Comparison of the Existing and Draft Revision of the Guidelines on Maintaining and Improving Health of Emergency Workers at the TEPCO Fukushima Daiichi Nuclear Power Plant

Draft revision	Existing
Guidelines on Maintaining and Promoting Health of Emergency Workers at Nuclear Facilities Section 1 Objectives Among workers presently or previously engaged in the emergency works designated by the Minister of Health, Labour and Welfare pursuant to Article 59-2, paragraph 1 of the Ordinance on Prevention of Ionizing Radiation Hazards (Ministry of Health, Labour and Welfare Notification No. 402 of 2011, hereinafter referred to as "Ionizing Radiation Ordinance") or workers presently or previously engaged in the exceptional emergency works specified in Article7, paragraph 2-3 of the Ionizing Radiation Ordinance (hereinafter referred to as "designated emergency works" (those workers are hereinafter referred to as "emergency workers"), workers whose dose has exceeded the dose limit for regular radiation works (herein after referred to as "regular dose limit") during the period of designated emergency works should be provided with appropriate long-term health care due to the heightened concern for late onset diseases such as cancer, and mitigation of the health concern of the emergency workers, including cancer screening even after workers leave	Guidelines on Maintaining and Improving Health of Emergency Workers at the TEPCO Fukushima Daiichi Nuclear Power Plant Section 1 Objectives For workers presently or previously engaged in the emergency works designated by the Minister of Health, Labour and Welfare (Ministry of Health, Labour and Welfare Notification No. 402 of 2011 pursuant to Article 59-2, paragraph 1 of Ordinance on Prevention of Ionizing Radiation Hazards, hereinafter referred to as "designated emergency work") at the TEPCO Fukushima Daiichi Nuclear Power Plant resulting from the Great East Japan Earthquake on 11 March 2011, hereinafter referred to as "emergency workers" Due to the heightened concern for late onset diseases such as cancer, emergency workers who had above maximum levels of exposure to radiation after regular radiation works during the period of designated emergency work should be provided with appropriate measures for health care. Continuing medical examinations conducted on a long-term basis even after workers leave their job, might help mitigate fear of potential risks in these workers.

their job. In accordance with Article 70-2, paragraph 1 of the Industrial Safety and Health Act (Act No. 57 of 1972, hereinafter referred to as “Act”), these guidelines establish principles for implementing measures for employers who assign emergency workers to engage in the designated emergency works or radiation works, hereinafter referred to as “emergency works” so that employers would strive toward taking appropriate and effective measures that minimize potential risks in these workers. They also establish the measures required for mid- to long-term health care appropriate for emergency workers whose doses have exceeded the regular dose limit after they leave the radiation works. Furthermore, the guidelines clarify the Japanese government’s role in maintaining and improving health of emergency workers, by defining specific measures for implementation.	In accordance with Article 70-2, paragraph 1 of the Industrial Safety and Health Act (Act No. 57, 1972, hereinafter referred to as “the Act”), these guidelines establish principles for implementing measures for health care of workers who have engaged in the designated emergency work or radiation works, hereinafter referred to as “emergency works” so that employers would strive toward taking appropriate and effective measures that minimize potential risks in these workers. They also establish the needed measures for long-term health care appropriate for emergency workers after they leave radiation works. Furthermore, the guidelines clarify the Japanese government’s role in protecting health and safety of workers involved in emergency works by defining specific measures for implementation.
Section 2 Actions for the long-term health care 1.Establishment of an on-site health care system Employers who assigned their employees to emergency works (excluding small and medium sized employers who assign emergency workers to non-emergency works) should establish an on-site health care system with a health and safety committee that constitutes appropriate numbers of health officers, industrial medical doctors, public health nurses, and other professionals based on the scale of the	Section 2 Actions for the long-term health care 1.Establishment of an on-site health care system Employers which assigned their employees to emergency works, excluding small and medium sized employers who assign emergency workers to non-emergency works, should establish an on-site health care system with a health and safety committee that constitutes appropriate numbers of health officers, industrial medical doctors, public health nurses, and other professionals based on the scale of the site. The employers are expected to conduct the general medical examination (the Act, Article 66, paragraph 1) as well as the ionizing

site. The employers should carry out the general medical examination (prescribed in Article 66, paragraph 1 of the Act), ionizing radiation medical examinations (prescribed in Article 56 of the Ionizing Radiation Ordinance), the emergency ionizing radiation medical examinations (prescribed in Article 56-2 of the Ionizing Radiation Ordinance) along with the stress check (tests to check psychological burden defined in Article 66-10, paragraph 1 of the Act). Then with consideration of all results, individual direct guidance (prescribed in Article 66-10, paragraph 3 of the Act) should be conducted appropriately.	radiation medical examination stipulated in Article 56 of the Ordinance on Prevention of Ionizing Radiation Hazards (Ministry of Labour Ordinance No. 41, 1972, hereafter referred to as "Ionizing Radiation Ordinance,") in order to manage long-term health care of emergency workers.
2. Providing cancer screening (1)Employers should provide the slit-lamp microscope examination for cataracts approximately once a year for emergency workers who have been exposed to effective doses of more than 50 mSv per a year while they were engaged in designated emergency works. Taking photographs of their lenses is recommended in this examination. This rule should not apply in cases where the relevant workers opt out of taking such an examination. (2)Employers should provide the examinations shown in the left column for the items shown in the central column at the frequency shown in the right column in the table below to emergency workers who have been exposed to an effective dose higher than 100 mSv	2. Providing cancer screening (1)Employers should provide the slit-lamp microscope examination for cataracts approximately once a year for emergency workers who have been exposed to effective doses between the ranges of 50 mSv to 100 mSv while they were engaged in the designated emergency work. Taking photographs of their lenses is recommended in this examination. This rule should not apply in cases where the relevant workers opt out of taking such an examination. (2)Employers should provide the following examinations to emergency workers who have been exposed to an effective dose higher than 100 mSv while they were engaged in the designated emergency work, approximately once a year in addition to the examinations described in paragraph (1). However, this should not apply in cases where the relevant workers opt out of taking such examinations. The white

while they were engaged in the designated emergency works approximately once a year in addition to the examinations described in paragraph (1). However, this should not apply in cases where the relevant workers opt out of taking such examinations.

Type of examination	Examination items	Frequencies
Gastric cancer screening	a Gastric fluoroscopy examination or gastric endoscopy examination b Helicobacter pylori antibody test	a: Once a year b: Once for each person (Conducted at the time of examination a above)
Lung cancer screening	a Lung X-ray examination b Sputum cell examination for smokers c Chest CT examination in the case that a medical doctor judged it necessary from the result of a and exposure dose, etc.	a: Once a year b: Once a year c: Once a year for smokers / Approximately once every 3 years for non-smokers
Colon cancer screening	a Fecal occult blood test b Colonoscopy in the case that a medical doctor judged it necessary from the result of a and radiation exposure dose etc.	a: Once a year b: Approximately once every 10 years
Thyroid examination	a Neck ultrasonography b Examination of levels of thyroid stimulation hormone	a: Once every 3 to 5 years

blood cell count, differential leukocyte count, red blood cell count, and hemoglobin content should be identified from blood samples taken from emergency workers at the routine general medical examination.

Type of examination	Examination items
Thyroid examination	1) Levels of Thyroid stimulation hormone (TSH), free triiodothyronine (free T3), free thyroxine (free T4) from blood samples 2) Neck ultrasound if determined necessary based on the aforementioned blood test results and radiation exposure doses
Gastric cancer screening	Gastric fluoroscopy examination or gastric endoscopy examination
Lung cancer screening	Lung X-ray and sputum cell examination
Large intestine cancer screening	Fecal occult blood tests

	(TSH), free triiodothyronine (free T3) and free thyroxine (free T4) from blood samples in the case that a medical doctor judged these necessary from the result of a and radiation exposure dose, etc.	
Other examinations	a Hepatitis testing (HBs antigens and HCV antibodies) b Renal function tests (urea nitrogen, creatinine, uric acid), Blood serum chemistry examination (Na, K, Cl, Ca, P)	a: Once for each person (Conducted at the time of examination b above) b: Once a year

(3)Employers should take note of the remarks described below when conducting medical examinations listed in the table in paragraph (2) above.

(a)Appropriate treatments such as removal of helicobacter pylori should be offered to those whose result for the helicobacter pylori antibody test was positive in the gastric cancer screening.

(b)Considering radiation exposure associated with the examination, low dose CT should be used for the chest CT examination in the lung cancer screening.

(c)Since examinations of thyroid stimulation hormone (TSH), free triiodothyronine (free T_3), and free thyroxine (free T_4) from

(New guideline)

blood samples for the thyroid examination are to investigate radiation impacts on health resulting from hypothyroidism, etc., it is recommended those examinations be conducted on those workers who receive more than a certain level of thyroid equivalent dose (approximately 5 Gy and higher). (d) Appropriate treatments based on the results from hepatitis testing in the other examination should be offered. (4) It is desirable that employers provide examinations of white blood cell count and differential white blood count along with red blood cell count and hemoglobin content from blood samples taken at the regular general medical examination. (5)Employers should fully explain the details and the necessity of the aforementioned examinations in paragraphs (1) to (4) in advance to all employees expected to take these examinations. 3. Health guidance, etc. (1)When employers provide health guidance through medical doctors or public health nurses to emergency workers in accordance with the "Guidelines on Steps to Be Taken by Employers Based On Medical Examination Results" (Guideline on Measures Based on Medical Examination Results – Public Notice No. 7, 31 January 2008), results of the general medical examination, ionizing radiation medical examination, emergency ionizing radiation medical	(New guideline) (3)Employers should fully explain the details and the necessity of the aforementioned examinations in paragraphs (1) and (2) in advance to all employees expected to take these examinations. 3. Health guidance, etc. (1)When employers provide health guidance through medical doctors or public health nurses to emergency workers in accordance with the "Guidelines on Steps to Be Taken by Employers Based On Medical Examination Results" (Guideline on Measures Based on Medical Examination Results –Public Notice No. 7, 31 January 2008), results of the ionizing radiation medical examination and the cancer screening specified in subsection 2 above should be given full consideration

examinations, and the cancer screening specified in subsection 2 above should be given full consideration. It should be noted that, since it is known that there is a relationship between smoking and radiation exposure, advice to quit smoking will be effective for those workers who received more than a certain level of radiation exposure. Therefore employers should provide guidance on the need to quit smoking to those workers relevant to subsection 2 (2) above at the time of the health guidance. In the case workers agree to quit smoking, employers should introduce available smoking cessation clinics. (2) (Omitted) (3)The results of the general medical examination, ionizing radiation medical examination or emergency ionizing radiation medical examinations are used by employers in making employment-related decisions for workers who had remarks raising concerns in the results of relevant examinations while considering medical doctors' opinions in accordance with Article 66-4 of the Act. However, it should be noted that the results of cancer screening specified in section 2 above should be used only for the purpose of re-examination, detailed analyses, or giving recommendations for further treatment and not for determining employment actions.	(2) (Omitted) (3)The results of the general and ionizing radiation medical examination are used by employers in making employment-related decisions for workers who had remarks raising concerns in the results of relevant examinations while considering medical doctors' opinions in accordance with Article 66-4 of the Act. However, it should be noted that the results of cancer screening specified in section 2 above should be used only for the purpose of re-examination, detailed analyses, or giving recommendations for further treatment and not for determining employment actions.

	(New guideline)
4.Providing the stress check (1)Considering the mental impacts to workers engaged in highly urgent works, employers should provide the stress check specified in Article 66-10, paragraph 1 of the Act to all emergency workers wherever possible even at workplaces with the number of workers less than 50. (2)When the stress check is conducted, employers should ask the practitioners such as the medical doctors who conduct the stress check to analyze statistically the results for each group with a certain size (hereinafter referred to as “statistical analysis for each group”). Based on the analysis, if necessary, employers should make efforts to take appropriate measures in order to reduce the psychological burden of the group considering the actual circumstances of workers in the said group. Nuclear facility employers and primary contractors are expected to provide support to relevant subcontractors, if necessary, when the statistical analysis for each group is conducted by those relevant subcontractors.	
5. Protection of personal information In order to protect the health information relevant to these guidelines, in handling of the results of the ionizing radiation medical examination,	(4)In order to protect the health information relevant to these guidelines including results of the general and ionizing radiation medical examinations and health guidance, employers should be mindful of the Ministry of Health, Labour and Welfare Notification No. 259 in

emergency ionizing radiation medical examinations, health guidance, and stress check, etc., employers should be mindful of the "Guidelines on Measures Taken by Employers to Ensure an Appropriate Handling of Personal Information Relating to Employment Management" (Ministry of Health, Labour and Welfare Notification No. 259 of 2004), and the "Guidelines on Examination to Evaluate Level of Psychological Burden, on Interview and Guidance, and on Measures which Employers Should Provide Based On the Interview and Guidance" (Guidelines on Examination to Evaluate Level of Psychological Burden, Public Notice No. 1, 15 April 2015 ").	2004 "Guidelines on Measures Taken by Employers to Ensure an Appropriate Handling of Personal Information Relating to Employment Management".
Section 3.Mid- to long-term exposure dose control for the emergency workers who received radiation beyond the regular dose limit	(New guideline)
1.Radiation control for the dose control periods subsequent to the dose control period including the time when the accident occurred	
(1)For the radiation control in the dose control periods subsequent to the dose control period within the 5-year-period including the time when the accident occurred (hereinafter referred to as the "accident") associated with the designated emergency work in nuclear facilities, etc. (hereinafter referred to as simply "dose control period"), employers should set a dose limit for each individual emergency worker during the dose control period in the said remaining working period, by multiplying 5 by the value	

obtained by dividing the remaining dose (which is the lifetime dose of 1Sv minus accumulated dose at the time (total of the emergency exposure dose and regular exposure dose)) by the remaining working period (final age of the working period to 68 years of age (assumed 50-year working period starting from 18 years old) minus current age) (see example calculations in Attachment), in the range not exceeding 100 mSv. It should be noted that the calculation of dose limit for each dose control period should be set in 5 mSv units (rounded down to the nearest 5). (2)For the dose limit during the dose control period calculated according to paragraph (1), in order to reflect the subsequent exposure doses in detail, employers should re-calculate the subsequent dose limits using the remaining dose and remaining working period at the time when the dose control period ends (every 5 years). (3)Employers should control accumulated dose for each dose control period not exceeding the dose limit calculated in (1) above as well as 50 mSv/year which is the annual dose limit during each dose control period. (4)Employers should notify each emergency workers of the dose limit for each dose control period calculated in paragraphs (1) and (2). Employers should manage each emergency worker, so as not to	

exceed his/her dose limit when assigning that worker to engage in radiation works as well as strive to make the exposure dose as low as possible. 2. Radiation control in works for which a dose limit is applied for the regular radiation exposure during the dose control period including the time when the accident occurred (1)Employers may assign emergency workers whose total for the emergency exposure dose and regular exposure dose exceeded 100 mSv per 5 years (which is the dose limit for regular works during the dose control period in regular radiation works) to engage in regular works within an additional exposure dose not exceeding 5 mSv a year, provided that the said workers are limited to those personnel essential to secure safe operation of nuclear facilities. In this case, the accumulated exposure dose by regular works may not exceed the dose limit for regular works (50 mSv per a year and 100 mSv per 5 years). (2)Employers should require those emergency workers in paragraph (1) above to see a doctor in advance, and should manage their exposure dose control and health care based on the relevant laws and ordinances. (3)Employers should use the exposure dose received during the radiation works described in paragraph (1) above in the calculation	

for setting exposure dose limit for the dose control period immediately after the period including the accident occurrence , and should also make efforts to keep the radiation exposure dose as low as possible.	
Section 4. Development of a database for the long-term health care of emergency workers	Section 3. Development of a database for the long-term health care of emergency workers
1. Development of a database	1. Development of a database
(1)Employers who assign their employees to emergency works should report on the following items to the Japanese government in accordance with Article 59-2 and Article 59-3 of the Ionizing Radiation Ordinance. This includes employers who assigned their employees to the designated emergency works before the partial revision of the Ordinance came into effect (Ministry of Health, Labour and Welfare Ordinance No. 129 in 2011).	(1)Employers who assign their employees to emergency works should report on the following items to the Japanese government in accordance with Article 59-2 of the Ionizing Radiation Ordinance. This includes employers who assigned their employees to the designated emergency work before the partial revision of the Ordinance came into effect (Ministry of Health, Labour and Welfare Ordinance No. 129 in 2011).
(a)Results of medical examination	(a)Results of medical examination
i) Results of ionizing radiation medical examination conducted pursuant to Article 57 of the Ordinance	i) Results of ionizing radiation medical examination conducted pursuant to Article 57 of the Ordinance
ii) Results of emergency ionizing radiation medical examinations conducted pursuant to Article 57-2 of the Ionizing Radiation Ordinance	(New guideline)
iii) Results of general medical examination conducted pursuant to Articles 44 and 45 of the Ordinance on Industrial Safety	ii) Results of general medical examination conducted pursuant to Articles 44 and 45 of the Ordinance on Industrial Safety and Health
	iii) Results of special medical examination conducted pursuant to Art.

and Health iv) Results of special medical examination conducted pursuant to Article 66, paragraph 4 of the Act (b)Matters specified in the “Status report on radiation dose control, etc.” (Form 3, Ionizing Radiation Ordinance) i) Names and addresses of workers and names of employers ii) Radiation exposure dose before, during, and after being engaged in designated emergency works and radiation works (2) –(4) (Omitted) 2.Measures for assigning emergency workers to new radiation works (1) If employers who assign new workers to radiation works should determine at the time of hiring that any of those workers fall into the category of emergency workers upon investigating their radiation exposure history when the ionizing radiation medical examination was performed, they should report to the Japanese government as provided in Section 3-1 above, in accordance with Article 59-2 of the Ordinance on Prevention of Ionizing Radiation Hazards. In addition, they must implement appropriate health care measures as specified in 2 above, according to the levels of radiation exposure dose received during the designated emergency works.	66, paragraph 4 of the Act (b)Matters specified in the “Status report on radiation dose control, etc.” (Form No. 3, Ionizing Radiation Ordinance) i) Names and addresses of workers and names of employers ii) Radiation exposure dose before, during, and after being engaged in designated emergency work and radiation works. (2) –(4) (Omitted) 2.Measures for assigning emergency workers to new radiation works (1) If employers who assign new workers to radiation works should determine at the time of hiring that any of those workers fall into the category of emergency workers upon investigating their radiation exposure history when the ionizing radiation medical examination was performed, they should report to the Japanese government as provided in Section 3-1 above, in accordance with Article 59-2 of the Ordinance on Prevention of Ionizing Radiation Hazards. In addition, they must implement appropriate health care measures as specified in 2 above, according to the levels of radiation exposure dose received during the designated emergency work. (2) (Omitted)

(2) (Omitted) Section 5. (Omitted) Attachment Examples of calculation of the dose limit per 5-year period Following are examples showing how to calculate dose limit for the 5-year period described in paragraph (a) of Section 3-1. Example 1: Exposure dose from emergency works: 500 mSv, Exposure dose from regular works: 100 mSv (accumulated dose: 600 mSv) , Age: 45 years old i) (1000 mSv – 600 mSv) / (68 years old – 45 years old) = 17.4 mSv/year ii) Dose limit per 5-year-period: 17.4 mSv/year x 5 years = 87 mSv (85 mSv by rounding down to nearest 5) In this case, the annual exposure dose limit (50 mSv/year) should be applied without modification. Example 2: Exposure dose from emergency works: 500 mSv, Exposure dose	Section 4. (Omitted) (New guideline)

from regular works: 100 mSv (accumulated dose: 600mSv), Age: 23 years old i) (1000 mSv – 600 mSv) / (68 years old – 23 years old) = 8.9 mSv/year ii) Dose limit per 5-year-period: 8.9 mSv/year x 5 years = 44.5 mSv (40 mSv by rounding down to nearest 5) In this case, since the calculated dose limit is less than the annual exposure dose limit (50 mSv/year), the annual exposure dose should not exceed the dose limit per 5-year period calculated as above. Example 3: Exposure dose from emergency works: 200 mSv, Exposure dose from regular works: 100 mSv (accumulated dose: 300 mSv), Age: 45 years old i) (1000 mSv – 300 mSv) / (68 years old – 45 years old) = 30.4 mSv/year ii) Dose limit per 5-year-period: 30.4 mSv/year x 5 years = 152 mSv In this case, no special exposure dose control is necessary and the dose limit for regular works should be applied.	