ND to 3,000	NO	NO	NO	NO
Yamanashi	13	ND to 813	NO	NO	NO	NO
Nagano	27	ND to 1,970	NO	NO	NO	NO
Shizuoka	34	ND to 2,300	NO	NO	NO	NO
Total	469		7	42	0	0

*4 In addition to bottom ash, melted slag and compounds of bottom ash and fly ash are included.

*5 Includes melted fly ash

Monitoring of Radioactive Materials at General Waste Treatment Facilities

1. Concept behind Monitoring

The manual published by the Ministry of the Environment on June 23, 2011 entitled "Treatment policies for disaster waste in Fukushima Prefecture" contains a provision about monitoring for safety assurance regarding the treatment of waste that could have been contaminated by radioactive materials. It specifies that continuous monitoring is required with regard to air dose rates and underground water in the periphery of treatment facilities, as well as exhaust gas, discharged water and other substances emitted from the treatment facilities. The monitoring techniques are specified in the manual published on August 9, 2011 entitled "Incineration facilities for treatment of disaster waste in Fukushima Prefecture and Monitoring."

This concept also applies to general waste treatment facilities outside Fukushima Prefecture. If an amount of radioactive cesium exceeding a certain level is detected in incineration ash or other substances, monitoring is also considered necessary to ensure safe treatment. Based on measurement data collected by the Ministry of the Environment regarding incineration ash and other substances at general waste incineration facilities in 16 prefectures, this document summarizes the concept for the target facilities and monitoring techniques.

2. Target facilities

Monitoring targets shall be general waste incineration facilities for which previous measurements have indicated that radioactive cesium concentrations in incineration ash and other substances (bottom ash, fly ash, molten slag and molten fly ash) have been detected to be close to or over 8,000 Bq/kg. If there is a possibility that general waste to be incinerated at a facility may contain an amount of radioactive cesium that may exceed 8,000 Bq/kg, monitoring is required at the facility. The radioactive cesium concentration in incineration ash and other substances shall be determined to be close to 8,000 Bq/kg if the concentration exceeds about 80% of 8,000 Bq/kg.

Monitoring is also required at the temporary storage sites and landfill

disposal sites used for the temporary storage of incineration ash and other substances containing radioactive cesium at a concentration of over 8,000 Bq/kg.

It is also considered effective to carry out monitoring by referring to measurement items and other conditions specified under this policy and to ensure the safety of general waste treatment at facilities not classified as target facilities, in order to promote awareness among citizens.

3. Measurement items, locations and monitoring frequency

Measurement items, locations and monitoring frequency shall be as specified in the manual published on August 9, 2011 entitled "Incineration facilities for treatment of disaster waste in Fukushima Prefecture and Monitoring."

(1) In principle, the items listed below shall be monitored for the time being. Radioactive cesium (^{134}Cs and ^{137}Cs) shall be measured as a radioactive material.

(2) Monitoring locations shall be intermediate treatment facilities as well as temporary storage sites and landfill disposal sites specified in the manual published on July 28, 2011 entitled "Temporary storage of disaster waste in Fukushima Prefecture."

(3) Standard monitoring frequencies are listed below. Air dose rates can be monitored in more detail by taking measurements continuously and other techniques. If an air dose rate suddenly increases or if waste to be treated changes in type or property, measurements shall be taken immediately. When monitoring results indicate that there is no possibility that the radioactive cesium concentration in incineration ash and other substances will exceed 8,000 Bq/kg in the future, the frequency of monitoring at intermediate treatment facilities may be decreased.

<Monitoring items and standard monitoring frequency>

a) Intermediate treatment facilities

Air dose rate at site boundaries: Weekly

Radioactive material concentration in exhaust gas: Monthly

Radioactive material concentration in discharged water: Monthly
Radioactive material concentration in discharged sludge: Monthly
Radioactive material concentration in bottom ash: Monthly
Radioactive material concentration in fly ash: Monthly
Radioactive material concentration in molten slag: Monthly
Radioactive material concentration in molten fly ash: Monthly

b) Temporary storage sites other than those listed in (c)
Air dose rate at site boundaries: Weekly

c) Temporary storage sites (storage at general waste final disposal sites [controlled final disposal sites])
Air dose rate at site boundaries: Weekly
Radioactive material concentration in discharged water: Monthly
Radioactive material concentration in discharged sludge: Monthly
Radioactive material concentration in underground water at the periphery of the site: Monthly

d) Landfill disposal sites
Air dose rate at site boundaries: Weekly
Radioactive material concentration in discharged water: Monthly
Radioactive material concentration in discharged sludge: Monthly
Radioactive material concentration in underground water at the periphery of the site: Monthly

(4) At facilities for the incineration of disaster waste and businesses such as controlled final disposal sites, if the effective doses of external radiation may exceed the standard (1.3 mSv/three months or 2.5 μSv/hour) stipulated in Article 3, Paragraph 1 of the Rules for the Prevention of Hazards from Ionizing Radiation (Labour Ministry Notice No. 41 issued in 1972; hereinafter called "Ionizing Radiation Rules"), or incinerated ash may fall under the definition of radioactive materials (for radioactive cesium, the total concentration of ^{134}Cs and ^{137}Cs exceeds 10,000 Bq/kg) stipulated in Article 2, Paragraph 2 of the Ionizing Radiation Rules, these facilities shall observe the relevant rules in the Ionizing Radiation Rules to ensure the safety of workers. Even in other cases, when handling incinerated ash that has a radioactive material concentration near the lower limit (about 80% of the lower limit or more; specifically, about 8,000 Bq/kg or more) defined in Article 2, Paragraph 2 of the Ionizing Radiation

Rules, it is advisable to measure air dose rates at work environments (places where incinerated ash is handled) about once a week.

Table: List of monitoring items

	Intermediate processing facility	Temporary storing sites			Land-fill site
		Storing in drums in places where radiation can be shielded	Storing at general waste disposal sites (controlled final disposal sites)	Other storing methods	
Air dose rate at site boundaries	○	○	○	○	○
Radioactive material concentration in exhaust gas	○				
Radioactive material concentration in discharged water	○*		○		○
Radioactive material concentration in discharged sludge	○*		○		○
Radioactive material concentration in bottom ash	○				
Radioactive material concentration in fly ash	○				
Radioactive material concentration in molten slag	○*				
Radioactive material concentration in molten fly ash	○*				
Radioactive material concentration in underground water at the periphery of the site			○		○

○: To be measured in principle

○*: To be measured when objects that fall under the rules are found

4. Analysis method

(1) The measurement of radioactive material concentrations shall comply with "Gamma Ray Spectrometry with a Germanium Semiconductor Detector," series 7 of the Education Ministry's radiation measurement method (revised in 1992). For sampling methods for bottom ash and fly ash, refer to the cone and quartering method in "Particulate materials—General rules for methods of sampling," JIS M 8100. Sampling methods for exhaust gases and discharged water shall continue to be studied. It is appropriate to determine detection limit levels for each measurement purpose.

(2) Nal scintillation survey meters shall be used to measure air dose rates. Carry out measurements at a height of 1 m near compound boundaries.

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Handling of General Waste Possibly Contaminated by Radioactivity at General Waste Treatment Facilities

August 29, 2011
Ministry of the Environment

1. Developments and present situation

(1) Handling of incineration ash at general waste treatment facilities

The Ministry of the Environment (MOE) discussed measures to safely deal with the disaster waste in Fukushima Prefecture at the Disaster-Related Waste Safety Assessment Committee, and finalized the "Guidelines for the Management of Disaster Waste in Fukushima Prefecture" on June 23.

In response to the fact that radioactive cesium at a concentration of more than 8,000 Bq/kg was detected in fly ash emitted from a general waste incineration facility in Tokyo, MOE prepared the document "Concerning the Measurement and Immediate Handling of Incineration Ash at General Waste Incineration Facilities" in line with the above guideline, and requested sixteen prefectural governments in the Tohoku and Kanto regions to carry out measurements on incineration ash and gave them instructions on how to handle incineration ash on June 28.

The Ministry of the Environment has just presented a policy regarding the handling of incineration ash at general waste treatment facilities for the time being that states that if the radioactive cesium concentration is not more than 8,000 Bq/kg, the ash should be buried at controlled final landfill sites, and if it is more than 8,000 Bq/kg, the ash should be temporarily stored at controlled final landfill sites.

(2) Measurement results of radioactive cesium in incineration ash

In response to the measurement request described above, radioactive cesium concentration in incineration ash has been measured at general waste incineration facilities in sixteen prefectures in the Tohoku and Kanto regions, and measurement results obtained up to August 24 have been organized into an interim report (see Annex 1).

As can be seen from the results, the nuclear disaster at Fukushima Dai-ichi NPS has resulted in radioactive cesium being detected in incineration ash generated at incineration facilities of municipal bodies and the like in these regions outside Fukushima Prefecture, indicating that some waste brought into these facilities contained radioactive cesium.

2. Concept of safety in waste treatment

(1) Basic thinking on risk reduction

The fact that radioactive cesium has been detected in incineration ash at many incineration facilities is the result of diffusion of a large amount of radioactive materials in the environment over wide areas, due to the nuclear power station disaster. To reduce the human health risk of radioactive materials diffused in the environment, it is necessary to immediately remove radioactive materials present in the living environment as much as possible and manage them appropriately.

(2) Safety in the incineration treatment

In response to dioxin problems and the like in the past, waste incineration facilities have been established as a system in which various types of waste materials can be safely incinerated without releasing toxic substances into the environment based on thorough combustion management and appropriate exhaust gas treatment. With regard to ash after incineration, a system in which the ash can be finally disposed of at controlled landfill sites in a safe manner without affecting the living environment near the facilities has also been established.

As a result of the incineration treatment, radioactive materials contained in waste that is volatilized and moved to exhaust gas will be collected as fly ash by the exhaust gas treatment. It has been confirmed by actual data*2 that this method can meet the concentration limits for exhaust*1 based on the concept described by the Japanese Nuclear Safety Commission. Therefore, proper management of incineration ash is possible by burial at controlled landfill sites along with bottom ash after incineration.

Notes:

*1: Concentration limits shown in the "Notification for Dose Equivalent Limits on the Basis of the Rules for Commercial Power Reactors." 20 Bq/m^3 for ^{134}Cs and 30 Bq/m^3 for ^{137}Cs.

*2: Document No.3, etc. for the 4th Disaster-Related Waste Safety Assessment Committee

(3) Proactive utilization of waste treatment systems

Originally, waste treatment systems were mechanisms to maintain cleanliness and safety of the living environment near the facilities, and it has been confirmed that the systems are capable of functioning in an effective manner for the current cesium issues. Further, regarding the present issue of the diffusion of radioactive cesium into the environment, the waste treatment systems have functions that are capable of handling the part of the separation/concentration management system for diffused radioactive cesium, suggesting that proactive utilization of the systems is effective in reducing the risk to human health caused by radioactive materials.

3. Measures to be taken

(1) Promotion of the treatment of incineration ash under 8,000 Bq/kg

In line with the concepts outlined above, according to the "Handling and Measurement of Incineration Ash at General Waste Incineration Facilities" of June 28, definite policies on landfilling and other forms of treatment have been laid out, but as it stands, at some facilities, even if the radiation concentration level of the incineration ash and other such substances is under the 8,000 Bq/kg defined as safe for landfilling (even from the point of view of worker safety), there have been cases of handling the ash by temporarily storing it on incineration facility grounds or no longer accepting waste that may be contaminated with radioactive materials. As a result, the removal of radioactive materials from the surrounding environment is at a stand still, and taking the effect on human health into consideration, it can only be said that there is no progress being made in terms of risk reduction through implementable measures.

In order to improve this situation, it is imperative that incineration ash under 8,000 Bq/kg be promptly treated, based on a reaffirmation of the concepts of safety described above.

It is also important to actively put the knowledge we have gained thus far to use by considering measures such as hindering water from coming into contact with incineration ash by not burying incineration ash in places on facility grounds where puddles form, in addition to burying incineration ash above the soil layer in view of radioactive cesium's affinity to soil, so that stable landfilling can be achieved.

(2) Handling incineration ash between 8,000 and 100,000 Bq/kg

Based on the deliberations of the Disaster-Related Waste Safety Assessment Committee, the thinking on the safe treatment of incineration ash between 8,000 and 100,000 Bq/kg is being compiled in the "Policy on Treatment Methods for Incineration Ash Between 8,000 and 100,000 Bq/kg" and should be completed in the near future. We believe it is necessary to begin appropriate treatment of incineration ash over 8,000 Bq/kg based on that policy.

(3) Monitoring of radioactive materials at waste treatment facilities

It is important for incineration facilities in which radioactive cesium has been detected in the incineration ash above a certain level, along with places that temporarily store such ash, as well as controlled landfill sites, to make efforts to promote understanding among residents through monitoring and by verifying the

safety of exhaust gas, and appropriately publishing the results according to the concepts described in Annex 2.

4. Considerations for the future

The properties of incineration ash are very different depending on the type of furnace used to burn the waste, in one method the fly ash from exhaust gas treatment and the bottom ash left after incineration are discharged separately, and in the other method, it is all discharged as incineration ash as in a fluidized bed furnace. It has been found that through the mixture of cementation and bottom ash, fly gas has the effect of suppressing the elution of radioactive cesium[*3]. Also, although the reference is to sewage sludge, it has been discovered that radioactive cesium does not easily elute out of the incineration ash from a fluidized bed furnace[*3].

Therefore, based on such findings, it is necessary to discover the most effective method suited to the properties of the incineration ash that can prevent the elution of radioactive cesium for landfilling in the most stable way possible, and it is our stance that investigations into these matters should be continued.

*3: 5th Meeting of the Disaster-Related Waste Safety Assessment Committee, Document 3-1

Basic Policy for Emergency Response on Decontamination Work

August 26, 2011
Nuclear Emergency Response Headquarters

1. Purposes of this policy

1) To eliminate anxieties about radioactive contamination resulting from the accident at TEPCO's Fukushima Dai-ichi Nuclear Power Station as early as possible, the national government intends to take responsibility for eliminating radioactive contamination by working with prefectural and municipal governments and local residents.

2) Currently, lawmakers are deliberating the bill "Bill on Special Measures on Environmental Contamination due to Radioactive Materials Emitted from Nuclear Power Station Accident Caused by the Tohoku district - off the Pacific Ocean Earthquake on March 11, 2011" in the Diet. After this bill is passed in the Diet, the government will systematically and drastically push ahead with decontamination work in line with the framework as set forth in said legislation.
On the other hand, since it is necessary to carefully designate applicable areas or develop technical standards before putting said legislation into practice, it will take a certain period of time for the government to implement drastic decontamination work based on said legislation.

3) Nonetheless, decontamination is an urgent task that should be tackled immediately. Before a new framework for decontamination work becomes operational in accordance with said legislation, the Nuclear Emergency Response Headquarters describes the basic principles of emergency decontamination works and intends to eliminate radioactive contamination in collaboration with prefectural and municipal governments and local residents.

4) The basic principles described herein are consistent with the purposes of said legislation bill and will be replaced with the new framework when the new legislation is passed in the Diet and comes into fully effect.

2. Interim targets for decontamination work

1) In line with the 2007 basic recommendations of the International Commission on Radiological Protection (ICRP) and "Basic Policy"[1] suggested by the Nuclear Safety Commission, the government aims at quickly reducing areas with emergency exposure situations[2] (i.e., additional exposure dose[3] is 20 mSv a year or more, according to the current practices).
2) As a long-term target, the government aims at reducing the additional exposure dose to 1 mSv a year in areas with existing exposure situations[4] (areas where the additional exposure dose is 20 mSv a year or less, according to the current practices).
3) As a specific target for decontamination work, the government aims to reduce the estimated annual exposure dose for the general public by approximately 50% at radiation-contaminated areas within two years at the latest.

   According to the estimate of Nuclear Emergency Response Headquarters, annual exposure dose is expected to decrease by about 40% in two years from the current level because of physical attenuation of radioactive materials as well as natural attenuation due to wind and weather (i.e. weathering effect).

   With decontamination work reducing the exposure dose by approximately 10% at least, the government will attain the aforementioned 50% reduction target and aims to further reduce the exposure dose.
4) In addition, as the radiation effect for children is larger than that of adult, it is important to restore a safe environment where children are able to live their lives without worry. In this context, by thoroughly conducting decontamination work in places that children frequent, such as schools or

[1] Nuclear Safety Commission, "Basic Policy of the Nuclear Safety Commission of Japan on Radiation Protection for Termination of Evacuation and Reconstruction," July 19, 2011
[2] "Emergency exposure situation" means that emergency action is necessary to avoid or mitigate undesirable impacts at the time of a nuclear accident or radiological emergency.
[3] "Additional exposure dose" means the exposure dose excluding natural exposure dose and medical-purpose exposure dose.
[4] The term "existing exposure situation" means that radiation exposure already exists, including long-term radiation exposure after an emergency, at the time that making management-related decisions becomes necessary.

parks, in the next two years, the government aims at reducing the estimated annual exposure dose for children by approximately 60% in two years at the latest.[5]

According to the estimate of Nuclear Emergency Response Headquarters, annual exposure dose for children is estimated to decrease by about 40% in two years from the current level due to physical attenuation of radioactive materials as well as natural attenuation due to wind and weather (i.e., weathering effect).

With decontamination work reducing the exposure dose by approximately 20% at least, the government will attain the aforementioned 60% reduction target and aims to further reduce the exposure dose.

5) The government has set the aforementioned interim targets based on the limited information available because it recognizes the necessity to conduct decontamination work immediately. From now on, it will closely look into these targets and reexamine them at regular intervals through detailed monitoring, data accumulation, actual surveys on exposure doses for children, and decontamination model projects.

3. How to proceed with decontamination work

(1) Basic concept

(a) The national government takes responsibility for proceeding with decontamination work.

(b) To create an appropriate environment for safer and more efficient decontamination work, the national government will provide further assistance, including implementing fiscal policies, enhancing and operating efficient decontamination/measuring equipment, fostering human resources and sending experts.

In addition, the national government will, through model projects in local areas including locations with particularly high radiation dose, continuously provide support, such as technical information, necessary for decontamination work ("Decontamination technology catalogue"), including effective decontamination methods, costs or matters for

[5] This is calculated for the location that would have a current air dose rate of 3.8 micro Sv/h (accumulative exposure dose of 20 mSv a year). If decontamination work is already done beforehand, target achievement will be evaluated through comparison with the pre-decontamination level.

consideration.

(c) The national government will take responsibility for treating radiation-contaminated soil arising from decontamination work.

(d) When pushing ahead with the aforementioned projects, the national government will work and cooperate with the international community and mobilize expertise from both at home and abroad.

(2) Actions for each area in line with radiation dose levels

(a) Areas under evacuation directives

1) In an area designated with an evacuation directive (Deliberate Evacuation Area) where the cumulative dosage might exceed 20 mSv within a year after the accident, decontamination work will require high-level technologies and considerable attention to the safety of decontamination workers. For this reason, until local residents return home after lifting the evacuation directive, the national government will take the initiative in decontamination work in collaboration with prefectural and municipal governments.

2) In locations designated as Restricted Areas, local governments have been relocated, and access to such locations is prohibited. For this reason, until local residents return home after lifting the evacuation directive, the national government will take the initiative in decontamination work in collaboration with prefectural and municipal governments.

On the other hand, municipalities in these areas are permitted to develop their own decontamination plans and conduct decontamination work on their own if they wish to do so, as long as they are able to ensure the safely of workers and efficacy of the decontamination work. In this case, the national government will provide all-out fiscal support or provide experts to aid those efforts.

3) In locations where the additional exposure dose significantly exceeds 20 mSv a year, the national government will work on decontamination model projects to present effective and efficient decontamination techniques and

safety programs for decontamination workers in high-level exposure areas.

(b) Other areas where the additional exposure dose ranges from 1 to 20 mSv a year

1) If the additional exposure dose stands at 20 mSv a year or less, it is contaminated with radioactive materials, but the municipality is still able to work, and local residents are able to live there. In this case, systematic decontamination work on a community-wide basis would be the most effective solution because the community grasps the local situation and residents' needs.

2) Municipalities will develop their decontamination plans suitable to their contamination status or residents' needs in accordance with the "Guidelines for Municipality's Decontamination Work." The national government will assist in ensuring the smooth operation of such decontamination efforts.

If a municipality develops its decontamination plan including decontamination work at a public facility managed by another entity, it is desirable that the municipality will work with such other entity in managing the public facility.

[Items which should be considered in decontamination plans]
1. Setting appropriate targets
2. Deciding on appropriate policies and methods for each decontamination project
3. Responsible organization
4. Setting aside temporary storage space

3) If radioactive dose stands at a relatively higher level from 1 mSv to 20 mSv a year, multi-phase decontamination work will be necessary for improving contaminated conditions.

On the other hand, if the radioactive dose stands at a relatively low level, multi-phase decontamination work is basically unnecessary due to physical attenuation of radioactive materials as well as natural attenuation due to

wind and weather (i.e., weathering effect). However, it is important to eliminate contamination at locations that locally show high radiation dosage, such as side ditches or rain water gutters.

The national government will provide all-out support when municipalities develop or conduct their decontamination plans. To be more specific, the national government will provide support suitable to individual municipality's needs. These support services will include sending experts, providing fiscal support, giving local residents information on monitoring results or important considerations in decontamination work, and providing measuring equipment.

4) If a prefectural or the national government manages a public facility, it will work closely with the relevant municipality to conduct decontamination work on the public facility in accordance with the decontamination plan developed by the relevant municipality.

(c) Locations where the additional exposure dose is generally 1 mSv or less

1) If the radiation dosage is generally 1 mSv a year or less, multi-phase decontamination work is basically unnecessary on a municipality basis because of physical attenuation of radioactive materials as well as natural attenuation due to wind and weather (i.e., weathering effect).

2) On the other hand, since side ditches, rain water gutters or some other locations locally tend to show a higher radiation dosage, the national government will work with prefectural governments and municipalities to provide necessary support so that local residents or other stakeholders will be able to safely, effectively and efficiently conduct decontamination work.

4. Treating soil, etc. arising from decontamination work

1) For smoother and quicker decontamination work, it is absolutely necessary to treat soil arising from decontamination work as well as local rice straw, farmyard compost or debris.

2) In relation to such treatment of soil, etc., the national government will take responsibility for allocating repository sites that require long-term management services as well as providing safety at these repository sites. It will develop and disclose a roadmap for constructing repository sites as soon as possible.
3) However, since such a drastic solution will require a certain period of time for securing and developing repository sites of a certain size, and simply waiting for the establishment of repository sites might prevent quick decontamination services.
4) For this reason, it would be more realistic that municipalities or local communities have designated temporary repository sites for soil resulting from decontamination work. The national government will provide fiscal and technical assistance for these municipal projects.

5. Prefecture's cooperation

1) When municipalities develop and conduct their decontamination plans, prefectural government should act as a cross-sectional coordinator as necessary.

2) In addition, prefectural governments should work with the national government to provide information, such as monitoring results or important considerations for residents' daily lives, and to provide an appropriate environment, such as providing measuring equipment, so that local residents will be able to efficiently and effectively conduct decontamination work.

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Provisional Translation
(for the official version, please see Japanese version
(http://www.cas.go.jp/jp/genpatsujiko/index.html))

15 August 2011

Basic Policy on the Reform of an Organization in charge of Nuclear Safety Regulation (Cabinet Decision)

The Government will take forward the reform of an organization in charge of nuclear safety regulation in line with the following principles in order to win back public confidence on the government work on nuclear safety and to strengthen its functions.

1. Policy on the Immediate Review on an Organization in charge of Nuclear Safety Regulation

(1) "Nuclear Safety and Security Agency (NSSA) (tentative)" will be created as an Affiliated Organization (Gaikyoku) of the Ministry of Environment in view of "the separation of nuclear regulation and promotion", separating the nuclear safety regulation section of the Nuclear and Industry Safety Agency (NISA) from the Ministry of Economy, Trade and Industry (METI) and integrating the function of the Nuclear Safety Commission (NSC).

(2) Aiming to further strengthen its functions as a regulatory organization by unifying works related to nuclear safety regulation, the NSSA will also be in charge of safety regulation on the use of reactors and nuclear fuel materials, nuclear security and leading function in environmental monitoring (including the operation of the SPEEDI).

(3) Crisis management including emergency responses is one of the primary roles of the NSSA, and necessary arrangements will be made for this purpose.

(4) In order to steadily implement operations of the new organization, the government will make every effort to secure competent human resources both from the public and private sectors.

(5) In parallel with the organizational review, the government will also conduct a review on the contents of nuclear regulations and their related systems,

including the introduction of a new regulatory framework in view of the accident this time.

(6) The Cabinet Secretariat will carry out preparation work including drafting necessary bills, aiming to create the NSSA in April 2012.

(7) When the relevant outcome from the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electronic Power Company is presented during the course of the review, the government will respond to it in a flexible manner.

2. Further Review on an Nuclear Safety Regulatory Organization, taking into consideration the Future Review on Nuclear and Energy Policy and the Investigation on the Accident

It is expected that the result of a review on mid/long-term nuclear and energy policy as well as investigation by the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electronic Power Company will be presented in due course. The government will forward a wider study on areas including a review on important challenges such as mid/long-term work toward the restoration from the accident, as well as securing and training human resources in the area of safety regulation. The government will then present the result of its review by around the end of 2012 on areas covered by the new organization and on the way to upgrade a more effective and robust organization.

<END>

Provisional Translation
(for the official version, please see Japanese version
(http://www.cas.go.jp/jp/genpatsujiko/index.html))

12 August 2011

Review on an Organization in charge of Nuclear Safety Regulation (Understanding by Relevant Ministers*)

A review on a nuclear safety regulatory organization should be conducted in line with the following principles in order to win back public confidence on the government work on nuclear safety and to strengthen its functions.

(* Relevant Ministers are; Prime Minister, Chief Cabinet Secretary, Minister of Education, Culture, Sports and Technology, Minister of Economy, Trade and Industry, Minister of Land, Infrastructure, Transport and Tourism, Minister of Environment, Minister of Defense, Chairman of the National Public Safety Commission, Minister for the Restoration from and Prevention of Nuclear Accident, Minister of State for National Policy)

1 Principles

- By **separating nuclear regulation and promotion functions**, the government should create a new nuclear regulatory organization which is trusted domestically and internationally.
- By **unifying relevant functions** related to nuclear safety regulations, the government should further strengthen the functions of the new regulatory organization.
- **Crisis management** is one of the most important roles of the new organization, and necessary arrangements should be made for that purpose.
- Recognizing that **human resources** are the backbone of the organization, the new organization should make every effort to reform organizational culture and train and secure talented experts.
- By introducing new regulatory mechanism, the government should further strengthen **new nuclear safety regulations**.

2 New Organization

(1) Overview

- Separating the nuclear regulatory section of the Nuclear and Industry Safety Agency (NISA) from the Ministry of Economy, Trade and Industry (METI), **"the Nuclear Safety and Security Agency (NSSA) (tentative)"** should be created as an Affiliated Organization (Gaikyoku) of **the Ministry of Environment**.
- Involvement of the Diet should be assured from the perspective of democratic control.
- **The position and role of the Nuclear Safety Commission (NSC) should be reviewed** in view that the relevance of its double-check function (ex. necessary hearing for approval on new nuclear power plants) will be diminished as a result of separation of nuclear regulation and promotion functions within the government. Specifically, **"the Nuclear Safety Panel (tentative)" should be created within the framework of the new organization** as an "Article 8 (of the National Administrative Organization Law)" Committee, which is necessary to provide advice and opinion based upon technical expertise from the third party's point of view.

(2) Mission and Responsible Areas

In order to ensure nuclear safety, the new organization should cover areas mentioned below.

a) The new organization should take over **nuclear safety regulations (including policy planning functions)** from the NISA.
b) **The functions of the NSC** should be unified to the new organization.
c) **Emergency response (Crisis Management)** should be regarded as an important role of the new organization.
   - Arrangements should be made from the peacetime to clarify the command/control line and to conduct exercises for emergency response (including **the creation of "Emergency Officer (tentative)"**).
   - **Regional branches** should be enhanced in order to secure close coordination with operators during accident.
   - Demarcation between the commanding function of the new organization and other relevant government bodies should be clarified in order to steadily implement necessary measures in the case of nuclear disaster. (**Minister of the new organization should take a lead within the Nuclear Disaster Response Headquarters as its Deputy Head**,

delegated responsibility from the Prime Minister (Head of the Headquarters).)

d) The new organization should basically take over **nuclear safety functions in other ministries** if it is expected that its functions will be further enhanced when they are unified to the new organization. Arrangements are as below.

[Other Nuclear Safety Regulations]

- Regulations on **research reactors and reactors for ships** should be unified to the new organization.
- Regulations on the **use of nuclear fuel and other materials** should be unified to the new organization.

[Nuclear Security]

- The new organization should be in charge of supervision over operators and cooperation with security agencies for **nuclear security** measures including countering nuclear terrorism. (Similar functions in those bodies such as the Atomic Energy Commission (AEC) should be transferred to the new organization.)

e) The new organization should basically work on **new challenges in view of the response to the accident** this time if it is expected that its functions should be further enhanced when they are unified to the new organization. Arrangements are as below.

- The new organization should be in charge of the commanding function for planning and coordination in the area of **environmental monitoring** (including the use of SPEEDI) in order to maintain and strengthen the entire national monitoring functions not only during the emergency but also during the peacetime.
- The new organization should be involved in the **treatment of radioactive waste and contaminated soil, as well as decontamination work** with regard to mid/long-term rehabilitation work. Health care of the local residents and other issues should be considered separately as a work of the entire government.
- The new organization should be in charge of the **investigation** of the future accident. It should consider the possible creation of a third-party committee if a particularly serious accident happens.
- The new organization should take part in support for residents affected by the nuclear accident in the area where expert knowledge regarding radiation is useful.

(3) Regional Arrangements

- It is necessary to **strengthen regional branches** of the new organization as it is more important to maintain the safety of reactors in each region and contact and coordinate with local authorities.

(4) Unification of Supporting Organization

- Supporting organizations such as the Japan Nuclear Energy Safety Organization (JNES) play an important role in the actual regulatory works. Upon the creation of the new organization, it is important to make unified operating arrangements with these supporting organizations. They are also expected to support in the area of human resources management.
- Specifically, **the JNES should be placed under the new organization**.

3 Human Resources

- It is important not only to create a new organization but also to **secure and train capable experts** if the government is to upgrade the quality of nuclear regulations and steadily implement them. Nevertheless, in view of the technical specialty in the area of nuclear safety, human resources are limited. It is therefore necessary to explore new idea and actions for human resources management in order to manage the new organization steadily and sustainably.
- It is also essential to **transform organizational culture** in the new organization. In this regard, it is important to establish appropriate independent human resources management. It is also necessary to carry out effective measures such as the introduction of “no-return-rule” and independent recruitment for the strict implementation of the separation between regulation and promotion.
- In parallel with institutional review and further work on the detailed designing of the new organization, measures to secure and train experts should be elaborated from the perspectives below.
  - Independent recruitment of young experts through creating attractive career-path
  - Recruiting experts with various backgrounds including those who are active in the international works.
  - Strengthening competitiveness of the experts, taking into consideration

response to new challenges of the organization.
- Establishing a mechanism to train and secure experts for emergency responses.
- Securing capable staff at the time of the creation of the new organization.
- Establishing relations with supporting organizations in view of securing experts with various backgrounds.

- The creation of the **"International Nuclear Safety Training Academy (tentative)"** should be considered for strengthening the capability of the staff, exploring international cooperation using lessons from the Fukushima accident, and exploring international sharing of new safety regulation infrastructure.

4 Preparation for the Transition to the New Organization

- It is essential for the government to quickly create a new organization in view of securing public confidence on nuclear safety.
- In order to move to the new nuclear safety regulation, it is inadequate to simply create a new organization. It is required to review the existing regulations and relevant mechanism in parallel, based upon lessons from the accident.
- From this perspective, the government should **quickly set up a preparation office** for the work to submit relevant bills, aiming to **create a new organization in around April 2012**.

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The matters that the Nuclear Safety Commission is requested to advice etc.

Date	Matter	Description
June 2	On the request of opinion regarding the provision of Article 20, paragraph 5 of the Act on Special Measures Concerning Nuclear Emergency Preparedness	The Nuclear Safety Commission (NSC) expressed the view that it would be acceptable for a change of the areas from which food and drink shipments should be suspended in order to suspend the shipment and restrict the intake of certain foods, with considering the following points: - It is important that safety is ensured when persons orally ingest food that has the risk of containing radioactive materials, and the provisional regulatory limit under the Food Sanitation Act should not be exceeded when such food is actually ingested. - Continuous monitoring should be conducted and measures should be thoroughly taken upon the appropriate decisions of the related government offices in order to avoid the ingestion of food and drink that contain a level of radioactive materials exceeding the regulatory limit. - A new regulatory limit should be promptly established based on the food and health impact assessment carried out by the Food Safety Commission.
June 16	On the policy for responding to specified areas where the cumulative dosage over a one year period after the accident is estimated to exceed 20 mSv	The Nuclear Safety Commission (NSC) expressed the view that it would be acceptable for carrying out measures involving calling the attention of residents who live in the Specified Areas Recommended for Evacuation (tentative), providing them with information, and assisting their evacuation in order to reduce the residents' radiation exposure, with considering the following points: - The measures to reduce the dose rates of residents should be discussed and implemented by conducting detailed monitoring in the environment surrounding these concerned areas, and identifying the cause of different dose rates in different areas - Based on this, other practical measures for residents should be suggested in order to reduce their exposure by avoiding unnecessary exposure etc. - As the dose rate at each point may change with time, continuous monitoring should be conducted and the predicted exposure level in real life should be evaluated, and individuals should be required to carry dosimeters where possible. - Appropriate information regarding the above matters should be provided to the residents.

June 17	Advice on the report "Improvements to work environment inside the reactor building of Unit 2 at Fukushima Dai-ichi Nuclear Power Station, Tokyo Electric Power Co., Inc."	The Nuclear Safety Commission (NSC) expressed the view that it would be acceptable for opening of the double doors at the reactor building because the work is required for restoration from the accident, and it is recognized to contribute to the reduction of radioactive materials released into the environment on the whole, although the opening of the double doors at the reactor building may cause radioactive materials in the air inside the buildings to be released into the outside environment, with considering the following points: - When the double doors are to be opened, workers on the site should be informed, the reduction of exposure levels should be ensured, and the impact on the environment should be taken fully into consideration. - The actual impact should be continuously confirmed by continuous monitoring of the surrounding environment, and reports should be made to the Nuclear Safety Commission (NSC) accordingly. - Because there is a large amount of contaminated water that contains high concentrations of iodine in the basements of the reactor and turbine buildings of Unit 2, iodine volatilization should be controlled in order to reduce the exposure of workers inside these buildings.
June 23	Advice on "Indication of water quality for radioactive materials in bathing areas" (answer)	The Nuclear Safety Commission (NSC) expressed the view that it would be acceptable for taking the indications of radioactive materials (50 Bq/L for radioactive cesium and 30 Bq/L for radioactive iodine-131) as provisional values for this summer in relation to the water quality for radioactive materials in bathing areas across Japan, including its surrounding waters, because sufficiently low doses are confirmed by a conservative evaluation, reviewed with the responsibility and judgment of the related government offices' responsibility and provisional values are to be only applied during this summer. In addition, following points are to be considered in the view of the distance from Fukushima Dai-ichi Nuclear Power Station (NPS): - As nuclides other than radioactive cesium and iodine have been detected by ocean monitoring, appropriate evaluation should be ensured for such other nuclides based on the results of ocean monitoring in the future as needed. - It is preferable that air dose rates should also be measured as a precautionary measure in accordance with the actual usage of beaches. - As there may be places where the concentration of radioactive materials may fluctuate greatly such as near the mouth of a river, detailed monitoring should be conducted as needed. - Efforts should be made to publicize the above monitoring

		results so that the general public may make appropriate decision regarding their usage of bathing areas.
June 27	On the “Policy for adding and removing items and areas to the inspection plan and shipment suspension”	The Nuclear Safety Commission (NSC) advised that the related government offices should make decisions taking the intake situation of foods into consideration and utilizing their knowledge and NSC’s technical advice regarding the change to the “Policy for adding and removing items and areas to the inspection plan and shipment suspension”, based on the fact that radioactive cesium exceeding provisional regulatory limit has been detected in certain foods. The NSC also advised that a new regulatory limit should be promptly established based on the food and health impact assessment carried out by the Food Safety Commission regarding the provisional regulatory limit under the Food Sanitation Act.
July 28	On the request of opinion regarding the provision of Article 20, paragraph 5 of the Act on Special Measures Concerning Nuclear Emergency Preparedness	The Nuclear Safety Commission (NSC) expressed the view that it would be acceptable for changing the areas from which food and drink shipments should be suspended in order to suspend the shipment and restrict the intake of certain foods, with considering the following points: - It is important that safety is ensured when persons orally ingest food that has the risk of containing radioactive materials, and the provisional regulatory limit under the Food Sanitation Act should not be exceeded when such food is actually ingested. - Continuous monitoring should be conducted and measures should be thoroughly taken upon the appropriate decisions of the related government offices in order to avoid the ingestion of food and drink that contain a level of radioactive materials exceeding the regulatory limit. - A new regulatory limit based on reviews by the Food Safety Commission should be promptly established.
August 1	On the request of opinion regarding the provision of Article 20, paragraph 5 of the Act on Special Measures Concerning Nuclear Emergency Preparedness	The Nuclear Safety Commission (NSC) expressed the view that it would be acceptable for a change of the areas from which food and drink shipments should be suspended in order to suspend the shipment and restrict the intake of certain foods, with considering the following points: - It is important that safety is ensured when persons orally ingest food that has the risk of containing radioactive materials, and the provisional regulatory limit under the Food Sanitation Act should not be exceeded when such food is actually ingested. - Continuous monitoring should be conducted and measures should be thoroughly taken upon the appropriate decisions of the related government offices in order to avoid the ingestion of food and drink that contain a level of radioactive materials exceeding the regulatory

		limit. - A new regulatory limit should be promptly established based on the food and health impact assessment carried out by the Food Safety Commission.
August 4	On the request of opinion regarding the provision of Article 20, paragraph 5 of the Act on Special Measures Concerning Nuclear Emergency Preparedness	The Nuclear Safety Commission (NSC) provided an opinion as the “Policy for Lifting the Urgent Protective Measures regarding the Accident at TEPCO’s Fukushima Dai-ichi NPS” (Attachment VI-5) regarding the current status and review of areas where emergency responses are to be taken and the information that should be provided to the residents in such areas within the Evacuation-Prepared Areas in Case of Emergency, Deliberate Evacuation Areas, and Restricted Areas in light of the improving situation at Fukushima Dai-ichi NPS of Tokyo Electric Power Co., Inc. (TEPCO) with Step 1 of the “Roadmap towards Restoration from the Accident at Fukushima Dai-ichi NPS” achieved on July 19, 2011. In addition, we advised that reference should be made to the “Basic Policy for Radiation Protection towards Future Lifting of Evacuation Orders and Rehabilitation” (Attachment VI-3).
August 4	Advice on “Policy for adding and removing items and areas to the inspection plan and shipment suspension”	The Nuclear Safety Commission (NSC) advised that the local governments who have been instructed to formulate inspection plans should be added to the document described previously in light of the fact that radioactive cesium exceeding provisional regulatory limit has been detected in beef and the rice harvest season has arrived. The NSC also advised that the related government offices should make decisions taking the intake situation of foods into consideration and utilizing their knowledge and NSC’s technical advice regarding the revision of adding beef and rice to the items to be individually handled. The NSC also advised that a new regulatory limit should be promptly established based on the reviews by the Food Safety Commission regarding the provisional regulatory limit under the Food Sanitation Act.
August 24	Advice on “Policy for predicting future air dose rates from present air dose rates”	The Nuclear Safety Commission (NSC) advised that prediction of future air dose rates is important for developing a basic decontamination policy and the effects of weathering should be projected appropriately taking fully into consideration aspects such as the Japanese soil and weather when predicting air dose rates. The NSC also advised that the exposure dose should be evaluated based on the results of monitoring when taking protective measures, and actual measurement value and the predicted value should be compared and that future air dose rates should be reviewed accordingly.
August 29	On the appropriate decontamination when leaving an evacuation area	The Nuclear Safety Commission (NSC) advised the following points based on the fact that it has become increasingly important to effectively and safely carry out decontamination and remedial actions in areas currently exposed to radioactivity since the reactor facilities in stable

	(Restricted Area)	condition and recovery efforts fully in progress in the situation that five months have passed since the occurrence of the accident, and radioactive cesium, which has a longer half-life than iodine, is now predominant: - The Nuclear Emergency Response Headquarters should conduct appropriate screening of all persons, goods, and vehicles leaving the evacuation areas (Restricted Areas) in order to prevent expansion of radioactive contamination outside these areas. Even if the contamination detected is below the screening level, decontamination should be carried out to the greatest extent possible from the standpoint of ALARA (as low as reasonably achievable) to prevent contamination spreading. - It is preferable that screening levels are appropriately established and gradually reduced taking into consideration the results of monitoring as well as the status of entering and leaving the areas monitored comprehensively. - For the above purposes, it is preferable that new facilities for screening and decontamination are added, the existing facilities are expanded, sufficient numbers of staff are assigned, and the system is improved in places for entering and leaving the evacuation areas (Restricted Areas).

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Near-term policy to ensure the safety for treating and disposing contaminated waste around the site of Fukushima Dai-ichi Nuclear Power Plants

June 3, 2011
Nuclear Safety Commission

Introduction

As to the materials which were affected by the accident at Fukushima Dai-ichi Nuclear Power Plant of Tokyo Electric Power Co. (TEPCO) and which are to be disposed of (materials such as debris, sludge from the water and sewerage treatment, incinerated ash, trees and plants and soil resulted from the decontamination activity, etc.), it is necessary that the disposal of those materials be finally accomplished after the safety of residents living in the vicinity of the facilities and workers are fully considered, and after the treatment and storage of these materials are pursued under the proper management.

The treatment and disposal of materials affected by this accident are one of the most important activities to improve the life environment of inhabitants who are currently living under the existing exposure situation. On carrying out these activities, it is important to; define clearly the responsibility and role of TEPCO and the government (relevant ministries and agencies); fully perform information exchange, exchange of opinions and consultation with the local governments, local people and the associated organizations including companies, and; establish a proper operating system and a safety confirmation system.

This document describes the near-term policy to ensure safety for the treatment and disposal of materials concerned. This policy is issued on the basis of advice provided at this accident and a set of regulatory guides issued in the past by the Nuclear Safety Commission (NSC).

1. Reusing

A part of the above mentioned materials affected by this accident is considered to supply for reusing. As to the products manufactured from these reused materials, it is necessary to check that the concentration of radioactive materials is managed appropriately, before the products are circulated in the market, so that the concentration is lower than the standard level corresponding to 10μSv/year employed for the clearance level[1].

[1] The clearance level is set forth to determine whether the certain material contaminated by radioactive substance can be given back to the general community and reused or not. Usually it is used as a standard

The approach of reusing by applying the concept of above mentioned clearance level is a possible measure in consideration of the peculiarity that influence of the accident is found in general environment itself, although the degree of influence is different from area by area. Taking into account the general concept that reusable materials are desirable to be reused as resources, this approach shall be allowed only under the regulated conditions that; the concentration of radioactive materials provided for reusing in recycling facilities is managed appropriately, and that of products is confirmed to be less than the standard level employed as the clearance level.

2. Treatment, Transportation, and Storage

When the materials concerned is treated in recycling, incineration and melting facilities, and temporary storage facilities or areas, it is important to take measures in consideration of the particularity of this accident that the level of radiation exposure dose of residents living in the vicinity of the facilities and the workers engaged in the treatment of contaminated materials should be kept as low as reasonably achievable, based on the fundamental idea of the radiation protection indicated by NSC[(1)].

In particular, special care is necessary to prevent radiation exposure of the residents living in the vicinity of the facilities caused by the treatment of contaminated materials from exceeding 1mSv/year, by performing the improvement measures of environment for the periphery of treating facilities. Furthermore, the radiation dose of workers exposed by the treatment of those materials is desirable to be controlled possibly less than 1mSv/year. It is considered that the waste of relatively high radioactivity concentration is generated in the processes such as incineration and melting, therefore such processes should be performed under the proper management of radiation protection for the worker, in compliance with "The Ordinance on Prevention of Ionizing Radiation Hazards (Ordinance of the Ministry of Labor No.41 of September 30, 1972)".

Furthermore, for the exhaust and drainage from treating facilities, it is important to confirm that the level of radioactivity concentration is less than the limit shown in "Public Notices which include the Dose Limit based on the Provision of the Rule about Establishment and Operation of the Practical Nuclear Reactors for Electricity Generation (Public notice of Ministry of Economy, Trade and Industry No.187 of March 21, 2001)".

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to exclude certain material, which does not need to be treated as radioactive material, from the category under the regulation relating to radiation protection.

3. Disposal

In the final disposal, based on full understanding of the basic information such as shape and quantity of the waste, type of radioactive material and radioactivity concentration, it is necessary to select a proper method of disposal depending on radioactivity level, to set a method and a period of necessary management depending on the type and concentration of radioactivity, and to evaluate the long-term safety of disposal facilities.

The safety assessment of disposal facilities should be conducted according to the proper scenario by taking into account various phenomena that may give health impact to residents living in the vicinity of the facilities, based on natural and social environmental conditions which are peculiar to the location of facility and also the engineering countermeasures employed to ensure the safety. It is essential to confirm that the assessment result satisfies the "target dose" for each scenario.

Considering the safety standards in the International Atomic Energy Agency (IAEA), International Commission on Radiological Protection (ICRP) and various foreign countries, NSC has studied commonly important issues(2) for the safety of disposal of radioactive waste generated from the nuclear facilities, and also has indicated the idea of the safety assessment after the management period and the "target dose" to evaluate the validity of the assessment result for disposal methods (trench, pit, and sub-surface disposal) applied to Category 2 radioactive burial projects(3)(4)(5).

Specifically, NSC demands that the radiation dose of residents exposed should be less than 10μSv/year as a result of assessment (the assessment of likely scenarios) based on the scenario assumption which seems to be possible scientifically, and also the radiation dose which residents receive should be less than 300μSv/year as a result of assessment in consideration of the variable factor and uncertainty against the basic scenario (assessment of less-likely scenarios)(3)(4)(5).

In a series of previous studies conducted, NSC has indicated that, although the scenarios of the assessment vary depending on the disposal method, the "target dose" to evaluate the validity of an idea of the long-term safety assessment and the assessment result is applicable uniformly regardless of the disposal methods[2].

[2] The ideas of the safety assessment for the underground disposal of the high-level radioactive waste have not yet been determined. Therefore, when waste of high radioactivity concentration to be handled by underground disposal is generated, a study is necessary separately.

Therefore, even when disposing waste affected by this accident, NSC considers that there are scientific basis of ensured safety after the terminating active control, if scenario depending on an adopted disposal method is set followed by conducting proper assessment, and if the result of the assessment satisfies the "target dose" for each scenario indicated in "Basic Guide for Safety Review of Category 2 Radioactive Waste Disposal "[(3)].

References

(1) Commission’s views as the basis of advices on radiation protection (May 19, 2011 the Nuclear Safety Commission)
http://www.nsc.go.jp/NSCenglish/geje/doc_dis/2011_33rd/2011_0519_33rd_doc6.pdf

(2) Commonly Important Issues for the Safety Regulations of Radioactive Waste Disposal (Approved by the Nuclear Safety Commission on June 10, 2004)
http://www.nsc.go.jp/haiki/page3/050728.pdf

(3) Basic Guide for Safety Review of Category 2 Radioactive Waste Disposal (Decision by the Nuclear Safety Commission on August 9, 2010)
http://www.nsc.go.jp/NSCenglish/guides/facilities/F-RW-I.02.pdf

(4) Policy of the Safety Assessment of Sub-surface Disposal after the Period for Active Control (approved by the Nuclear Safety Commission on April 1, 2010)
http://www.nsc.go.jp/NSCenglish/topics/radioactive_waste/20100401_e.pdf

(5) Technical Document on the Safety Assessment of Sub-surface Disposal after the Period for Active Control (in Japanese, approved by the Special Committee on Radioactive Waste and Decommissioning in Nuclear Safety Commission on August 5, 2010)
http://www.nsc.go.jp/shinsashishin/pdf/3/ho100805.pdf

Basic Policy of the Nuclear Safety Commission of Japan on Radiation Protection for Termination of Evacuation and Reconstruction

19 July 2011
Nuclear Safety Commission

The Nuclear Safety Commission (NSC) has given various kinds of technical advices on radiation protection for the people in the affected areas by the accident on 11 March 2011 at the Fukushima Dai-ichi Nuclear Power Plant (NPP) of the Tokyo Electric Power Co., Inc. On 19 May 2011, the NSC made an announcement "Commission's views as the basis of advices on radiation protection" to achieve the commission's accountability on its basic policy on radiation protection. Hereby, noting the recent needs of new strategy on radiation protection, the NSC summarizes its basic policy on radiation protection for termination of the evacuation and restoration of normal life as follows:

1. Radiation protection actions according to exposure situations

(1) Emergency exposure situation

The International Commission on Radiological Protection (ICRP) defines the emergency exposure situation as a situation which requires urgent actions to avoid or reduce undesirable consequences under nuclear accidents or radiological emergencies. In the initial phase of the accidents at the Fukushima Dai-ichi NPP, the criteria[1] of projected dose provided in the "Regulatory Guide: Emergency Preparedness for Nuclear Facilities" (formulated and established by the NSC on 30 June 1980; hereinafter referred to as the Guide for Emergency Preparedness) were referred. The evacuation and sheltering were ordered on 11 and 12 March 2011, with the evacuation area gradually expanded to 20 km, from the precautional view of urgency and potential deterioration of the event. On 15 March the sheltering area was expanded from 20km to 30km from the Fukushima Dai-ichi NPP.

As it was observed that the integrated dose from deposited radioactive materials continued significantly increasing in some areas beyond the 20 km, based on the NSC's recommendation on 10 April, the Deliberate Evacuation Area was set

[1] Criteria of projected dose for sheltering: 10 to 50 mSv (effective dose due to external exposure) or 100 to 500 mSv (equivalent dose of childhood thyroid due to internal exposure), and criteria for evacuation: over 50 mSv (effective dose due to external exposure) or over 500 mSv (equivalent dose of childhood thyroid due to internal exposure)

on 22 April for the area beyond 20 km from the Fukushima Dai-ichi NPP where its integrated dose for one year after the accident may exceed 20 mSv. The sheltering order to the other areas has been partly lifted, but some areas have been designated as the Evacuation-Prepared Area due to the instability of accidental situation at the Fukushima Dai-ichi NPP.

The criteria for protection measures in the Guide for Emergency Preparedness was established based on the international criteria on evacuation and sheltering for a short period, while no criteria for a longer period protective measures has been defined yet in Japan. The NSC has applied 20 mSv per year, which is the lowest level of dose band of 20 to 100 mSv (acute or annual) for the reference level in emergency exposure situation of the ICRP 2007 recommendations, for the NSC's advice on the designation of the Deliberate Evacuation Area.

(2) Existing exposure situation

The ICRP defines the existing exposure situation as a situation that already exists when a decision on control has to be taken, including long term exposure situations after an emergency. No policy set up yet in Japan concerning the protection strategy for the situations where radioactive contamination remains in environments for a long period after a nuclear accident. The NSC has made the decision that it is appropriate to apply the concept of existing exposure situation to the present situation based on the ICRP 2007 recommendations.

The NSC considers that the areas in the emergency exposure situation can be shifted to the existing exposure situation when the release of radioactive materials from the Fukushima Dai-ichi NPP is under control and exposures due to residual radioactive materials in the areas can be managed to be a certain level or less. On the other hand, some areas have been under the existing exposure situations without passing through the emergency exposure situation due to the radioactive materials deposition. Hence, the areas around the Fukushima Dai-ichi NPP are currently considered to be under emergency exposure and existing exposure situations in parallel.

Transition from the emergency exposure situation into the existing exposure situation is one of the conditions required for termination of the evacuation. In order to make decisions on the transition into existing exposure situation (i.e. exposures due to residual radioactive materials can be managed at a certain level or less), a "indication level" for the exposures should be defined taking account of all possible exposure pathways (external exposure to deposited

radioactive materials on ground, internal exposure from inhalation of resuspended materials and ingestion of food and drink). The values of exposure rate (μSv/h), radioactive concentration of soils (Bq/kg) and surface deposit concentration (Bq/m^2) can be used to define the "indication level".

In areas to be shifted into the exiting exposure situation as well as in the areas already under the existing exposure situation, it is necessary to define the places where new protective actions (including decontamination and remediation of the places) are needed and to implement appropriate actions in timely manner. A reference level for optimization of the protective actions should be selected from the lower part of 1 to 20 mSv/year band recommended by the ICRP for the management of existing exposure situation. In order to improve the situation step by step, provisional reference level can be fixed between this band, but the target of the exposure dose in the long term should be 1 mSv/year. A certain attention and control by inhabitants on their exposure in the livelihood and social activities may be required as a part of the protective actions according to predicted exposure levels in the existing exposure situation. Planning and formulation of such radiation protection actions should be made as part of a comprehensive support program for the livelihood of inhabitants and industrial activities. For administrative decisions on radiation protection, the Japanese government and the local governments should ensure that the measures for radiation protection are implemented appropriately and reasonably through sufficient discussions with the stakeholders. All relevant aspects should be considered, as appropriate, such as health, environment, society, economy, ethics, psychology, and politics. Transparency of decision making processes is required.

2. Establishment of environmental monitoring system, individual dose estimation system and health assessment system

In order to make administrative decisions for implementation of protective actions including decontamination and remediation and for lifting the evacuation order, it is important to establish an environmental monitoring system and individual dose estimation systems as a scientific basis. Health assessment system should be also established based on these systems.

(1) Environmental monitoring system

The main purpose of environmental monitoring is to understand changes in time of radiation levels and radioactive material concentration levels and to provide

the basic references for the following matters:

- To make administrative decisions on health management, residency (including evacuation, sheltering and return), social and industrial activities for people in the affected areas, from the viewpoint of radiation protection.
- To decide appropriate measures to control and reduce radiation exposure (protective measures, decontamination, remediation, and restrictive actions on specified exposure pathways).
- To assess exposure levels of the habitants (external and internal exposures) and to estimate exposure doses at present and in the future (individual dose estimation).

In order to appropriately provide useful information on environmental monitoring for these purposes, it is necessary at planning stages of the monitoring to clarify the process to utilize the monitoring results based on the understanding of the needs of assessment and analysis. It is also inevitable, in order to achieve the effective monitoring system, to make effective and efficient use of the resources of the national and local governments, its specialized agencies, research institutions, universities etc. under the leadership of each Ministry in charge. Lastly, a unified system should be established by the national or local government to collect, store and utilize the monitoring data.

(2) Individual dose estimation system

Individual doses vary depending on the amount and scope of movements of each individual. It can be estimated by cross-checking results of environmental monitoring with results of investigation on individual movement after the accident. These estimated individual doses should be verified with actual measured values of individual dose. The dose estimation can be more reliable by combining such estimated data and the measured data.

Under the long term contamination situations, adequate protection strategy with decontamination and remediation should be formulated based on results of the environmental monitoring and the realistic dose estimation in order to make decisions to support daily life of the habitants and industrial activities and to lift the evacuation orders

(3) Health assessment system

It is important to mitigate health effects and people's concern for their potential health effects in the future by stress from the long term evacuation, sheltering or group living by the unprecedented disaster combined nuclear disaster with earthquake and tsunami. In this regard, an appropriate long-term health assessment system should be established. Not only illness clearly related to radiation effects but also other health conditions, including mental health, should be dealt with in this system. The above-mentioned individual dose estimation based on the environmental monitoring can be used as a basis of the health assessment in terms of radiation effects.

3. Implementation of protective actions

Effective protective actions should be implemented with harmonization between radiation protection technology and socio-economic factors.

(1) Decontamination and remediation actions

In deciding decontamination and remediation actions and selecting of technologies to be applied, it is necessary to create a detailed plan, taking account of real costs, social factors and relevant international standards, such as the IAEA safety standard "Remediation Process for Areas Affected by Past Activities and Accidents; WS-G-3.1". To select decontamination methods, not only averted dose but also their costs, exposed dose of decontamination workers and radioactive wastes generated from the decontamination should be considered. Comprehensive assessment is inevitable for each method.

It is also recommended to clarify the priority of each method in the decontamination programs according to the situations of each site, and to combine various kinds of methods for decontamination and remediation in the long term.

(2) Cooperation for radiation protection

The national and local governments should provide necessary information, materials, instruction, training opportunities, and specialized advisors in order to promote the habitants and workers in the affected areas to participate in the radiation protection measurements. It is important that these people are directly involved in the environmental and individual detailed monitoring program under their living environments, and play active roles in the radiation protection measurements by understanding and using the monitoring results. Since levels of exposure significantly vary depending on personal activities, individual dose can be

reduced by identifying places with higher dose rate and reducing the time to stay there, or recognizing possible internal exposure from dust and foods and taking appropriate actions to avoid it. Furthermore, it should be noted that the stakeholders, such as representatives of the inhabitants, should be involved in planning of radiation protection strategy in order to include more detailed and effective protective actions for decontamination and remediation by the national and local governments.

Basic Policy on Radiation Monitoring from Now on

July 21, 2011
Nuclear Safety Commission

Since the outbreak of an accident at Fukushima Dai-ichi NPP, emergency radiation monitoring in response to massive release of radioactive materials into the atmosphere has been conducted particularly by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Now, four months have passed since the accident, and the amount of radioactive materials being released from the nuclear reactor facilities is considerably reduced comparing with that at the early stage of the accident.

In view of this situation, and from the perspective that it is appropriate to move on to a more global assessment of the effects on the surrounding environment and to contribute to considerations of future countermeasures, the Nuclear Safety Commission issues the basic policy on the process of radiation monitoring hereafter.

1. Objective of radiation monitoring

Radiation monitoring hereafter should provide a detailed situation of radiological contamination (radiation dose distribution) of the inhabited areas and places, and should address the following items:

1) Evaluation of the radiation dose (both the external and internal doses) of the surrounding population exposed up to now from the onset of the accident, and the estimation of future radiation dose to be exposed,
2) Planning and decision on measures to reduce exposure doses,
3) Reviewing and judgment on lifting/modification of evacuation areas, etc.,
4) Health care for the surrounding population,
5) Assessment on environmental fate of radioactive materials released, in connection to 1)–4) above.

2. Points to keep in minds for radiation monitoring

To conduct radioactive monitoring effectively, cooperation among the national and local governments, specialized agencies and research institutes, and universities, etc. is essential. Therefore, in order to serve the points given in 1. above, it becomes especially vital to collect quality assured data and conduct analysis under the cooperation among the above bodies with coordinating amongst the institutions concerned, and to listen and respect opinions of specialists.

The data obtained through radiation monitoring will continue to be collected and accumulated on a long-term basis as the basic data of health care, etc. for the surrounding population. Furthermore, these data will need to withstand verification both inside and outside the country. Therefore, consolidation of radiation monitoring system will be necessary.

Also, regarding the emergency radiation monitoring up to now, the location, frequency, detection sensitivity, etc. will be revised on the basis of the above, and it is considered to be appropriate to incorporate the revisions properly in radiation monitoring from now on.

Based on the above, the items and points of concern for the radiation monitoring to be conducted hereafter are given in the Annex.

Annex

Items and Points of Concern for Radiation Monitoring to be Conducted

1. Monitoring items
   1) Evaluation of the radiation dose (both the external and internal doses) of the surrounding population exposed up to now from the onset of the accident, and estimation of the future radiation dose to be exposed
      A) Monitoring of chronological change
      B) Monitoring of medium- to long-term change in radiation dose

   2) Planning and decision on measures to reduce exposure doses
      A) Detailed monitoring at locations with exceptionally high dose rates in comparison with the surrounding areas
      B) Monitoring of radiation sources to cause external exposure in various activities

   3) Reviewing and judgment on lifting/modification of evacuation areas, etc.
      A) Monitoring of medium- to long-term change in radiation dose
      B) Investigation to understand the dynamics of the radioactive materials in the environment

   4) Health care for the surrounding population
      A) Matching check between the individual dose data and with the environmental monitoring data
      B) Monitoring of food circulated in the market

   5) Assessment on environmental fate of radioactive materials released, in connection to 1)–4) above
      A) Monitoring of medium- to long-term changes in the amount of radioactive materials (amount of radioactivity)
      B) Monitoring to understand the trend of diffusion in the ocean
      C) Monitoring to understand the transition parameters of radioactive materials

2. Points of concern

Attention should be paid to the following points in order to assure, maintain and manage the high quality of the radiation monitoring data.

   A) The adoption of the analysis method shown in the Radioactivity Measurement Method Series [i] and of the lower detection limit corresponding to the standard survey level of environmental radioactivity for all radioactive nuclides potentially released
   B) Unification of measuring/sampling methods to match the objective, calibration of measuring equipment, and cross-check among analytical institutions concerned
   C) Administration of radiation monitoring data by establishing database

[i] Radiation Measurement Method Series: An analysis method manual enacted by MEXT that provides a uniform/standardized method for analyzing environmental radiation (radioactivity).

Standpoint of the Nuclear Safety Commission for the Termination of Urgent Protective Actions implemented for the Accident at Fukushima Dai-ichi Nuclear Power Plant

August 4, 2011
Nuclear Safety Commission

1. Basic Standpoint

(1) Conditions for the termination

The Nuclear Safety Commission (NSC) is of the opinion that discontinuation of the urgent protective actions implemented for the accident at Fukushima Dai-ichi Nuclear Power Plant (NPP) of the Tokyo Electric Power Co., Inc. (such as evacuation and sheltering, that are actions to be implemented in an emergency for radiation protection,) should be decided based upon the fulfillment of the following conditions.

- In light of the purpose of urgent protective actions, continuation of the actions is judged to be unnecessary or unjustified. In other words, it is expected with certainty that the criteria for the application of current actions are no more applicable and new criteria to be set for the termination of current actions are fulfilled.

(2) Adjustment with new protective actions

In the termination of the current urgent protective actions, it is often necessary to implement new protective actions, such as measures for proper control of exposure, decontamination, and improvement of situation. Attention should be paid to the following point.

- For the proper termination of urgent protective actions, necessary preparations for new protective actions should be made with the implementation period, method and practical contents, etc., in advance of the termination of the current actions.

(3) Coordination with local governments and residents

In order to terminate the current urgent protective actions and efficiently and effectively implement new protective actions, it is important to let the related local governments and residents participate in the decision-making

process. This will help local governments and residents understand the new protective actions more deeply, and it is expected that the new actions will be more effective and implemented more smoothly. Attention should be paid to the following point.

- In the termination of current urgent protective actions and the planning of new protective actions such as measures for proper control of exposure, decontamination and improvement of situation, a framework for involvement of related local governments and residents with the process should be constructed and utilized properly.

2. Standpoint for the termination of each urgent protective action

In accordance with the basic standpoint above, the following shows the standpoint for the termination of the major urgent protective actions that are currently implemented. The NSC is of the opinion that it is allowable that the areas are gradually narrowed for the urgent protective actions.

(1) Standpoint for the termination in the Evacuation-Prepared Area

The Evacuation-Prepared Area has been designated for smooth reaction of residents by letting them be "always prepared themselves for sheltering or evacuation in case of further emergency," because "for the area between 20 and 30 km radius from the power station, where residents have been advised to shelter, possibilities have still remained for emergency sheltering or evacuation since the plants have not yet reached stable conditions."

In light of the purpose of such designation, the NSC considers that the current protective actions in the Evacuation-Prepared Area can be terminated when the possibility to occur a situation that requires urgent sheltering or evacuation in this area is judged to be extremely small. The condition for termination is as follows.

- The possibility to occur a situation that requires urgent sheltering or evacuation is extremely small judged from conditions and situations of the Fukushima Dai-ichi NPP, and even if such an event should occur, it is judged that residents have enough time to react to the situation. In addition, in order to reduce residents' exposure (including internal exposure; the same hereafter), necessary decontamination and monitoring should be implemented.

(2) Standpoint for partial termination in the Evacuation Area (within a 20km-radius)

The area where the residents were ordered to be evacuated (the Evacuation Area) has been designated in order to avoid possible exposure with high doses to radioactive materials released in a large amount due to the accident at the Fukushima Dai-ichi NPP.

In light of the purpose of such designation, the NSC considers that the current evacuation can be partially terminated when the possibility to occur a situation that requires urgent sheltering or evacuation is judged to be extremely small with the exception of the condition for termination as follows. There are still some places in this area where the annual cumulative dose after the onset of the accident would be 20 mSv or more. It is necessary to treat these places in the same way as the "the Deliberate Evacuation Area" and continue the evacuation.

- The possibility to occur a situation that requires urgent sheltering or evacuation is extremely small judged from present conditions and situations of the Fukushima Dai-ichi NPP, and even if such a situation should occur, it is judged that residents have enough time to react to the situation.
- Residents' annual dose in the area after the termination of evacuation is expected with certainty to be 20 mSv or less, and efforts should be made to reduce the dose as low as reasonably achievable, with the reference level within the range of 1–20 mSv per year, and a long-term goal of 1 mSv per year. In addition, prior to the termination of evacuation, necessary decontamination should be implemented, and detailed monitoring should be carried out to estimate exposure dose that residents would receive.
- An optimized plan of protective actions to reduce exposure in the area is clearly made, including measures for proper control of exposure, decontamination and improvement of situation, etc. The plan should indicate that residents' annual exposure dose would be 1mSv or less in the long term with the efforts to reduce exposure.

(3) Standpoint for the termination in the Deliberate Evacuation Area

The Deliberate Evacuation Area has been designated in order to avoid residents being exposed to a high dose, since "relatively high cumulative doses have been recorded in some areas outside the 20 km radius of the

Fukushima Dai-ichi Nuclear Power Station due to local contamination of the ground, affected by the weather and geographical conditions, by radioactive materials released from the power plants."

In light of the purpose of such designation, the NSC considers that the current evacuation in this area can be terminated when residents are expected with certainty not to be exposed to a high dose (20 mSv per year or more) by effect of weathering and decontamination, etc. The condition for termination is as follows.

- Residents' annual dose in the area after the termination of evacuation is expected with certainty to be 20 mSv or less, and efforts should be made to reduce the dose as low as reasonably achievable, with the reference level within the range of 1-20 mSv per year, and a long-term goal of 1 mSv per year. In addition, prior to the termination of evacuation, necessary decontamination should be implemented, and detailed monitoring should be carried out, in order to estimate exposure dose that residents would receive.
- An optimized plan of protective actions to reduce exposure in the area is clearly made, including measures for proper control of exposure, decontamination and improvement of situation, etc. The plan should indicate that residents' annual exposure dose would be 1mSv or less in the long term with the efforts to reduce exposure.

(Reference) Standpoint of international standards for the termination of urgent protective actions.

(ICRP Pub.82)

・(122) The simplest basis for justifying the discontinuation of intervention after an accident is to confirm that the exposures have decreased to the action levels that would have prompted the intervention. If such a reduction in exposure is not feasible, the generic reference level of existing annual dose below which intervention is not likely to be justifiable could provide a basis for discontinuing intervention.

(ICRP Pub.109)

・(73) The termination of protective measures is another area where the interaction of urgent protective measures and later protective measures is particularly obvious. Withdrawing all urgent protective measures and then, sometime later, initiating new protective measures such as decontamination may, purely from consideration of future doses and dose rates, seem the optimum course of action. It may not be optimum from a practical and 'cost' viewpoint. For example, … decontamination may be carried out more efficiently in the absence of people living in the area.

・(103) The active participation of stakeholders will, in general, bring relevant local knowledge, experience, and values to decision-making processes such that the resulting detailed protection strategies are more likely to be well focused, understood, and supported.

・(106) It is important to involve, wherever possible, relevant stakeholders in discussions regarding termination of protective measures. While it will be difficult, if not impossible, to discuss decisions with populations sheltered at home, it will be essential to discuss decisions to return to evacuated areas with those who have been evacuated, and the termination of protective measures implemented at a later stage.

・(108) The involvement of relevant stakeholders is essential, and processes and procedures should be established to ensure that such involvement can take place efficiently.

・(115) The change from an emergency exposure situation to an existing exposure situation will be based on a decision by the authority responsible for the overall response. … The Commission recommends that planning for the transition from an emergency exposure situation to

an existing exposure situation should be undertaken as part of the overall emergency preparedness, and should involve all relevant stakeholders.

(ICRP Pub.111)

・(50) The Commission recommends that the reference level for the optimization of protection of people living in contaminated areas should be selected from the lower part of the 1–20 mSv/year band recommended in Publication 103 for the management of this category of exposure situation.

(IAEA BSS SSNo115)

・V.26. A protective action will be discontinued when further assessment shows that continuation of the action is no longer justified.

(DS379 (new BSS))

・4.5. (f) Optimized protection strategies for the implementation and termination of measures to protect members of the public who may be exposed in an emergency, including considerations for protection of the environment

(IAEA GS-R2)

・ 4.44. A protective action shall be discontinued when it is no longer justified.

・ 4.46. National guidelines in accordance with international standards shall be adopted for the termination of urgent protective actions.

・4.87. “A protective action [shall] be discontinued when further assessment shows that continuation of the action is no longer justified.”

Assessment Procedures and Implementation Plan Regarding the Comprehensive Assessments for the Safety of Existing Power Reactor Facilities Taking into Account the Accident at Fukushima Dai-ichi Nuclear Power Station, Tokyo Electric Power Co. Inc.

July 21, 2011
Nuclear and Industrial Safety Agency

Responding to the request of the Nuclear Safety Commission (NSC) in the official document of 23 SCD No.7 dated 6 July 2011, Nuclear and Industrial Safety Agency (NISA) has decided as follows concerning the assessment procedures and implementation plan regarding the comprehensive assessments for the safety of existing power reactor facilities taking into account the accident at Fukushima Dai-ichi Nuclear Power Station (NPS) of Tokyo Electric Power Co. Inc. (TEPCO).

I. Assessment procedures

1. Facilities subject to the assessments

All existing power reactor facilities, including those under construction, are subject to the assessments. However, Fukushima Dai-ichi and Dai-ni NPSs, TEPCO as well as any facilities that are being taken measures for decommissioning and do not have any fuels remaining in the facilities are excluded.

Separate implementation of assessments on nuclear fuel cycle facilities will be considered.

2. Specific time subject to the assessments

The assessments will be implemented on subject facilities and their management condition at a time of choosing, prior to report time.

3. Events subject to the assessments

The following events are subject to the assessments taking into account the accident at Fukushima Dai-ichi NPS, TEPCO.

- Natural phenomena: Earthquake and tsunami
- Loss of safety functions: Loss of all Alternating Current (AC) power

sources and loss of the ultimate heat sink (UHS)

4. Implementation method of the assessments

Electricity Utilities and other related organization (Operators) will implement assessments based on the following methods and will submit the results of the assessments to NISA. NISA will evaluate the assessment results from each Operator and request the NSC to confirm its evaluation results.

The assessments by each Operator comprise a preliminary assessment and a secondary assessment. Both assessments are required to specify implemented measures as the emergency safety measures and other related measures after the accident at Fukushima Dai-ichi NPS, TEPCO.

(1) Preliminary assessments

Assessments will be implemented for the degree to which safety margins are secured for structures, systems and components (SSCs) with safety functions of especially high importance, against the events beyond the design basis. The assessment will be implemented from the perspective of the degree to which safety margins are secured against the allowable limit and other related value.* The assessments will also indicate the effectiveness of measures taken to secure safety against the events beyond the design basis, from the defense-in-depth perspective. These processes will determine whether higher safety margins have been added to the required safety standards.

* In the cases where the allowable limit has been set with ample margin as compared with the upper limit of resilience, a value that takes this margin into account may be used as long as the usage is technologically accountable.

(2) Secondary assessments

The safety margin (the ultimate limitations of strength) will be assessed by evaluating the scale of events that an NPS can withstand without significant damage to the fuel, assuming the occurrence of events beyond the design basis. Additionally, in terms of measures to

prevent significant damage to the fuel, their effectiveness will be indicated from the defense-in-depth perspective. At the same time, any cliff edge effect will be identified to uncover potential vulnerabilities. These processes will yield a comprehensive assessment of the robustness of existing NPSs against external events beyond the design basis.

(3) Method to proceed with assessments

In the assessments, each Operator will indicate an event tree for the development process of an event, and at each stage of the event tree, the Operator will consider the protective measures that can be used at the given stage and indicate the validity and limitations of each measure. Indicating the situation at each stage in this manner, results in a clear-cut assessment from the defense-in-depth perspective. When implementing the assessment, the Operators should take note of the following points.

- As the situation when an initiating event arises, in addition to assuming the most severe operation conditions, such as under the maximum output operation, the Operator will assume the most severe plant situation, for example, the spent fuel pools are completely filled with spent fuels.
- The assuming natural phenomena are earthquakes and tsunamis. It is supposed that these natural phenomena occur concurrently; furthermore, in the secondary assessments, the most severe conditions assumable in light of the recent experience, the events beyond the design basis and, as needed, a concurrence of other natural phenomena will also be considered without limitation to the events for the design basis,
- The Operator will also review the development of the event and the time required for the operations when considering the course of events.
- The Operator will suppose that the reactor and the spent fuel pool are simultaneously affected. Furthermore, for the assessments of protective measures, the Operator will suppose severe situations, such as those where the function will not recover if it is once lost excluding the case that the recovery of a function can be expected due to reasonable assumptions, and where the Operator cannot receive any support from out side the

plant.

- For the secondary assessments, the Operator may include in its assessments the SSCs, even though they are the facilities and functions voluntarily reinforced by the Operator, or the structures and components of the class B and C based on the classification of importance in seismic design (Seismic Class B and C), if their functions are expected to be maintained by reasonable assumptions.
- As to the loss of safety functions, the loss of all AC power sources and the loss of the UHS are assumed, and their concurrent loss is also supposed for the secondary assessments.
- For NPSs that have multiple units, the Operator will consider the possibility of interaction between the different units.
- A deterministic approach will be used and the realistic assessment will be implemented without considering excessive conservativeness.
- Implementation should be accompanied by an awareness of this undertaking as a part of a process that enables a grasp of the reserves and potential vulnerabilities possessed by the Operator's NPSs and leads to improved safety.

5. Implementation matters for the preliminary assessments

The below-listed matters will be implemented in the preliminary assessments.

(1) Earthquake

(a) Assess whether SSCs of Seismic Class S as well as SSCs of other seismic class that could be involved in significant fuel damage would suffer damage or loss of function, according to a degree where the seismic motion exceeds the design basis, taking into account the knowledge derived from seismic probabilistic safety assessment (PSA) and other related knowledge or a comparison with the allowable limit or other related value.

(b) Identify the course of events from the initiating event to any significant damage to the fuel and specify the presence of any cliff edge effect, taking into account the results of the assessment described in (a). In addition, specify the

magnitude of the seismic ground motion on that occasion.

(c) In terms of measures to prevent the development of events in the process leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(2) Tsunami

(a) Assess whether SSCs with safety functions of especially high importance and SSCs that could be involved in significant fuel damage would suffer damage or loss of function, according to a degree where the tsunami height exceeds the height of the tsunami postulated in the design (design-basis tsunami height), which was evaluated using the "Tsunami Assessment Method for Nuclear Power Plants in Japan" (2002) by Japan Society of Civil Engineers, taking into account the knowledge derived from tsunami PSA and other related knowledge or a comparison with the design-basis tsunami height or other related value.

(b) Identify the course of events from the initiating event to any significant damage to the fuel and specify the presence of any cliff edge effect, taking into account the results of the assessment described in (a). In addition, specify the height of the tsunami on that occasion.

(c) In terms of measures to prevent the development of events in the process leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(3) Concurrence of earthquake and tsunami

(a) Assess whether SSCs with safety functions of especially high importance and SSCs that could be involved in significant fuel damage would suffer damage or loss of function in the event of an earthquake exceeding the design basis followed by a tsunami exceeding the design basis, taking into account the knowledge derived from earthquake and tsunami PSA or a comparison with the design basis.

(b) Identify the course of events from the initiating event to any significant damage to the fuel and specify the presence of any cliff edge effect, taking into account the results of the

assessment described in (a). In addition, specify the magnitude of the seismic ground motion and the height of the tsunami on that occasion.

(c) In terms of measures to prevent the development of events in the process leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(4) Loss of all AC power sources

(a) Identify the course of events from the loss of all AC power sources as the initiating event to any significant damage to the fuel, taking into account the knowledge derived from PSA addressing internal events. In addition, specify the duration of the loss of all AC power sources on that occasion.

(b) Specify the presence of any cliff edge effect, taking into account the course of events identified in (a) and the development process from the loss of external power supply to the loss of all AC power sources.

(c) In terms of measures to prevent the development of events in the process leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(5) Loss of the ultimate heat sink (UHS)

(a) Identify the course of events from the loss of the UHS as the initiating event to any significant damage to the fuel, taking into account the knowledge derived from PSA addressing internal events. In addition, specify the duration of the loss of the UHS on that occasion.

(b) Specify the presence of any cliff edge effect, taking into account the development in the course of events identified in (a).

(c) In terms of measures to prevent the development of events in the process leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(6) Other severe accident management

In terms of severe accident management measures introduced in the regulations with the document of “How to Advance Accident

Management Measures in the Future" announced by the Ministry of International Trade and Industry (at the time) in July 1992 and implemented by Operators (measures to prevent significant damage to the fuel, and measures to maintain the integrity of containment functions to prevent the large-scale release of radioactive materials), indicate their effectiveness from the defense-in-depth perspective.

However, exclude measures to prevent the development of events in the process leading to any significant damage to the fuel described in each paragraph (c) in the above sections (1) to (5).

6. Implementation matters for the secondary assessments

The below-listed matters will be implemented in the secondary assessments.

(1) Earthquake

(a) Assess whether SSCs would suffer damage or loss of function according to a degree where the seismic motion exceeds the design basis, taking into account the knowledge derived from seismic PSA and other related knowledge.

(b) Identify the course of events from the initiating event to any significant damage to the fuel and specify the presence of any cliff edge effect, taking into account the results of the assessment described in (a). In addition, specify the magnitude of the seismic ground motion on that occasion.

(c) In terms of measures to prevent the development of events leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective. Moreover, if there is a possibility to incur a significant impact on the course of events due to the concurrence of other natural phenomena, consider the impact and the response measures.

(2) Tsunami

(a) Assess whether SSCs would suffer damage or loss of function according to a degree where the tsunami height exceeds the design basis, taking into account the knowledge derived from tsunami PSA and other related knowledge.

(b) Identify the course of events from the initiating event to any significant damage to the fuel and specify the presence of any

cliff edge effect, taking into account the results of the assessment described in (a). In addition, specify the height of the tsunami on that occasion.

(c) In terms of measures to prevent the development of events leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective. Moreover, if there is a possibility to incur a significant impact on the course of events due to the concurrence of other natural phenomena, consider the impact and the response measures.

(3) Concurrence of earthquake and tsunami

(a) Assess whether SSCs would suffer damage or loss of function in the event of an earthquake exceeding the design basis followed by a tsunami exceeding the design basis, taking into account the knowledge derived from earthquake and tsunami PSA.

(b) Identify the course of events from the initiating event to any significant damage to the fuel and specify the presence of any cliff edge effect, taking into account the results of the assessment described in (a). In addition, specify the magnitude of the seismic ground motion and the height of the tsunami on that occasion.

(c) In terms of measures to prevent the development of events leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective. Moreover, if there is a possibility to incur a significant impact on the course of events due to the concurrence of other natural phenomena, consider the impact and the response measures.

(4) Loss of all AC power sources

(a) Identify the course of events from the loss of all AC power sources as the initiating event to any significant damage to the fuel, taking into account the knowledge derived from PSA addressing internal events. In addition, specify the duration of the loss of all AC power sources on that occasion.

(b) Specify the presence of any cliff edge effect, taking into account the course of events identified in (a) and the

development process from the loss of external power supply to the loss of all AC power sources.

(c) In terms of measures to prevent the development of events leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(5) Loss of the ultimate heat sink (UHS)

(a) Identify the course of events from the loss of the UHS as the initiating event to any significant damage to the fuel, taking into account the knowledge derived from PSA addressing internal events. In addition, specify the duration of the loss of the UHS on that occasion.

(b) Specify the presence of any cliff edge effect, taking into account the development in the course of events identified in (a).

(c) In terms of measures to prevent the development of events in the process leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(6) Compound of loss of all AC power sources and loss of the UHS

(a) Identify the course of events from the compound event of the loss of all AC power sources and the loss of the UHS as the initiating event to any significant damage to the fuel, taking into account the knowledge derived from PSA addressing internal events. In addition, specify the duration of the compound event of the loss of all AC power sources and the loss of the UHS on that occasion.

(b) Specify the presence of any cliff edge effect, taking into account the course of events identified in (a).

(c) In terms of measures to prevent the development of events leading to any significant damage to the fuel, including response to any specified cliff edge effect, indicate their effectiveness from the defense-in-depth perspective.

(7) Severe accident management

(a) In terms of severe accident management measures introduced in the regulations with the document of “How to Advance Accident Management Measures in the Future”

announced by the Ministry of International Trade and Industry (at the time) in July 1992 and implemented by Operators (measures to prevent significant damage to the fuel, and measures to maintain the integrity of containment functions to prevent the large-scale release of radioactive materials), identify any cliff edge effect. In addition, assess the interval between the time the severe accident management measures start and the time the event reaches the cliff edge effect.

(b) In terms of measures to prevent a cliff edge effect, indicate their effectiveness from the defense-in-depth perspective, examining not only hardware but also the aspects of software such as preparedness of manuals and organization.

II. Implementation plan

1. Preliminary assessments

Preliminary assessments will be implemented on a reactor, which is in periodic inspection and has organized its start-up preparations.

2. Secondary assessments

Secondary assessments will be implemented on all existing power reactor facilities (However, Fukushima Dai-ichi and Dai-ni NPSs of TEPCO, as well as any facilities that are being taken measures for decommissioning and do not have any fuel remaining in the facilities, are excluded). The target deadline for the Operators to submit their reports is by the end of the year. However, this deadline will be adjusted, as necessary, considering the states of implementation of the stress tests in European countries and the state of review in the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company.

Power reactor facilities currently under construction will be implemented the assessments prior to starting-up.

The assessments will be implemented per NPS.

3. Actions taken by NISA

(1) Preliminary assessments

NISA will evaluate the content of the preliminary assessment when NISA receives submission of it. NISA will report the results of its findings to the NSC and request the NSC for its confirmation.

(2) Secondary assessments

NISA will evaluate the content of submitted reports. NISA will report the results of its findings to the NSC and request the NSC for its confirmation.

Furthermore, if necessary, NISA will revise the implementation matters for the secondary assessments, and will instruct the Operators again to implement the assessments based on the revised implementation matters, considering the states of implementation of the stress tests in European countries and the state of review in the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company.

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Attachment VIII-2

50th Nuclear Safety Commission
Reference No.1
July 6, 2011

Mr. Banri Kaieda
Minister of Economy, Trade and Industry

Haruki Madarame
Chairman,
The Nuclear Safety Commission

Request to the NISA to report on Comprehensive Safety Review of Existing Nuclear Power Plants Based on the Lessons Learnt from the Fukushima Dai-ichi NPS Incident

Pursuant to Article 25 of the Act for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission, we hereby ask for arrangements for reporting requested in the attached document.

Attachment VIII-2

(Attached sheet)

Implementation of comprehensive safety review of existing nuclear power plants based on insights from the accident at the Fukushima Dai-ichi Nuclear Power Station of the Tokyo Electric Power Co., Inc.

July 6, 2011
The Nuclear Safety Commission

In light of the March 11, 2011 accident at the Fukushima Dai-ichi NPS of Tokyo Electric Power Co., Inc., the Nuclear Safety Commission has determined that the Nuclear and Industrial Safety Agency (NISA) should carry out comprehensive review of existing nuclear power plants (NPPs) for their robustness against beyond-design-basis external events.

The NPP designs, emergency operational procedures and accident management measures are all based on the defense-in-depth concept. There is expectation that NPPs would respond in a robust manner to events exceeding the conditions postulated in their designs. Nevertheless, in such an event as a tsunami well beyond the design basis, excessive loads imposed on the facility may possibly cause simultaneous, wide-spread loss of safety functions, due to certain common factors, revealing so-called cliff edge effects. It is recognized that the development of the Fukushima Dai-ichi NPS accident included such effects. In order to find potential vulnerabilities typified by cliff edge effects, and to take measures against them, it is crucial to assess the robustness of NPPs against beyond-design-basis events in a comprehensive manner.

Already, the NISA has given several instructions to the electric power utilities to implement additional measures for prevention and mitigation of severe core damage, and has reviewed the state of implementation. These individual measures are believed to be effective in enhancing the safety level of NPPs. However, in light of the lessons learnt from the accident, the effectiveness of these measures as a whole in enhancing the facility robustness and in overcoming vulnerabilities has to be assessed in a comprehensive manner. The assessment should cover: (1) natural phenomena such as earthquake and tsunami, including superposition of these phenomena, unlimited to the range of design basis but spanning to the most severe probable conditions and even severer conditions, (2) plant states including loss of all AC sources, loss of the ultimate heat sink, and superposition of these states, where possible scenarios leading to the losses should be addressed in addition to considering scenarios initiated by the losses,

with possible multi-unit interactions), and (3) severe accident countermeasures including preventive and mitigative measures, and on-site emergency plan.

Based on the matters mentioned above, the Commission requests the NISA to carry out comprehensive review of existing NPPs for their robustness against beyond-design-basis external events.

In this context, the Commission requests, pursuant to Article 25 of Act for Establishment of the Atomic Energy Commission and the Nuclear Safety Commission, the NISA to formulate and report to the Commission the methods of assessment and the implementation schedule, noting that the assessment should:

(1) Define clearly the roles of individual preventive/mitigative measures in defense-in-depth.

(2) Evaluate the effectiveness and limitation of individual measures in securing the relevant layer(s) of defense-in-depth, by assuming that the measures are to fail one by one, and thereby identifying the scenarios leading to severe core damage. Evaluate, not necessarily quantitatively, the routes and margin to failure for each measure.

(3) Use deterministic methods.

(4) Assume the severest initial operating conditions.

(5) Utilize outcomes from probabilistic safety assessment (PSA) on internal events, earthquake and tsunami.

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