

Nara Institute of Science and Technology  
Radiation Hazard Prevention Regulations

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Regulations No. 2

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I. General provisions

Article 1 (Purpose)

The purpose of these Regulations is to specify requirements to ensure the safety of those who handle radioisotopes and radioisotope contaminants (hereinafter referred to as “Radioisotopes”) at the Nara Institute of Science and Technology (hereinafter referred to as “NAIST”) and those who enter NAIST, and to prevent harmful radiation effects on the surrounding area under the Act on the Regulations for Radioisotopes (Act No. 167, 1957; hereinafter referred to as “Act”) and related laws.

Article 2 (Scope of application)

These Regulations shall apply to all persons who enter radiation facilities

specified in item (1) of the following article.

#### Article 3 (Definitions)

For the purpose of these Regulations, the terms below shall be defined as follows:

- (1) "Radiation Facilities" refers to use facilities, storage facilities, and disposal facilities as defined in Article 1, item (ix), of the Ordinance for Enforcement of the Act on Regulations for Radioisotopes (Prime Minister's Office Order No. 56, 1960; hereinafter referred to as "Enforcement Ordinance").
- (2) "Radiation Work" refers to the handling and management of the use, storage, transport, and disposal of Radioisotopes or work associated therewith.
- (3) "Radiation Workers" refer to those who enter controlled areas to handle or manage radioisotopes or engage in work associated therewith, and are designated by the President as such.
- (4) "Temporarily Entering Persons" refer to those who temporarily enter controlled areas other than Radiation Workers.
- (5) "Disposal/Storage Room" refers to a place used as storage and disposal facilities.
- (6) "Radiation Instruments" refers to radiation meters and radiation survey monitors.

#### Article 4 (Relationship with other regulations)

The security associated with handling Radioisotopes shall be governed by the provisions of the following regulations and other security regulations, as well as these Regulations:

- (1) Nara Institute of Science and Technology Safety and Health Management Regulations (Regulations No. 1, 2004),
- (2) Nara Institute of Science and Technology Committee Regulations (Regulations No. 7, 2004), and
- (3) Nara Institute of Science and Technology Health Care Regulations (Regulations No. 39, 2004), and
- (4) Nara Institute of Science and Technology Fire and Disaster Prevention Management Regulations (Regulations No. 37, 2004).
- (5) Nara Institute of Science and Technology Corporate Document Management Regulations (Regulations No. 3, 2011), and
- (6) Nara Institute of Science and Technology Risk Management Rules (Regulations No. 1, 2012),
- (7) *Nara Institute of Science and Technology Risk Management Manual*

#### Article 5 (Compliance obligation)

1. Persons entering controlled areas in NAIST must comply with applicable laws and regulations (hereinafter referred to as “Laws and Regulations”) and these Regulations, and follow instructions issued by the Senior Radiation Protection Supervisor as defined in Article 8.2 hereof for radiation hazard prevention.
2. The President must respect the recommendations or opinions provided by the Senior Radiation Protection Supervisor defined in Article 8.2, hereof under Laws and Regulations and these Regulations.
3. The President must respect recommendations or opinions provided by the Radiation Safety Committee defined in Article 7.1, hereof under Laws and Regulations and these Regulations.

## II. Organization and duties

### Article 6 (Organization)

The persons to handle Radioisotopes and the organization to handle safety management at NAIST shall be as set forth in Chart 1.

### Article 7 (Radiation Safety Committee)

1. A Radiation Safety Committee (hereinafter referred to as “Committee”) shall be established at NAIST with to enhance the safe handling and safety management of Radioisotopes, to discuss provisions contained in the Nara Institute of Science and Technology Committee Regulations, and to ensure the implementation of periodic on-site safety management inspections at radiation facilities on campus and improvements for duties related to radiation hazard prevention.
2. Requirements for the Committee shall be specified separately.

### Article 8 (Radiation Protection Supervisor appointment)

1. The President must appoint one or more Radiation Protection Supervisors (hereinafter referred to as “Supervisors”) from among those who have a Type-I radiation protection supervisor license to take charge of comprehensive supervision for the prevention of radiation hazards at NAIST.
2. The President shall, upon appointment of two or more Supervisors, assign a Senior Radiation Protection Supervisor (hereinafter referred to as “Senior Supervisor”) and a Deputy Radiation Protection Supervisor (hereinafter referred to as “Deputy Supervisor”) from among the Supervisors, and if the Senior Supervisor is unable to perform duties due to travel, illness, or other accidents, the Deputy Supervisor shall perform all the duties on behalf of the Senior Supervisor for the duration of the Senior Supervisor’s absence.

3. If Supervisors are unable to perform their duties due to travel, illness, or other accidents, the President shall appoint a substitute Supervisor (hereinafter referred to as the "Substitute") from among those who have a Type-I radiation protection supervisor license to perform all the duties on behalf of the Supervisors for the duration of their absences.
4. The President must, when appointing or removing a Supervisor or Substitute, notify the Nuclear Regulation Authority to that effect in accordance with the provisions of the Act and Enforcement Ordinance. If Supervisors are unable to perform their duties for over 30 days, notification of appointment of a Substitute, or removal if removed, must be submitted to the Nuclear Regulation Authority.

#### Article 9 (Senior Supervisor duties)

The Senior Supervisor shall perform the following duties in connection with supervision of radiation hazard prevention at NAIST:

- (1) Participation in establishment, amendment, and abolition of these Regulations
- (2) Participation in the preparation of important plans for the prevention of radiation hazards
- (3) Guidance and instruction to plan for education and training
- (4) Participation in management related to emergency measures
- (5) Verification and review of applications, notifications, and reports stipulated in Laws and Regulations
- (6) Attendance of on-site inspections stipulated in Laws and Regulations
- (7) Participation in investigations into causes of abnormalities and accidents
- (8) Submission of opinions to the President and the Director
- (9) Verification and review of the use of radiation facilities and radioisotopes, and registers and documents
- (10) Supervision and guidance for Radiation Workers (hereinafter referred to as "Workers")
- (11) Advice, recommendation, and instruction to concerned parties
- (12) Requests for Committee meetings
- (13) Other duties necessary for radiation hazard prevention

#### Article 10 (Supervisor training)

The President must have Supervisors receive regular training at intervals as specified in the following items:

- (1) No longer than one year from the date of their appointment as Supervisors (or no longer than three years for those who received regular training within one year before the date of their appointment as Supervisors, as calculated

from the first day of the next academic year following the training)

- (2) No longer than three years for those who received regular training after the date of their appointment as Supervisors, as calculated from the first day of the next academic year following the training

#### Article 11 (Radiation Control Director)

The President must appoint a radiation control director (hereinafter referred to as the "Director") to oversee the handling of Radioisotopes and Radiation Work.

#### Article 12 (Director duties)

The Director shall perform the following duties:

- (1) Duties related to supervision of a Controlled Area Manager stipulated in the following article, a Safety Control Manager under Article 19 hereof, and a Facility Manager stipulated in Article 21
- (2) Duties related to Workers registration
- (3) Duties related to the general management of Radioisotopes
- (4) Duties related to planning and implementation of Workers education and training
- (5) Duties related to Worker medical examination planning and implementation
- (6) Duties related to maintaining records stipulated in Laws and Regulations
- (7) Duties related to clerical duties stipulated in Laws and Regulations, such as applications and reports
- (8) Duties related to facility inspections and safety management inspections stipulated in Articles 25 and 26
- (9) Duties related to overseeing safety management of radiation facilities and implementing the necessary measures therefor
- (10) Other clerical duties, such as communication with relevant agencies

#### Article 13 (Controlled area manager)

The President must appoint a Controlled Area Manager for the controlled areas.

#### Article 14 (Controlled Area Manager duties)

The Controlled Area Manager shall perform the following duties under the Director's supervision:

- (1) Duties related to guidance for those who handle Radioisotopes
- (2) Duties related to necessary measures for radiation hazard prevention in the controlled areas
- (3) Other duties related to guidance for those who enter the controlled areas to comply with instructions given by the Senior Supervisor and Director for radiation hazard prevention

#### Article 15 (Radiation use manager)

1. For each research or education project using Radioisotopes, the President shall assign a Radiation Use Manager (hereinafter referred to as the "Use Manager") who has sufficient knowledge and skills in the safe handling of Radioisotopes.
2. The Use Manager must be registered as a Worker in accordance with the provisions of Article 17 hereof.

#### Article 16 (Use Manager duties)

The Use Manager shall perform the following duties in collaboration with Supervisors, the Substitute, and the controlled area manager:

- (1) Ensure that instructions for radiation hazard prevention given by the Senior Supervisor, Director, and controlled area manager are provided to Workers
- (2) Provide Workers adequate instruction for handling Radioisotopes
- (3) Provide supervision and guidance on the management of Worker records involving the use, storage, transport, and disposal of Radioisotopes

#### Article 17 (Worker registration)

1. Workers involved in handling of Radioisotopes at NAIST must be registered by submitting the prescribed application form to the President for approval.
2. The President shall, when granting approval under the preceding paragraph, provide education and training as stipulated in Article 41 and medical examinations stipulated in Article 42 for persons who apply for facility use as Workers and allow them to be involved in the handling of Radioisotopes after evaluating the results thereof.
3. The President shall allow Worker registration and facility use in accordance with the provisions of the preceding two paragraphs and based on the Director and Senior Supervisor's opinions.
4. Registration in the preceding paragraph shall be annually and may be renewed.
5. The President shall notify the Director and Senior Supervisor of registered Workers (including those renewing registration).
6. Any persons other than registered Workers shall not be involved in the handling of Radioisotopes, or enter radiation facilities or controlled areas stipulated in Article 23, except for those permitted by the Senior Supervisor to temporarily enter the radiation facilities or controlled areas.
7. The President shall annually prepare and maintain a registered Workers list.

#### Article 18 (Registration cancellation)

1. When the Senior Supervisor considers any Worker in breach of these Regulations or lacks the ability to perform Radiation Work, the Director must recommend to the President to take the necessary action, such as cancelling or suspending registration under the preceding article.
2. The President must, upon recommendation under the preceding paragraph, implement the appropriate measures to determine the relevant Worker's eligibility through a Committee resolution.

#### Article 19 (Safety Control Manager)

The President must appoint a Safety Control Manager for controlled areas.

#### Article 20 (Safety Control Manager duties)

1. The Safety Control Manager shall perform the following duties under the Director's supervision, in close collaboration with the Senior Supervisor:
  - (1) Duties related to controlling the entry and exit of persons to and from controlled areas, radiation exposure, and Radioisotope contamination
  - (2) Duties related to measurement of radiation dosage and degrees of Radioisotope contamination inside and outside radiation facilities and controlled areas
  - (3) Duties related to maintenance and management of equipment and Radiation Instruments used in radiation facilities
  - (4) Duties related to management of Radioisotope receipt, release, use, storage, transport, and disposal
  - (5) Duties related to technical matters pertaining to safety in Radiation Work
  - (6) Duties related to radioactive waste storage, management, and disposal
  - (7) Duties related to safety management inspections stipulated in Article 26
  - (8) Duties related to other measures necessary for radiation hazard prevention
  - (9) Duties related to the management of records for the above items
2. The Safety Control Manager must post Radioisotope handling precautions in visible locations at the entrances of controlled areas and of the use, storage, and disposal facilities, and require those entering to comply therewith.

#### Article 21 (Facility Manager)

A Facility Manager shall be assigned to oversee radiation facility maintenance and management, and the Director General shall fill this role.

#### Article 22 (Facility management personnel)

1. Facilities management personnel shall be assigned to perform facility management duties.
2. Facilities management personnel shall perform the following duties in close

collaboration with the Senior Supervisor and the Facility Manager:

- (1) Facility maintenance management, and equipment operation and maintenance management
- (2) Duties related to operation and maintenance management of air supply and exhaust systems and water supply and drainage systems
- (3) Working environment protection
- (4) Air conditioning system operation
- (5) Maintenance management of high-pressure gas equipment and hazardous materials
- (6) Other duties necessary for facility and equipment maintenance and management

### III. Controlled areas

#### Article 23 (Controlled area designation)

1. The President shall designate areas defined in Article 1, item (i), of the Enforcement Ordinance as controlled areas to prevent radiation hazards.
2. Any person who enters a controlled area must follow the instructions issued by the Controlled Area Manager and the Safety Control Manager.
3. The Controlled Area Manager shall not allow persons other than those below to enter controlled areas.
  - (1) Persons registered as Workers
  - (2) Temporarily Entering Persons, such as visitors, approved by the Senior Supervisor to enter temporarily
4. The safety control manager must maintain records of those who enter controlled areas.

#### Article 24 (Instruction to be observed in controlled areas)

1. Any person entering controlled areas must observe the following instructions:
  - (1) Enter and exit through the specified door.
  - (2) Record all persons entering and exiting controlled areas and the Radioisotope handling.
  - (3) Put on a personal radiation exposure dosimeter at the specified position.
  - (4) Do not act in any way that may cause internal exposure, such as eating, smoking, or applying makeup, in controlled areas.
  - (5) Workers are to follow the instructions to prevent radiation hazards and other instructions to ensure facility security given by the Senior Supervisor and the Safety Control Manager.
  - (6) Temporarily Entering Persons are to follow instructions to prevent radiation hazards and other instructions to ensure facility security given by the Senior



Supervisor, the Safety Control Manager and Workers.

2. Persons who enter controlled areas where unsealed radioisotopes are handled must observe the following instructions, in addition to those in the preceding paragraph:
  - (1) Wear the protective clothing, work shoes, and other necessary personal protective equipment, and do not leave controlled areas unnecessarily while wearing such equipment.
  - (2) Contact the Safety Control Manager immediately if radioisotopes are or may have been introduced into a person's body and follow his/her instructions.
  - (3) Conduct contamination screening for the body, clothes, and other equipment when leaving a controlled area, and if contamination is detected, contact the Safety Control Manager and take immediate measures for decontamination; provided, however, that if decontamination is difficult, contact and follow instructions of the Senior Supervisor.
3. Workers must observe the following instructions, in addition to those in the preceding two paragraphs:
  - (1) Workers with little Radioisotope handling experience shall not perform operations alone.
  - (2) Provide appropriate shielding with shields suitable for radiation source used.
  - (3) Have an adequate distance from the radiation source, depending on its type.
  - (4) Reduce working time as much as possible.

#### IV. Facility maintenance and management

##### Article 25 (Facility inspections)

1. The Director must, at intervals of up to six months, conduct inspections of the items listed in Chart 2 under the Senior Supervisor's guidance to ensure the radiation facility's structure and proper function.
2. Facilities management personnel must record inspection results under the preceding paragraph and report them to the Facility Manager.
3. Facilities management personnel must, if an anomaly is detected as a result of an inspection under Paragraph 1 hereof, investigate the situation and causes thereof and implement the necessary emergency measures, and inform the Facility Manager.
4. The Facility Manager must, upon receipt of information under the preceding paragraph, report it to the Director through the Senior Supervisor.
5. The Director must report to the President anomalies reported under the preceding paragraph that cannot be dealt with by him/her or the Senior Supervisor.

#### Article 26 (Safety management inspections)

1. The Director must regularly conduct inspections listed in Chart 2.
2. The Safety Control Manager must record the inspection results under the preceding paragraph and report them to the Director.
3. The Safety Control Manager must, if any anomaly is detected as a result of an inspection under Paragraph 1 hereof, implement the necessary measures, such as repairs.
4. The Safety Control Manager must compile and report the results from the preceding paragraph to the Director through the Senior Supervisor.
5. The Director must report to the President about any anomaly reported under the preceding paragraph that cannot be dealt with by the Senior Supervisor or safety control manager.

#### Article 27 (New installation, repairs, modifications, and decontamination)

1. The Facility Manager and Safety Control Manager must, if any new installation, modifications, repairs, or decontamination is made to equipment and instruments under their respective controls, prepare an execution plan for approval by the President through a Committee resolution, except for those specifically deemed to have minimal safety effects.
2. The Safety Control Manager must, upon completion of the new installation, repairs, modifications, or decontamination under the preceding paragraph, report the results thereof to the President through the Senior Supervisor.

#### V. Radioisotope use

##### Article 28 (Unsealed Radioisotope use)

1. When unsealed radioisotopes are used, instructions given by the Controlled Area Manager and the Safety Control Manager must be followed, the following items must be in compliance, and the Safety Control Manager shall verify that the use does not exceed the maximum daily use limit by preparing a radioisotope management system (disabling input exceeding the maximum daily use limit) and experimental protocol for Radioisotope use.
  - (1) Radioisotopes shall be used in specified places within approved controlled areas for a specified purpose with a specified method, in a specified type, and up to the maximum allowable daily use limit, which shall be recorded.
  - (2) Experimental methods shall be prepared and examined thoroughly to prevent radiation hazards.
  - (3) Air supply and exhaust systems shall be checked for proper operation.
  - (4) The necessary measures to prevent contamination by using absorbent paper and drip trays shall be implemented.

- (5) Measures shall be implemented, such as providing shielding, keeping proper distance from human bodies, and shortened exposure time, to reduce human doses to a minimum.
  - (6) Workplaces within controlled areas where radioisotopes are used shall be always clean and organized, with no unnecessary items being brought in.
  - (7) Workers shall, after radioisotope use termination, conduct contamination screening at the workplace, and decontaminate when the surface density limit is exceeded.
  - (8) Contamination screening shall be conducted for each body part, work clothes, and shoes when leaving a controlled area, and decontamination be performed if there is contamination.
  - (9) If any items are to be brought out of a controlled area, surface contamination screening shall be conducted to confirm surface density is one-tenth or less of the limit before they are brought out.
  - (10) When leaving places where unsealed radioisotopes are being used, measures to prevent accidents, such as specified labels on containers and places of use and specifying precautions, shall be implemented.
2. When using radioisotopes, prepare a radioisotope use plan for approval by the President through a Committee resolution.

## VI. Radioisotope storage, transport, and disposal

### Article 29 (Receipt and release)

1. The Safety Control Manager must perform the following duties to control Radioisotope receipt and release under Article 20, Paragraph 1, item (4), hereof.
  - (1) Receipt of purchased radioisotopes
  - (2) Receipt of radioisotopes from other universities, etc.
  - (3) Release of radioisotopes to other universities, etc.
2. The Safety Control Manager must check and record Radioisotope receipt and release under the preceding paragraph, under the Senior Supervisor's direction.

### Article 30 (Radioisotopes transportation in and out of facilities)

Workers must, when transporting Radioisotopes (including radioactive materials equal to or less than the lower limit amount) in or out of radiation facilities, obtain permission of the Senior Supervisor.

### Article 31 (Storage facility management)

Facilities storing radioisotopes shall be managed by the Safety Control

Manager under the Senior Supervisor's guidance.

#### Article 32 (Storage)

Radioisotopes must be stored in a designated container in a designated storage room or storage box.

#### Article 33 (Storage precautions)

1. The Use Manager must, when storing radioisotopes, follow instructions issued by the Safety Control Manager and comply with the following items:
  - (1) A note describing radioisotope type and amount, storage starting date, and the Use Manager's name shall be attached to radioisotope container surfaces and this must be recorded.
  - (2) After work completion, all radioisotopes shall be stored in a designated container and a designated storage room, and this shall be recorded.
2. The Safety Control Manager must, under the Senior Supervisor's guidance, manage radioisotope storage so that storage room storage capacity is not exceeded.
3. Precautions must be taken to prevent storage boxes and containers storing radioisotopes from being carried without reason.
4. When unsealed radioisotopes are to be stored in a storage room or storage box, precautions must be taken to prevent contamination expansion in the storage room or storage box by using absorbent paper and drip trays, considering falling and damage to the container.
5. Precautions required to prevent radiation hazards must be posted in visible locations in storage facilities.

#### Article 34 (Transportation within controlled areas)

When Radioisotopes are transported within controlled areas, the necessary precautions must be taken under the guidance of the Senior Supervisor and the Safety Control Manager to prohibit mixed loading with hazardous materials and to prevent falling or tumbling, contamination expansion, radiation exposure, and for other security reasons.

#### Article 35 (Transportation outside controlled areas)

1. When Radioisotopes are transported outside controlled areas, precautions meeting the standards (Type L Packages and Type A Packages) specified in applicable laws and regulations must be taken with the Director's approval and under the Senior Supervisor's guidance.
2. The Senior Supervisor must instruct contractors who transport Radioisotopes outside controlled areas to comply with applicable laws and regulations.

3. When transportation is performed under Paragraph 1 hereof, the necessary information must be entered in transport record books.

#### Article 36 (Waste disposal)

1. When unsealed Radioisotopes are disposed of, waste must be treated in accordance with the methods below, under the Senior Supervisor's guidance and Safety Control Manager's control, and this must be recorded.
  - (1) Solid radioactive waste shall be classified and enclosed as non-combustible, non-flammable, and flammable in the respective designated waste containers, and stored and disposed of in a Disposal/Storage Room.
  - (2) Liquid radioactive waste shall be classified and enclosed as inorganic effluent and organic effluent according to the respective specific radioactivity levels, and drained when the radioisotope concentration in the effluent at the outlet is lowered by storage and disposal or water supply and drainage systems to a level equal to or less than the concentration limit.
  - (3) Gaseous radioactive waste shall be emitted when the radioisotope concentration in the exhaust air at the outlet is lowered by the air supply and exhaust systems to a level equal to or less than the concentration limit.
2. When Radioisotopes are entrusted for disposal to a waste disposal licensee under the Act on Control of Nuclear Source Materials, Nuclear Fuel Materials and Reactors (Act No. 166, 1957; hereinafter referred to as "the Act on Control of Nuclear Reactors, etc."), Radioisotopes not covered by the disposal licensee's permit shall not be entrusted for disposal.
3. Radioisotopes may be entrusted to a waste disposal licensee for disposal under the Act on Control of Nuclear Reactors. In such cases, Radioisotopes entrusted for disposal shall be deemed contaminated by nuclear fuel materials or nuclear source materials.
4. Other requirements for the disposal shall be specified separately.

#### VII. Measures for measurement and results

##### Article 37 (Radiation Instrument maintenance)

The Safety Control Manager must maintain safety management Radiation Instruments so they maintain their normal functions.

##### Article 38 (Measurement in locations)

1. The Safety Control Manager must, in locations where radiation hazards may occur, measure the radiation dose and the degree of Radioisotope contamination, and evaluate and record the results; provided, however, that if measurement with a radiation meter is difficult, such values may be evaluated

by calculation.

2. The radiation dose must be measured, in principle, with a radiation meter for measuring a 1-centimeter dose equivalent.
3. The radiation dose and degree of unsealed Radioisotope contamination must be measured in accordance with the following items:
  - (1) Measurement shall be done once before handling begins, and at least once at intervals of one month or less after the handling began; provided, however, that measurement at an exhaust port or drain port shall be made whenever exhaust or drainage is performed, or continuously if continuous exhaust or drainage is performed.
  - (2) Locations where radiation doses are to be measured shall be in the workroom, storage room, Disposal/Storage Room, air supply and exhaust systems, water supply and drainage systems, contamination test room, controlled area boundaries, residences, and NAIST campus boundaries.
  - (3) Working environment measurement shall be performed in workrooms and disposal workrooms.
  - (4) Locations where the degree of contamination is to be measured shall be in the workroom, storage room, waste storage room, contamination test room, and boundaries of controlled areas.
  - (5) The degree of Radioisotope contamination at the exhaust port of air supply and exhaust systems and the drain port of water supply and drainage systems shall be assessed based on results of concentration measurement of the exhaust or drainage; provided, however, that if measurement is difficult, the degree of contamination shall be assessed by calculation.
  - (6) The Director must conduct regular calibration of or check the safety management radiation meters, and record the execution date, results, and related measures, as well as the name of the person who calibrated or checked them, to assure it functions properly at all times.
  - (7) Notwithstanding the provisions of the preceding items, measurement must be made immediately if contamination may have occurred.
4. The Safety Control Manager must record measurement results for the items listed in Chart 3, notify the Senior Supervisor and maintain records.

#### Article 39 (Personal radiation exposure dose measurement)

1. The Safety Control Manager must instruct those entering controlled areas to wear a personal radiation exposure dosimeter appropriately and measure personal radiation exposure doses in accordance with the items below; provided however, that if measurement with a personal radiation exposure dosimeter is extremely difficult, such values shall be obtained by calculation.
  - (1) The radiation dose shall be measured in terms of the external radiation

exposure dose.

- (2) The external exposure measurement shall be made to determine the 1-centimeter dose equivalent and the 70-micrometer dose equivalent on the chest (or on the abdomen for women (excluding those diagnosed as not being pregnant)).
- (3) In addition to the part specified in the preceding item, if the highest external radiation exposure dose is not measured on parts belonging to the chest and upper arms (nor parts belonging to the abdomen and thighs for women to be measured on the abdomen under the preceding item) from measured parts including the head and neck, chest and upper arms, or abdomen and thighs, the measurement shall also be made to determine the 1-centimeter dose equivalent and 70-micrometer dose equivalent on such part, on which the highest external radiation exposure dose may be measured.
- (4) If the highest external radiation exposure dose may be measured on any human body part other than the head, neck, chest, abdomen, upper arms, and thighs, the measurement shall also be made to determine the 70-micrometer dose equivalent on such part, in addition to the parts specified in the preceding two items.
- (5) The internal exposure measurement shall be made on those who have mistakenly inhaled or ingested radioisotopes, and those who enter areas where there is such risk; provided, however, that if measurement with a radiation meter is difficult, such values may be obtained by calculation.
- (6) Measurement on those who enter controlled areas shall be conducted for the duration they are there.
- (7) The personal radiation exposure dose measurement shall be performed once per 3-month period starting from April 1, July 1, October 1, and January 1, or once per 1-month period starting from the 1st day of each month for women (excluding those diagnosed as not being pregnant), whose effective dose may exceed 1.7 millisieverts per month, and once per such 1-month period until delivery for women whose pregnancy is known to the President upon their notification.
- (8) The measurement results under the preceding item shall be compiled and recorded each year starting from April 1 and the relevant periods.
- (9) The effective and equivalent doses shall be calculated from the measurement results in the preceding item, and recorded for the respective 3-month periods starting from April 1, July 1, October 1, and January 1, for each year starting from April 1, and for the relevant periods for each month starting from the first day of every month until delivery for women whose pregnancy is known to the President upon their notification; provided, however, that as a result of the effective dose calculation, if the effective

dose exceeds 20 millisieverts for a one-year period starting from April 1, the cumulative effective dose for the five-year period, including the relevant one-year period, divided by five years starting from April 2001, shall be annually calculated and recorded for the relevant five-year period after the relevant one-year period.

2. The Safety Control Manager must submit to the Director the records under items (8) and (9) of the preceding paragraph for the items listed in Chart 3, and deliver a copy thereof to subject persons whenever recording is performed.
3. The Director must notify the Senior Supervisor of the records specified in the preceding paragraph and permanently maintain them.

#### Article 40 (Measures based on measurement results)

The Director may, if deemed necessary for radiation hazard prevention as a result of measurement, instruct the Safety Control Manager and Controlled Area Manager under the Senior Supervisor's guidance to take corrective measures.

### VIII. Education and training

#### Article 41 (Education and training)

1. The Director must implement the necessary education and training for those entering controlled areas and those handling Radioisotopes to prevent radiation hazards, in addition to promoting dissemination of these Regulations.
2. The education and training under the preceding paragraph shall be implemented as follows:
  - (1) The implementation times shall be as follows:
    - a. Before entering a controlled area for the first time, and
    - b. No longer than one year for those registered as Workers, as calculated from the first day of the academic year following the academic year which includes the date of the last training after their registration.
  - (2) The following items and durations shall apply to the implementation under item a, or the following items shall apply to the implementation under item b of the preceding item:
    - a. Effects of radiation on the human body: Thirty minutes or more
    - b. Safe handling of Radioisotopes: 2 hours and half or more
    - c. Radiation hazard prevention Laws and Regulations and these Regulations: 1 hour or more, and
    - d. Other items necessary for radiation hazard prevention.



3. Notwithstanding the provisions of the preceding paragraph, the Director may omit part of education and training for persons considered by the Committee to have sufficient knowledge and skills for the implementation items listed in item (2) of the preceding paragraph, in consultation with the Senior Supervisor based on the omission criteria below. In such cases, the reason for omission must be stated in the education and training completion record.
  - (1) Completion of education and training at other universities in the previous academic year can be confirmed.
  - (2) Completion of university or graduate school courses for the education for the items listed in item (2) of the preceding paragraph can be confirmed.
  - (3) Training equivalent to the above education and training has been completed at an external institution.
  - (4) Sufficient knowledge and skills for the items listed in item (2) of the preceding paragraph can be confirmed.
4. The Safety Control Manager must, when recognizing those who temporarily enter controlled areas as Temporarily Entering Persons, educate such Temporarily Entering Persons on the following items, orally and by posting, to prevent radiation hazards, and maintain the education and training record:
  - (1) Enter the affiliation, name, and time of entry in the temporary entry record book before entering a controlled area.
  - (2) Enter and exit through the specified door.
  - (3) When entering a controlled area, after receiving personal radiation exposure dosimeter operation instruction, wear it in the specified position (wearing position: on the chest for men and on the abdomen for women).
  - (4) When entering controlled areas, follow instructions from the Senior Supervisor, Safety Control Manager, facility staff, and Workers to prevent radiation hazards and other instructions to ensure facility security.
  - (5) When entering controlled areas, be accompanied by Workers or facility staff if necessary.
  - (6) Do not conduct acts that may cause internal exposure, such as eating, smoking, and applying makeup, in controlled areas.
  - (7) Wear protective work shoes and wear work clothes and personal protective equipment if necessary.
  - (8) Do not unnecessarily touch workroom laboratory tables or items in the hood.
  - (9) Do not unnecessarily approach those experimenting.
  - (10) When leaving controlled areas, conduct contamination screening for the body, clothes, and other equipment in a contamination test room, and if contamination is detected, contact the Safety Control Manager, Workers, or facility staff immediately and follow their instructions on measures for decontamination; provided, however, that if decontamination is difficult,

contact and follow instructions of the Senior Supervisor.

- (11) When leaving a controlled area, enter the value measured by the personal radiation exposure dosimeter and the time of leaving in the temporary entry record book in the presence of facility staff.
  - (12) Observe the three principles (distance, time, shielding) to prevent external exposure
  - (13) When an alarm sounds during accidents, follow instructions of the Senior Supervisor, Safety Control Manager, facility staff, and Radiation Workers and evacuate immediately.
5. The Director shall prepare education and training item contents, in consultation with the Safety Control Manager and the Senior Supervisor, for approval by the Committee and, according to the policy determined by the Committee, change or improve the contents and durations.

## IX. Medical examinations

### Article 42 (Medical examinations)

1. The Director must conduct medical examinations for Workers and applicants for registration as Workers in accordance with the following provisions:
  - (1) The implementation times shall be as follows:
    - a. Before registration as a Worker or entering controlled areas for the first time, and
    - b. At intervals of up to one year after entering controlled areas; provided, however, that if the effective dose does not exceed 5 millisieverts for a one-year period starting from April 1 of the previous academic year and is unlikely to exceed 5 millisieverts for a one-year period starting from April 1 of the current academic year, tests and examinations under the following item may be omitted and shall be conducted only when a doctor considers it necessary.
  - (2) Medical examinations shall include medical interviews and tests or examinations.
  - (3) Medical interviews shall be conducted to obtain information on whether Workers have radiation exposure history and, if Workers have exposure history, their workplace, duty description, duration, dose, presence of radiation hazards, and other radiation exposure situations.
  - (4) Medical tests or examinations shall be conducted on the areas and items listed below; provided, however, that such tests and examinations shall be conducted on the areas and items listed in items b through d., only when a doctor considers it necessary (excluding the areas and items listed in items a and b, in the case of medical examinations before entering controlled areas

for the first time).

- a. Hemoglobin content or hematocrit values, red and white blood cell count, and differential white blood cell count in peripheral blood,
  - b. Skin,
  - c. Eyes, and
  - d. Other areas and items specified by the Nuclear Regulation Authority.
2. Notwithstanding the provisions of the preceding paragraph, the Director must, without delay, conduct medical examinations for Workers, if any of the following events occur to Workers:
- (1) Radioisotopes mistakenly inhaled or ingested
  - (2) Radioisotope skin contamination exceeding the surface density limit which may not be easily removed
  - (3) Wounded skin radioisotope contamination or the risk thereof
  - (4) Radiation exposure exceeding the effective or equivalent dose limit or the risk thereof
3. The Director must record medical examination results as listed in Chart 3.
4. The Director must keep medical examination results permanently in a place specified in the Nara Institute of Science and Technology Corporate Document Management Regulations and deliver a copy of this record to the subject persons whenever a medical examination is conducted.

#### X. Measures for those subjected to radiation hazards

##### Article 43 (Measures for those subjected to radiation hazards)

1. If Workers and Temporarily Entering Persons are, or may have been, subjected to radiation hazards, the Director must recommend to the President, in consultation with the Senior Supervisor, measures such as shortened time in controlled areas, restricted access, or duty adjustment according to exposure, and medical diagnosis and necessary health guidance without delay.
2. The President must take the necessary precautions upon recommendation under the preceding paragraph.
3. If any person other than Workers and Temporarily Entering Persons is, or may have been, subjected to radiation hazards, the Director must, without delay, implement the appropriate measures, such as medical diagnosis and necessary health guidance.

#### XI. Records and record maintenance

##### Article 44 (Records and record maintenance)

Records under these Regulations must be closed on March 31 of every year, or on the date of abolition, if facilities are abolished, and kept as specified in Chart 3 and Nara Institute of Science and Technology Corporate Document Management Regulations.

## XII. Emergency measures

### Article 45 (Emergency measures)

1. Any person who finds that a radiation hazard has occurred or may occur as a result of any of the following situations must immediately inform the Safety Control Manager and Senior Supervisor to that effect.
  - (1) Radioisotope theft or loss
  - (2) Concentration limit or dose limit exceeded when gaseous Radioisotopes are disposed of by purification or exhaust through air supply and exhaust systems
  - (3) Concentration limit or dose limit exceeded when liquid Radioisotopes are disposed of by purification or drainage through the water supply and drainage systems
  - (4) Leakage of Radioisotopes outside controlled areas (except when unsealed radioisotopes are used outside of controlled areas under the provisions of Article 15, Paragraph 2, of the Enforcement Ordinance)
  - (5) Leakage of Radioisotopes inside controlled areas, provided that any of the following circumstances apply (except when a leak spreads outside controlled areas):
    - a. Leaked liquid Radioisotopes have not spread beyond the shuttering to prevent leakage spreading which has been installed around the facilities.
    - b. In case of gaseous Radioisotope leakage, the air and exhaust system functions in the leak area are properly maintained.
    - c. The leaked Radioisotope radiation dose is small, or otherwise the leakage degree is minor (not exceeding the surface density limit).
  - (6) The following doses exceed or potentially exceed the dose limits:
    - a. A radiation dose to which people may be exposed to in areas where people normally enter in the use facilities
    - b. A radiation dose in NAIST campus boundaries or NAIST residences
  - (7) Unplanned radiation exposure during use or other handling, exceeding or potential exceeding of the following doses:
    - a. Workers: 5 millisieverts
    - b. Persons other than Workers: 0.5 millisieverts
  - (8) Radiation exposure exceeding or likely to exceed the effective or equivalent dose limit for Workers

2. Workers must, in case of contamination in controlled areas due to unforeseen accidents during work, promptly take emergency measures to prevent the spread of contamination and, without delay, inform the Safety Control Manager and Senior Supervisor, and remove the contamination by following the Senior Supervisor's instructions.
3. The Senior Supervisor must, upon receipt of information under the preceding two paragraphs, immediately report to the President and Director, and take emergency measures, such as prevention of the spread of the disaster and evacuation warning, and inform the local police and fire departments based on evaluation of the situation.
4. The President must, within 10 days of the receipt of the report under the preceding paragraph, notify the Nuclear Regulation Authority, the Chief of the competent Labor Standards Office, and chiefs of other relevant agencies.
5. When the Senior Supervisor implements emergency measures under Paragraph 3 hereof, NAIST employees who are asked for their cooperation must follow the Supervisor's instructions.

### XIII. Measures for disasters such as earthquakes

#### Article 46 (Measures in case of disasters)

1. If a large-scale natural disaster (earthquake with an intensity of upper 5 or above, total collapse of houses due to wind and water damage [total loss due to flooding or flooding up to the first-floor ceiling, total collapse due to typhoon or hurricane]) occurs in the same municipality where the radiation facilities are located, or a fire or other disaster occurs in the radiation facilities, the President, the Director, the Senior Supervisor, the Safety Control Manager, and the Facility manager shall gather as soon as possible in accordance with the emergency communication and information system and as specified in the *Nara Institute of Science and Technology Risk Management Manual*.
2. The Director shall, in consultation with the Senior Supervisor, instruct the Safety Control Manager and the Facilities Manager to inspect the items specified in Chart 4, and the Director shall report to the President about the results and the emergency measures implemented.
3. The President shall implement the necessary budgetary measures for radiation facility safety management to address situations that cannot be dealt with by the emergency measures by the Director.
4. If an earthquake with an intensity of upper 5 or above occurs, facilities and equipment shall be inspected as soon as possible, the results shall be recorded, and the situation shall be reported to the Nuclear Regulation Authority.

#### XIV. Provision on information

##### Article 47 (Provision of information)

1. If radiation hazards that require accident reporting may occur, or radiation hazards have already occurred, the President, the Director, the graduate school Dean, and the Senior Supervisor shall be informed in accordance with the emergency communication and information system and as specified in the *Nara Institute of Science and Technology Risk Management Manual*. The President shall, under the Nara Institute of Science and Technology Risk Management Rules, establish a risk management headquarters to provide information to the public and media through the NAIST administrative offices by posting the accident situation and degree of damage as set forth in the following paragraph on the NAIST website, and establish a contact point at the administrative office to respond to inquiries from the public.
2. Information items to be provided publically about the accident situation and degree of damage (hereinafter referred to as "Provided Information Items") shall be as set forth below:
  - (1) Date, time and location of accident
  - (2) Impact of contamination outside of NAIST
  - (3) Radioisotope type, properties, and amount handled at the accident
  - (4) Description of emergency measures
  - (5) Radiation dose measurement results obtained with radiation meters
  - (6) Accident causes and preventive measures to prevent recurrence
3. Provided Information Items shall be determined through deliberation of the risk management headquarters.

#### XV. Improvements for duties

##### Article 48 (Improvements for duties)

1. The President shall direct the Committee to conduct work evaluations in radiation hazard prevention to improve safety in Radioisotope use and management at radiation facilities in NAIST.
2. The Committee must conduct facility inspections and document reviews of NAIST radiation facilities at least once a year by a person designated by a Committee member or by the Committee, and notify the relevant radiation facilities of the results and report them to the President through the Director.
3. The Director must, upon receipt of the results under the preceding paragraph, implement necessary improvements and prepare an improvement report, and report to the Committee about the improvement measures implemented. Also,

the Director shall, when considering it necessary, request budgetary measures to implement improvements.

4. The Committee must report to the President about improvement reports under the preceding paragraph.

## XVI. Reports

### Article 49 (Regular reports)

1. The Safety Control Manager must prepare a radiation control status report for the period from April 1 of each year to March 31 of the following year, and submit it to the President through the Senior Supervisor.
2. The President must submit a radiation control status report to the Nuclear Regulation Authority within three months after the expiration of the period defined in the preceding paragraph.
3. The President must, when he or she conducts a medical examination under Article 43 hereof, promptly submit a report on the ionizing radiation medical examination results to the Chief of the competent Labor Standards Office.

## XVII. Miscellaneous provisions

### Article 50 (Miscellaneous provisions)

In addition to the provisions of these Regulations, requirements concerning the prevention of radiation hazards shall be separately specified by the Committee.

### Supplementary provisions

These Regulations shall come into effect on April 1, 2019.

### Supplementary provision

These Regulations shall come into effect on September 17, 2019, and be applicable from September 1, 2019.

Chart 1 (relating to Article 6)

Organization for the prevention of radiation hazards

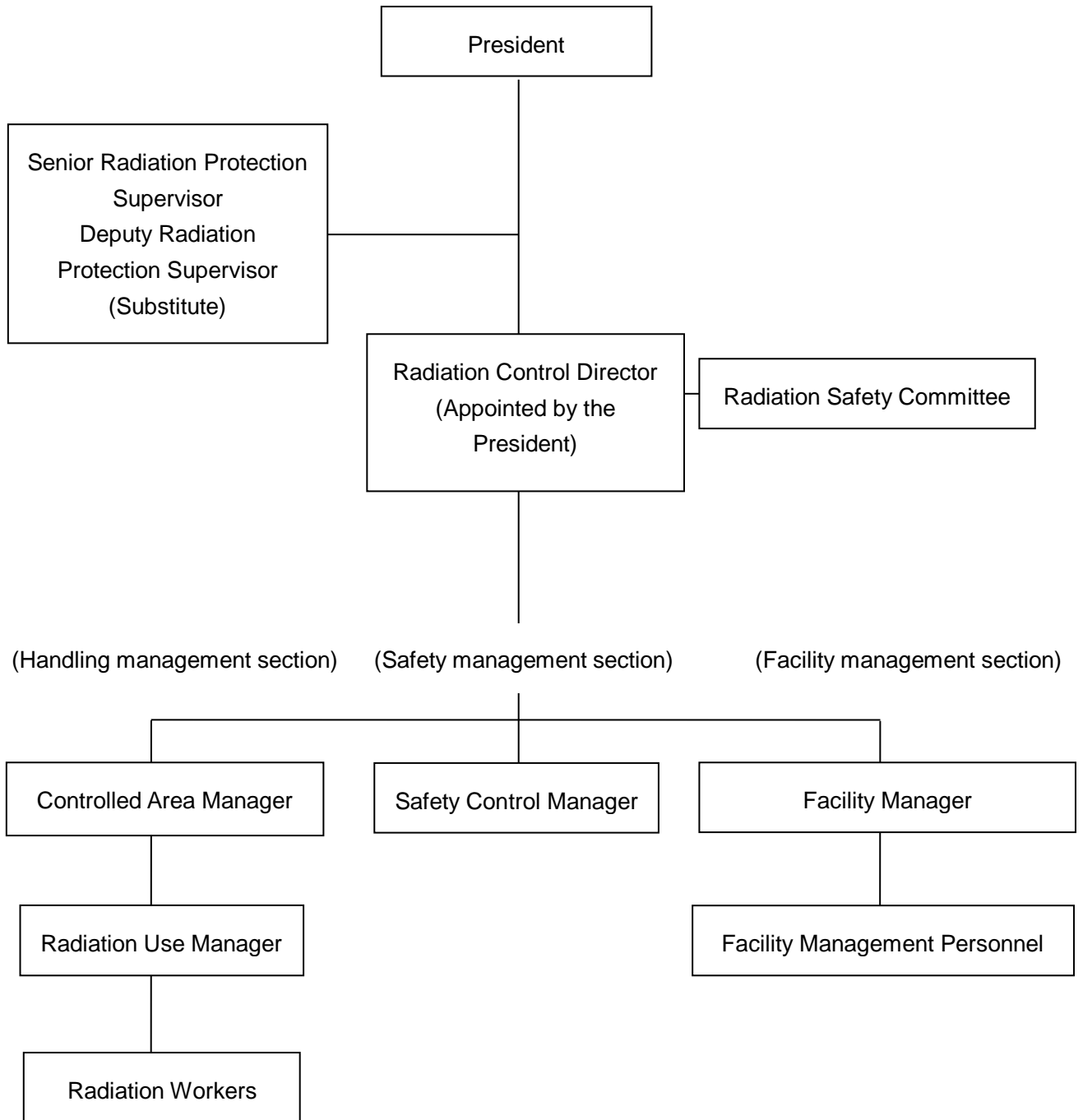




Chart 2 (relating to Article 25 and Article 26)

Inspection items for periodic inspections

Facility inspections (Article 25)

| Inspection category  | Inspection items   |
|--|--|
| 1. Common areas<br>Controlled areas                        | Flooding and landslide risk, fireproof construction<br>Fences and locks surrounding the controlled areas<br>Shield and wall failure<br>Number of entrances and location<br>Door construction (fireproof), type, and locks<br>Location and deterioration of labels and signs  |
| 2. Use facilities<br>Workrooms<br>Contamination test rooms | Location and deterioration of labels and signs<br>Cracks and dents in wall finishing materials<br>Cracks and dents in flooring finishing materials<br>Sink and drain connections, leakage, and damage<br>Hood and damper operating conditions<br>Room airflow<br>Air supply and exhaust pipe connections, leakage, and damage<br>Door construction (fireproof), type, and locks<br>Facilities for changing clothes<br>Washing facilities and decontamination equipment condition<br>Contamination screening meters |
| 3. Storage facilities<br>Storage rooms                     | Door construction (fireproof), type, and locks<br>Location and deterioration of labels and signs<br>Cracks and dents in the wall finishing materials<br>Cracks and dents in the flooring finishing materials<br>Hood and damper operating conditions<br>Room airflow, fire resistance<br>Air supply and exhaust pipe connections, leakage, and damage<br>Storage container locations, amounts, locks, and labels<br>Storage container airtightness and contamination prevention material condition                 |
| 4. Disposal facilities<br>Waste storage room               | Door construction (fireproof), type, and locks<br>Location and deterioration of labels and signs<br>Cracks and dents in the wall finishing materials<br>Cracks and dents in the flooring finishing materials<br>Damper operating conditions  |

|                                   |  |
|-----------------------------------|--|
|                                   | Room airflow<br>Air supply and exhaust pipe connections, leakage, and damage<br>Storage and disposal containers seals and labels   |
| 5. Air supply and exhaust systems | Location and deterioration of labels and signs<br>Air supply and exhaust duct failure and leakage<br>Fan belt loosening and failure<br>Damper operation<br>Air supply and exhaust blower (filter) capacity |
| 6. Water drainage systems         | Location and deterioration of labels and signs<br>Tank failure and leakage<br>Drain cracks and leakage<br>Valve and pump operation<br>Monitoring system operation  |

#### Safety management inspections (Article 26)

1. Radiation measuring instrument and radiation monitoring system inspections
2. Fire and other risk inspections (gas and water leaks, heating equipment)
3. Inspections on checks of storage volume and storage conditions by isotope (once per year)
4. Inspections of checks of use status of Radiation Workers (once per year)
5. Inspections of other items necessary to prevent radiation hazards

Chart 3 (relating to Article 44)

Records and record maintenance

| Type of record  | Items in record   | Maintenance period | Maintenance manager    | Remarks |
|---|---|--------------------|------------------------|---------|
| Controlled area entry record (Article 23)   | (i) Date, time of entry<br>(ii) Persons who entered   | 5 years            | Safety Control Manager |         |
| Facility and safety management inspections (Article 25 and Article 26)  | (i) Inspection date<br>(ii) Inspection results, related measures<br>(iii) Inspectors' names   | 5 years            | Director               |         |
| Radioisotope use (Article 28)   | (i) Type, amount<br>(ii) Date, purpose, method, location of use<br>(iii) Persons engaged in use   | 5 years            | Safety Control manager |         |
| Radioisotope receipt and release (Article 29)   | (i) Type, amount<br>(ii) Receipt and release date<br>(iii) Name of the counterparty   | 5 years            | Safety Control manager |         |
| Radioisotope storage (Article 33)   | (i) Type, amount<br>(ii) Storage duration, method, location<br>(iii) Persons engaged in storage   | 5 years            | Safety Control Manager |         |
| Radioisotope transportation (Articles 34 and 35)  | (i) Transportation date, method<br>(ii) Person or company of consignee or consignor, and persons engaged in transportation or person or company contracted for transportation | 5 years            | Safety Control Manager |         |
| Radioisotope disposal (Article 36)  | (i) Type, amount<br>(ii) Disposal date, method, location<br>(iii) Persons engaged in disposal   | 5 years            | Safety Control Manager |         |
| Measurements of radiation doses and contamination with radioisotopes where radiation hazards may occur (Article 38) | (i) Measurement date, time<br>(ii) Measurement points<br>(iii) Person who measured<br>(iv) Radiation meter type, model<br>(v) Measurement methods<br>(vi) Measurement results | 5 years            | Safety Control Manager |         |

|   |   |           |                        |  |
|---|---|-----------|------------------------|--|
| Working environment measurement (Article 38)                | (i) Measurement date, time<br>(ii) Measurement methods<br>(iii) Radiation meter type, model, performance<br>(iv) Measurement points<br>(v) Measurement conditions<br>(vi) Measurement results<br>(vii) Person who measured<br>(viii) Outline of measures taken based on measurement results | 5 years   | Safety Control manager |  |
| Personal radiation exposure dose measurement (Article 39)   | (i) Measurement date, time<br>(ii) Persons measured<br>(iii) Person who measured<br>(iv) Radiation meter type, model<br>(v) Measurement methods<br>(vi) Measured parts and results  | Permanent | Safety Control Manager |  |
| Effective dose and equivalent dose calculation (Article 39) | (i) Calculation date<br>(ii) Subject persons<br>(iii) Person who calculated<br>(iv) Period covered by calculation<br>(v) Effective dose<br>(vi) Equivalent dose, organization name  | Permanent | Safety Control Manager |  |
| Calculation of cumulative effective dose (Article 39)       | (i) Calculation date<br>(ii) Subject persons<br>(iii) Person who calculated<br>(iv) Period covered by calculation<br>(v) Cumulative effective dose  | Permanent | Safety Control Manager |  |
| Education and training (Article 41)                         | (i) Implementation date<br>(ii) Persons who received education and training<br>(iii) Items covered, duration for each, reasons for omission   | 5 years   | Director               |  |
| Medical examinations (Article 42)                           | (i) Implementation date<br>(ii) Subject names<br>(iii) Medical examination doctor<br>(iv) Medical examination results<br>(v) Measures taken based on medical examination results  | Permanent | Director               |  |

Chart 4 (relating to Article 46)

Inspection items in case of disasters

| Inspection category                                      | Inspection items  |
|--|---|
| 1. Common areas<br>Controlled areas                      | Flooding and landslide risk,<br>Fences and locks surrounding the controlled areas<br>Building structure and wall failure<br>Door construction and lock condition<br>Location and deterioration of labels and signs  |
| 2. Use facilities<br>Workroom<br>Contamination test room | Location and deterioration of labels and signs<br>Cracks and dents in wall finishing materials<br>Cracks and dents in flooring finishing materials<br>Sink and drain connection, leakage, and failure<br>Hood and damper operating conditions<br>Air supply and exhaust pipe connection, leakage, and failure<br>Door construction and lock condition<br>Washing facilities and decontamination equipment condition<br>Contamination screening meter conditions |
| 3. Storage facilities<br>Storage room                    | Door construction and lock condition<br>Location and deterioration of labels and signs<br>Cracks and dents in wall finishing materials<br>Cracks and dents in flooring finishing materials<br>Hood and damper operating conditions<br>Air supply and exhaust pipe connection, leakage, and failure<br>Storage container retention and contamination prevention material condition   |
| 4. Disposal facilities<br>Waste storage room             | Door construction and lock condition<br>Location and deterioration of labels and signs<br>Cracks and dents in wall finishing materials<br>Cracks and dents in flooring finishing materials<br>Damper operating conditions<br>Air supply and exhaust pipe connection, leakage, and failure<br>Storage and disposal container retention conditions  |
| 5. Air supply and exhaust system                         | Location and deterioration of labels<br>Air supply and exhaust duct failure and leakage<br>Fan belt loosening and failure<br>Damper operation<br>Air supply and exhaust blower operation  |
| 6. Water drainage  | Location and deterioration of labels  |

|          |  |
|----------|--|
| system   | Tank failure and leakage<br>Drain failure and leakage<br>Valve and pump operation<br>Monitoring system operation |
| 7. Other | Radiation Instruments and radiation monitoring systems   |