

Safety Manual

April 2008



Faculty and Graduate School of Science, The University of Tokyo

— CONTENTS —

*Faculty members and students of non-experimental courses must study Articles 1 to 7. Faculty members and students of experimental courses must study Article 8 in addition to 1 to 7.

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1. Introduction

1.1 About this manual

This manual was developed for the Faculty and Graduate School of Science (hereafter the School of Science), the University of Tokyo, by referring to the safety booklet that summarizes the Safety Manual (web version: <http://safetymanual.t.u-tokyo.ac.jp/index.htm>) of the Faculty and Graduate School of Engineering. The safety booklet sets out the minimum safety knowledge for members of the Faculty and Graduate School of Engineering, and was provided as a reference for members of the Health and Safety Management Office at a briefing organized by the Safety Management Committee, University of Tokyo (March 10, 2004). We wish to thank the Health and Safety Management Office of the Faculty and Graduate School of Engineering for providing the safety booklet. See also: Supplemental matters on the home page of the Environment and Safety Management Office, School of Science, The University of Tokyo (<https://www.s.u-tokyo.ac.jp/fswiki/kankyo/>) (hereafter ESM OFFICE HP).

1.2 Purpose of this manual

This safety manual sets out the code of conduct for all members and students of the School of Science, the University of Tokyo, and clarifies the responsibilities of those in managerial positions. The purpose of this manual is to prevent accidents, fires, or other disasters, to maintain the health of all faculty members and students, and to ensure that educational and research activities are conducted safely and smoothly. This manual is also intended to ensure that all educational and research activities are conducted in compliance with the Labor Standards Law, the Industrial Safety and Health Law, the Poisonous and Deleterious Substances Control Law, regulations on the use of radiation and radioactive materials, and other regulations.

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This manual was compiled by adding information that appears in the textbook on health and safety developed by the Health and Safety Management Office, the University of Tokyo, to the Safety Manual mentioned above. Useful information concerning health and safety management is provided on the website of the Environment and Safety Management Office, School of Science, and the Health and Safety Management Office, the University of Tokyo (<http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/index.htm>). Please consult this web page regularly.

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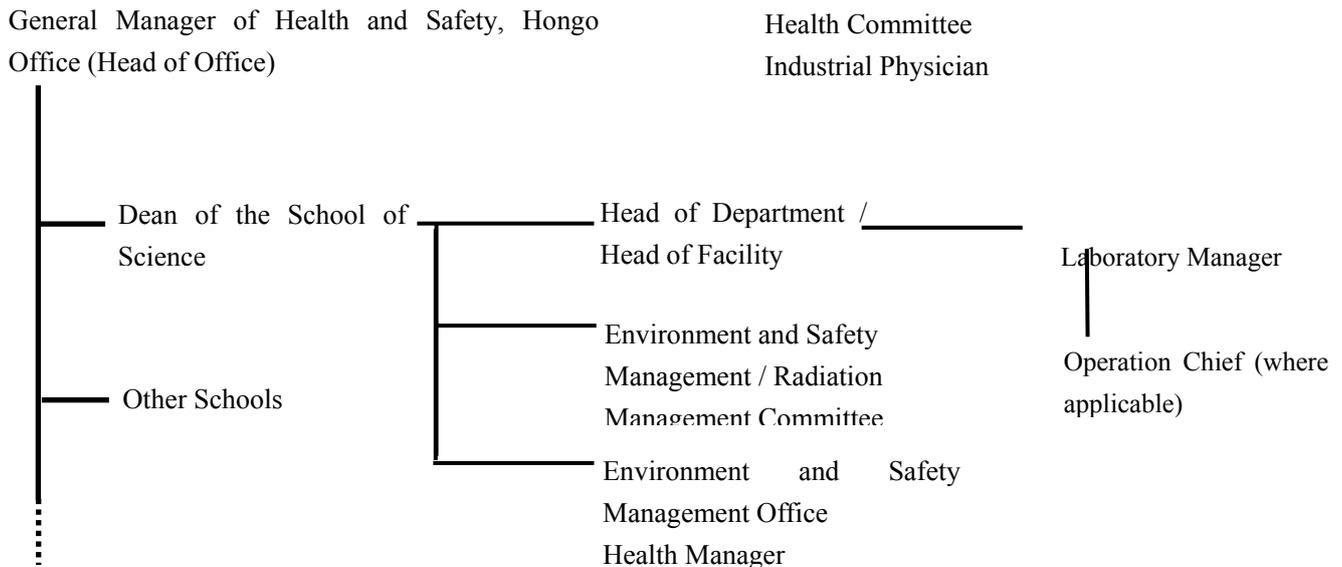
Environment and Safety Management Office, School of Science

2. Environmental Safety Management

Environmental safety management is important to ensure the security of faculty members and students, as well as neighboring residents. Accidents, disasters and environmental pollution occurring during the course of research and education have the potential to invalidate or undermine the significance of the research and education being undertaken, and therefore, preventing such incidents, minimizing the damage that they cause, and implementing follow-up measures and responses in a reasonable manner are the responsibilities of all those involved in research and educational activities. These duties are considered of the highest concern and preconditions for all research and educational activities. All faculty members must be mindful of these issues.

2.1 Environmental Safety Management

An outline of the management of environmental safety for the School of Science is shown below. Environmental safety management must be undertaken at all levels and in accordance with the structure of authority – from the Dean of the School of Science to the Head of the Department/Head of the Facility, and to the laboratory manager. All those responsible for management must be fully aware of their obligations to uphold safety standards.



*The botanical garden has been designated an independent office, and a separate health coordinator has been appointed.

2.2 Patrols and Self-Inspections

Patrols and self-inspections must be carried out in order to prevent accidents, disasters and environmental pollution.

Patrols

- Patrol by the Dean of the School of Science (once a year)
- Patrols by the Industrial Physician (at least once a month)
- Patrols by the Health Manager (at least once a week)

- Other patrols of important areas

Self-Inspections

- Self-inspections must be carried out by each laboratory (See below).
- Self-inspection of some equipment (such as local exhaust devices and pressure vessels) must be carried out by law.

2.3 Safety Training

- Safety training helps faculty members and students to understand the risks in each area where research is carried out. It helps them to take measures to prevent accidents, and to protect themselves from potential dangers.
- All members, including students, must receive safety training upon entering the faculty or undertaking new tasks/activities.
- Report the list of all persons who received safety training to the ESM OFFICE using the forms that can be downloaded from “Safety Training” at the ESM OFFICE HP.
- Persons engaged in operations requiring special training (e.g., driving a crane, replacing grinding stones or doing arc welding) must participate in seminars (special training) and acquire the knowledge and skills relevant to those operations.
- Fire drills for each building must be conducted in accordance with fire safety procedures. Fire brigade members and occupants of each building must proactively take part in the drills in order to understand and master the details of emergency procedures.
- Faculty members and students who handle radiation and radioactive isotopes (RI) must receive the prescribed training (seminars) complying with the Rules for the Prevention of Radioactive Damage, the School of Science (See Regulations and Rules at ESM OFFICE HP).

3. Common Safety Practices

3.1 Important points

- Contact information: Check that you have provided correct emergency contact information in case of a sudden illness, accident, or other emergency.
- Evacuation route: Ensure that you know the evacuation routes, emergency exits and evacuation sites.
- Emergency equipment: Ensure that you know the locations of fire extinguishers, fire alarms, fire hydrants, emergency showers, etc.



Check evacuation routes (at least two routes)



Emergency showers (located in washrooms)



Fire alarm (top) and fire hydrant (below)



Fire extinguishers are located in corridors
(Some are located in rooms)

3.2 General Safety Practices

- Always keep rooms and corridors tidy.
- Do not allow obstacles to block the routes. The routes must have a width of at least 80 cm. Secure at least two evacuation routes when using hazardous materials.
- Compare the power consumption to the capacity of the outlet in order to prevent overheating and current leakage. Do not plug too many power cables into a single socket.
- When leaving the workplace, turn off power to all appliances except those that are required to operate overnight.
- Use only safe heating appliances (e.g. shockproof quality), and do not place heaters near flammable substances or objects.
- Smoking is allowed only in designated smoking areas.
- In general, laboratory doors should be kept closed whenever possible.
- When leaving a room or a laboratory, lock the door after confirming all is safe inside.
- Do not lend your key card to others. When entering a building etc., with your key card, do not allow persons unknown to you to enter at the same time. They must use their own key card to enter.
- When working with visual display terminals (VDTs), such as CRT screens, do not work continuously for one hour or more.
- Waste materials, chemicals and effluents must be correctly sorted for disposal according to the relevant rules.

3.3 Preparations for Disasters

It is important to take the following daily precautions in order to prevent and respond to any possible disasters.

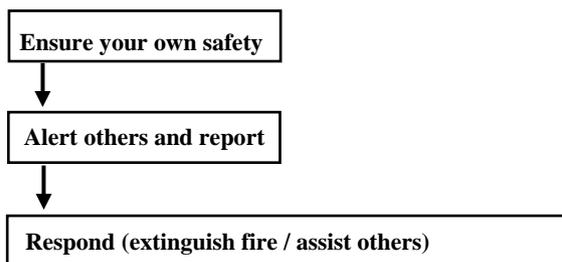
- Do not put obstacles in front of emergency exits, fire doors, or fire shutters.
 - Do not put obstacles around fire extinguishers, fire alarms, or fire hydrants.
 - Do not remove fire extinguishers from their designated locations, except when using them.
- *Since their locations were reported to Fire Department, their movement is not allowed. Please contact

the Facilities Department if a fire extinguisher is needed.

- Windows, aisles, doors, corridors and emergency stairways must be free from obstructions in order to keep evacuation routes clear.
- When using flammable solvents, use the minimum amount at all times. The amount used is often a definitive factor in the severity of accidents and/or the possibility of evacuation.
- Do not place any flammables or combustibles near a heat source.
- Be aware that static electricity may ignite nearby combustibles.
- Place appliances that have a flame on a non-flammable platform where they are not in contact with flammable materials.
- Use standardized switches, fuses and electric cords. Do not allow cords to hang or clutter the floor. Do not plug too many power cables into a single socket.
- Use safe rubber tubes and PVC tubes. (Tubes that crack when twisted must not be used.) Ensure that they cannot become dislodged or contact electrical cords.

4. Emergency Responses

4.1 Basics of Emergency Responses



See the last three pages of this manual for emergency contact numbers.

4.2 In the Event of a Fire

- If you discover a fire, first inform the people around you in a loud voice.
- Press the fire alarm button (the bell will sound and the fire hydrant pumps will start).
- Contact the emergencies office (dial 119 or 24919). Contact the Fire Department (dial: 0-119).
- The discoverer of the fire and nearby faculty members must attempt to extinguish the fire if possible (using fire extinguishers and fire hydrants), as long as their safety is not compromised.
- If the fire and/or the gas leak seem uncontrollable by the methods that are immediately available, evacuate the area immediately and move to a safe place (using the safest evacuation route).
- Cover your mouth and nose with a wet handkerchief, etc. and stay close to the floor in order to minimize the amount of smoke that you inhale as you evacuate the area.
- Evacuate the building by the emergency stairs located at the end or outside the building, or by another safe method. (Do not use the elevator.)
- Follow emergency exit lights and other indicators when evacuating a building during a fire or other emergency.

- See the Fire Response Manual for details on the correct fire response procedures (p. S24).

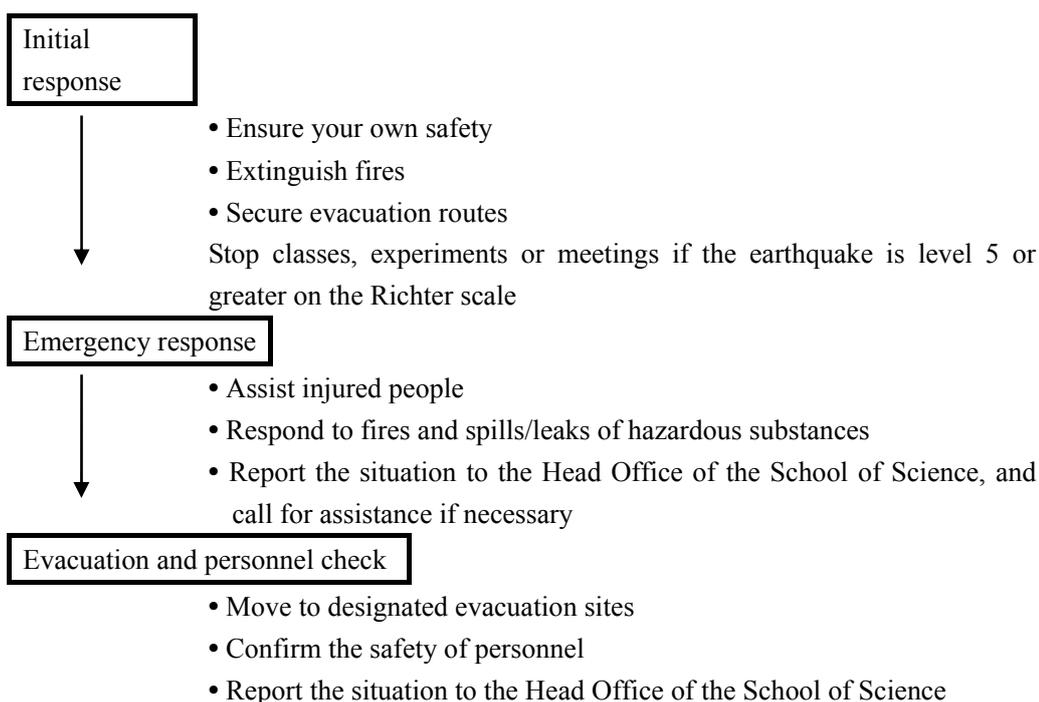
4.3 In the Event of an Explosion

- Check the immediate area and assist any injured persons.
- The appliance that caused the explosion must be shut down or made safe. If that is difficult and the appliance may cause another explosion, evacuate the area immediately.
- Check the area near the appliance that caused the explosion in order to avoid secondary accidents due to the air blast of the explosion or shattered items.

4.4 In the Event of a Chemical Spill

- If the chemical is highly toxic, evacuate the area immediately.
- If possible, stop the spill and prevent it spreading. (For safety data, see the MSDS (vide infra).)

4.5 In the Event of an Earthquake



4.6 Precautions for Earthquakes

- Use wooden or steel cabinets with double sliding doors as chemical cabinets. Cabinets with double or single swing doors must not be used to store chemicals.
- Fix cabinets to walls etc. to prevent them from falling. Ensure that the cabinets are mounted firmly enough to withstand strong force.
- Take measures to prevent objects falling from cabinet shelves (e.g. install railing).
- Take measures to prevent objects falling from flat laboratory tables and stone tables (e.g. use a rim or raised edge).

- Take measures to prevent appliances moving or falling over in the event of an earthquake.

4.7 Setting up AED (Automated External Defibrillator) on Campus

- An AED (Automated External Defibrillator) is a portable electronic device that automatically diagnoses the potentially life threatening cardiac arrhythmias of ventricular fibrillation and is able to treat them through defibrillation or the application of electrical therapy which stops the arrhythmia, allowing the heart to re-establish an effective rhythm. Since July 2004, people other than medical professionals are allowed to use this device based on a new law.
- Anyone can readily use an AED by following a phonetic message, but it is recommended to learn how to use an AED, which is shown in the “Data>>Set Up Location page (<http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/data/aed.html>)” at the Environment Safety Center Website before use.
- On March 22, 2007, 25 AEDs were set up at 16 locations on the Hongo campus. For the location see the map on p. 21. The set up location and number of AEDs are scheduled to increase.

4.8 Reporting Accidents

- In the event of an accident, injury or illness, report it immediately to the Head of the Department, Head of the Facility and the Environment and Safety Management Office (ext. 28868).
- A formal report must be made using the Accident Report Form (Can be downloaded from “Accident report” at ESM OFFICE HP).

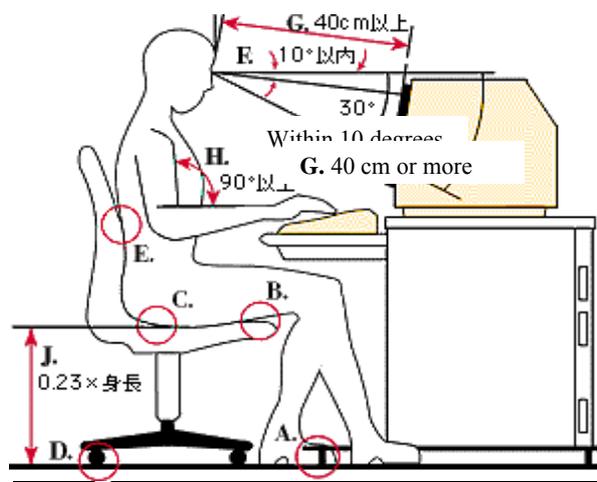
5. Office Safety Practices

5.1 VDT 1: Preventing Eyestrain

- If you usually require corrective lenses, wear lenses that best suit you (visual acuity at a distance of 50 cm is most important).
- To prevent dry eyes, ensure that the line of vision is downward. Also use eye drops as necessary. (Do not share eye drops with others.)
- Do not continue operation for more than one hour in order to prevent eye fatigue.
- Arrange the office lighting environment so that lights are not reflected on the screen.
- Close curtains or blinds if sunlight is reflected on the screen.

5.2 VDT 2: Preventing Neck, Shoulder and Arm Strain

- Support the arms with wrist rests, arm rests, etc. in order to prevent static muscle contractions. Maintain good posture to avoid back strain.
- Take breaks physical fatigue.



and do VDT exercises or other exercises in order to avoid chronic

90 degrees or more

0.23 x the operator's height

- A. Keep the entire sole of both feet flat on the floor.
- B. Leave a space the width of one finger.
- C. Adjust the chair height and sit back in the seat.
- D. Choose a chair with high stability (with 5 legs).
- E. Adjust the height and angle of the backrest if possible. Stretch the back along the backrest.
- F. The line of vision to the upper edge of the screen should be maintained at an angle of around 10 degrees or less.
- G. Maintain at least 40 cm distance between the eyes and the screen.
- H. Maintain elbows at 90 degrees or more (as appropriate).
- I. Keep the angle of the line of vision to look down on the lower edge of the screen at around 30 degrees or less.
- J. Adjust the height of the chair so that $(\text{the height of the knee} - 2 \text{ cm})^* / \text{operator's height} = 0.23$.
(*The height of the chair is around 2 cm lower than the knee when the operator sits down.)

5.3 Preventing Backache

5.3.1 When Lifting a Heavy Object

- A man should not lift more than 40% of his weight.
- Bring your body close to the object and lower your center of gravity.
- When lifting the object, place one foot slightly ahead of the other, bend your knees, crouch down and hold the object firmly. Then, slowly straighten your knees and stand up.
- Use stands or similar devices of appropriate heights in order to reduce operations that require bending your back.
- When carrying a heavy object, keep your back straight and avoid twisting.

5.3.2 When Engaged in Deskwork

- Make the same adjustments to desks and chairs for regular deskwork as those for correct viewing of the VDT.
- Position the required work items so that you can use them while maintaining a natural posture.
- Stand up and stretch your back occasionally.

5.3.3 Daily Precautions

- Do physical exercises to prevent abdominal and back muscles losing condition.



Good posture



Bad posture



Good posture



Bad posture

6. Basic Knowledge of Occupational Health

***This is the matter for all persons who are employed by the University of Tokyo**

(School Staff, Teaching Assistants and others).

6.1 Definition of Occupational Accidents

- Occupational accidents refer to injuries, illnesses, disabilities or deaths that occur at work.
Requirements for recognition:
 - Engaged in task: The employee was under the employer's supervision/instruction.
 - Origin of task: The employee incurred the injury etc. while fulfilling his/her job description.
- Compensation that may be available:
 - Medical and other necessary treatment and compensation for sick leave
 - Disability payment, payment to the bereaved in the event of death, etc.

6.2 Occupational Accidents under Special Circumstances

- Accidents during work-breaks
Accidents are recognized as occupational accidents if they result from deficiencies in the safety of the facility or failings in management.
- Accidents during business trips
Employees are considered to be on duty while on business trips, and as such, accidents that occur during business trips are regarded as occupational accidents, except when caused by a private activity.
- Applying for compensation
In order to qualify for compensation, the person who suffers injury, illness, etc., or his/her family must apply for compensation at the relevant Labor Standards Inspection Office. Obtain an employer certificate of occupational accident from the office of the relevant department before applying.
In principle, the application should be submitted within 2 years of the accident (or 5 years for the payment of disability or bereaved family compensation).

6.3 Commuting Accidents

- Commuting accidents refer to injuries, illnesses, disabilities or deaths sustained while commuting to or from work. Although commuting accidents differ from occupational accidents, they are handled similarly.
- If there are any deviations from the normal commuting route or means of travel, the accidents are not considered commuting accidents. However, the following activities are not regarded as deviations:
 - Purchasing daily necessities, or a similar activity
 - Participating in professional training, education at school, etc., including taking evening educational classes
 - Voting in a government election, or a similar activity
 - Consulting or receiving treatment at a hospital, clinic, etc., or a similar activity

7. Health Care and Others

7.1 Health Examinations

- Employees are obliged to maintain good health.
- Employees who are subject to health examinations must take examinations provided by the university. (Employees may choose to receive equivalent health checks at other medical institutions and submit their results.)
- University health checks comprise general checks for all employees and special examinations for employees engaged in certain hazardous jobs.
- Faculty members are obliged to comply with health instructions, etc. following health examinations.

7.2 Mental Health

- The most frequently occurring mental health problem in the workplace is depression. If you suffer any of the following symptoms, seek a consultation with a medical professional promptly:
 - Insomnia, waking up at night, or waking up early in the morning.
 - Feeling that you have not had enough sleep when you awake in the morning.
 - Not feeling like doing anything.
 - Feeling a sense of extreme disinclination toward work.
- If you have concerns about your mental health, you may seek assistance from the following services:
 - Industrial physician
 - Psychiatric and Neurological Department, Health Center (+81-3-5841-2578, ext. 22578)
 - Student supporting room of the School of Science (Rigakubu Old Build. 1 Room No. 237, ext. 28296)

7.3 Sexual Harassment

- Development of a platform of ethics and organization to prevent sexual harassment at the University of Tokyo
- Development of a declaration of prevention of sexual harassment at the University of Tokyo

7.3.1 Consultation Services

If you have concerns about sexual harassment, you may seek assistance from the following:

- Harassment Consultation Center, The University of Tokyo (03-5841-2233, ext. 22233)
- Harassment Counselors, School of Science (Enquire at the offices of individual departments.)

Your privacy is protected, and any information that you provide to these services is strictly confidential. Employees who seek these services need not fear reprisals or discrimination.

8. Laboratory Safety Practices

8.1 General Safety Practices

8.1.1 Principles of Safety Management

Learn about the potential hazards of substances and equipment. Check applicable laws and regulations.

Material Safety Data Sheets (MSDS) are useful for obtaining information on a substance. If you plan to use an extremely hazardous material, you must consider using a less hazardous alternative.

↓

Establish safety measures to avoid creating potential hazards.

↓

Carry out laboratory work with adequate safety measures in place.

8.1.2 Material Safety Data Sheet (MSDS)

Items described in the MSDS

(Information with an asterisk should be notified to persons who deal with compounds.)

1)* Identification of the Substance and of the Manufacturer	9)* Physical & Chemical Properties
2)* Composition & Information on Ingredients	10) Stability & Reactivity
3)* Identification of Hazards	11)* Toxicological Information
4)* First Aid Measures	12) Ecological Information
5) Fire Fighting Measures	13) Disposal Considerations
6)* Accidental Release Measures	14) Transportation Information
7)* Handling and Storage	15) Regulatory Information
8) Exposure Control & Personal Protection	16) Other Information

Note: MSDSs can be obtained from manufacturers, dealers, or the Internet, e.g., <http://www.siyaku.com/>

8.1.3 Precautions during Experiments

- 1) Keep the laboratory clean and uncluttered at all times.
- 2) Do not leave unnecessary chemicals on the laboratory bench. In particular, do not leave chemical containers unattended on the floor.
- 3) Use appropriate protective equipment such as protective goggles in accordance with the nature of the experiment.
- 4) When carrying out experiments, always adopt a serious attitude.
- 5) In general, do not carry out very dangerous or hazardous experiments during the weekend or after-hours. Such experiments must be attended by more than one person.
- 6) Know the location of emergency exits, as well as the location, type and handling of fire extinguishers in case an accident occurs.
- 7) Ensure that all the precautions that are required for unattended machine operations are in place, and display emergency contact numbers near the entrance of the laboratory or where clearly visible.

- 8) University laboratories do not have extraterritorial rights. They must comply with the same safety and health regulations that apply to other research institutions and companies. See “Lists of relevant websites” at the ESM OFFICE HP for further information on these regulations.

8.2 Management of Hazardous Substances

8.2.1 Management Systems for Chemical Substances

The quantity of each chemical substance and high-pressure gas that are used and stored in the School of Science must be managed in accordance with the Management System for Chemical Substances (UTCRIS: https://utcris.adm.u-tokyo.ac.jp/CRIS_v1_0/index.aspx). This system ensures that chemical substances are managed comprehensively and in accordance with the various regulatory requirements of the Law Concerning Reporting, etc. of Pollutant Release and Transfer Register (PRTR) Law, Poisonous and Deleterious Substances Control Law, Fire Services Law, Industrial Safety and Health Law, and others.

Although chemical substances that are not regulated by the rules shown below (8.2.2 hazardous substances (1)-(11)) do not need to be always managed by UTCRIS, it is better to manage them by UTCRIS gradually.

8.2.2 Hazardous Substances

The following are designated hazardous substances by law. The handling and storage of most of these substances are also regulated by law. Sufficient safety measures are needed even when a substance that is not regulated by law is expected to be as hazardous as a regulated substance.

* See Tables 1-9 shown in the “Safe Handling of Hazardous Substances” page at the ESM OFFICE HP.

- 1) Organic solvents (Ordinance on Prevention of Organic Solvent Poisoning, Industrial Safety and Health Law), which are Class 1, Class 2 and Class 3 substances; a total of 54 solvents (Table 1)
- 2) Specified chemical substances (Ordinance on Prevention of Hazards due to Specified Chemical Substances), which are Type 1, Type 2 and Type 3 substances; a total of 53 substances (Table 2)
- 3) Poisonous substances (Poisonous and Deleterious Substances Control Law), which include poisonous substances and specified poisonous substances; a total of 28 substances (Table 3)
- 4) Deleterious substances (Poisonous and Deleterious Substances Control Law); a total of 94 substances (Table 4)
- 5) Narcotics (Narcotics and Psychoactive Drugs Control Law) Narcotics (Table 5)
- 6) Psychoactive drugs (Narcotics and Psychoactive Drugs Control Law) Psychoactive drugs (Table 6)
- 7) Stimulants (Stimulants Control Law) Stimulants (Table 7)
- 8) Chemical substances regulated by PRTR Law (PRTR Law) Class 1 and Class 2, Metropolitan bylaw (See Environmental Science Center HP (<http://www.esc.u-tokyo.ac.jp/>))
- 9) Hazardous substances (Fire Services Law), which are Type 1, Type 2, Type 3, Type 4, Type 5 and Type 6 (Table 8)
- 10) High-pressure gases (High-pressure Gas Safety Law)
- 11) Gases with Special Components (High-pressure Gas Safety Law) (Table 9)
- 12) Radioisotopes (RI) (See section 8.5, “Radiation and Radioisotopes”)
- 13) Biohazardous materials (See section 8.6, “Preventing Biohazards”)

All laboratory personnel who intend to handle a substance specified in the above list must familiarize themselves with the corresponding text of the unabridged version of the Safety Manual (See the “Safety

Instructions for Hazardous Materials” page at the ESM OFFICE HP). These materials must be handled with caution.

8.2.3 Required Knowledge prior to Handling Hazardous Substances

- 1) Before handling a chemical substance, information on the toxicity (acute and chronic toxicity, and carcinogenicity), flammability and explosiveness of the substance must be obtained by consulting the MSDS that is provided by the manufacturer or distributor of the substance.
- 2) Before handling a chemical substance, determine whether it is regulated by law. If a specific procedure is required by law, consult the ESM OFFICE for directions. Before preparing or importing poisonous and deleterious substances and before buying specified poisonous substances, narcotics, psychoactive drugs, and application to stimulants is needed. Permission to receive them is necessary.
- 3) Minimize the use of substances that are considered highly hazardous due to their toxicity, flammability or explosiveness. Efforts to minimize the use of such substances must be taken when drawing up the study protocol. For example, consider whether the use of that substance is absolutely necessary, or whether another substance can be substituted.
- 4) The chemical substance manager from each work-area, such as a laboratory, must take the central role in chemical substance management in regard to health and safety. When dealing with substances designated by the Ordinance on Prevention of Organic Solvent Poisoning, the Ordinance on Prevention of Hazards due to Specified Chemical Substances, and the Industrial Safety and Health Law, the law requires correct handling of such substances, evaluation of the work environment, and specialized medical checkups.

8.2.4 Precautions for Handling Hazardous Substances

- 1) Any person(s) transporting or handling a hazardous substance must fully understand the nature of the substance. In principle, do not allow any employee, such as an office worker, who has not been educated on hazardous substances, to handle hazardous substances.
- 2) Before using any hazardous substance, measures for preventing disasters caused by the substance must be considered and prepared thoroughly. If the substance has the potential to cause a fire or explosion, place fire extinguishers nearby and work with respiratory protective equipment and heat resistant clothing. If a substance has the potential to cause poisoning, wear rubber gloves, a respiratory mask and protective clothing.
- 3) Take measures to prevent spattering, spillage and loss of hazardous substances during handling. Use a solid container with a cap or stopper that will prevent the substance spilling, leaking or evaporating.
- 4) Do not use an open flame heater in a laboratory where a volatile solvent is used.
- 5) Know the locations of fire extinguishers. If there is a risk of fire, ensure, in advance, that a fire extinguisher is close to the work area.
- 6) Turn off the main valve of the gas supply whenever there will be no one in the room.
- 7) Before conducting a potentially hazardous experiment, inform the people nearby, and take appropriate safety measures.
- 8) Experiments must be designed so that the least possible amount of hazardous substances is used, and if the nature of a substance is unknown, a preliminary experiment must be conducted.
- 9) When unsealing a glass ampoule containing a hazardous liquid, use a suitably sized chamber to prevent the substance spattering.

- 10) If a wrench is required to unscrew the cap from a bottle or jar that has become tight, use a buffer such as a cloth to avoid breaking the glass.
- 11) Hazardous substances must not be disposed of with non-hazardous wastes. They must be disposed of in accordance with the methods stipulated in the relevant regulations.

8.2.5 Precautions for Storing Hazardous Substances

- 1) When large amounts of hazardous substances are stored, they must be categorized and stored in warehouses that meet the legal requirements. Poisonous or deleterious substances must be stored in a chemical cabinet under locked conditions.
- 2) During storage, ensure that all containers of chemical substances and of waste liquids are closed.
- 3) Inspect the storage conditions and quantities of hazardous substances when it is considered appropriate, and continuously implement measures to ensure health and safety.
- 4) Generally, store hazardous substances in a cool place and away from direct sunlight and ignition sources such as sparks and heat. Do not store substances with different characteristics in the same location.
- 5) Ensure that stored containers cannot be damaged as a result of falling over, falling from the shelf or colliding, even during an earthquake. Store hazardous substances separately to prevent a fire or explosion caused by spilt substances interacting.
- 6) If an extremely hazardous substance is missing or stolen, the loss must be reported to the chemical substance manager so that measures may be taken to prevent the misuse of the substance or an accident.

8.2.6 Management Required by Regulations for Hazardous Substances

8.2.6.1 Health and Safety Management Required by OPOSP and OPHSCS

(OPOSP: Ordinance on Prevention of Organic Solvent Poisoning; OPHSCS: Ordinance on Prevention of Hazards due to Specified Chemical Substances)

- Managing the Work Environment
 - Preventing vapor and dust discharge (using a fume hood)
 - Assessing the work environment (twice a year)
- Managing Work Procedures
 - Establishing safe work procedures
 - Using personal protective equipment
- Health Management
 - Understanding measures to prevent sickness and injury, and knowing first aid
 - Undertaking specialized medical checkups (twice a year)
- Others
 - Signs and displays referring to the substances being used, and precautions

8.2.6.2 Management that is Required by the Poisonous and Deleterious Substances Control Law,

Narcotics and Psychoactive Drugs Control Law, and Stimulants Control Law.

Common matter:

- Store poisonous and deleterious substances separately from other chemicals in a chemical cabinet or other storage area under locked condition.
- Use UTCRIS to manage the quantity of all substances purchased, used or disposed of, and record the date and name of person who did so.
- Use protective equipment as needed when handling such substances.

Poisonous and Deleterious Substances:

- When preparing, importing, or buying (receiving) the specified poisonous substances, a license is necessary.
- Containers must be labeled as “Poisonous Substance Not for Medical Use” or “Deleterious Substance Not for Medical Use.”

Narcotics:

- When buying (receiving) narcotics, a narcotic researcher license is necessary.
- The narcotic researcher bears the responsibility for management of the narcotics.
- When the narcotic researcher moves to another place, the storage place is changed or the narcotic is disposed of, a notification is necessary.

Psychoactive Drugs:

- When buying (receiving) a psychoactive drug, a notification as “Psychoactive Drug Research Laboratory” is necessary. Although the School of Science has already done the notification, the researcher who intends to use psychoactive drugs must report it to the ESM OFFICE immediately, because management of the research laboratory is necessary.
- A manager and a researcher of the laboratory concerned bear the responsibility for management of psychoactive drugs.
- Change of the storage place etc. must also be notified to the ESM OFFICE.

Stimulants and their ingredients:

- When buying (receiving) stimulants and their ingredients, a researcher must be designated as a stimulant researcher.
- The stimulant researcher bears the responsibility for management of the stimulants and their ingredients.
- When the stimulant researcher moves to another place, the storage place is changed, or the stimulants and their ingredients are disposed of, a notification is necessary.

8.2.6.3 Management that is Required by the Fire Services Law (Hazardous Materials)

- Ensure that stored containers cannot be damaged as a result of falling over, falling from a shelf or colliding. Substances that are potentially hazardous when mixed (e.g., a combination of an oxidizing substance [belonging to Type 1 or 6] with a flammable substance [belonging to Type 2 or 4]) must not be stored in the same location.
- When substances are stored at one fifth or more of the maximum quantity specified by the law, this situation must be reported in accordance with the law.
- In the storage or handling area, possible ignition sources must be strictly controlled and fire-fighting equipment must be installed.
- Use appropriate protective equipment such as goggles and shields in order to ensure personal safety.

8.3 Work Hazards and Safety

- 1) When using equipment that involves extreme temperature, pressure, voltage, speed or weight, implement protective measures and handle the equipment with care.
- 2) When handling specific equipment for the first time, take extra care by carrying out appropriate preparations and, if possible, examine every part of the equipment. Seek expert advice before use.
- 3) Equipment that requires experience and practice must be handled only after the basic operational skills have been acquired. Carelessness may cause a serious accident.
- 4) All equipment must be properly cleaned at the end of each experiment. If any defect is found, repair it or report it to the next user.
- 5) Keep the work area organized to avoid unnecessary noise, vibration and odor. For example, improve work procedures by choosing low-noise and low-vibration equipment.
- 6) Protective equipment must always be ready for use, and the person who is carrying out the experiment or using the equipment, either staff or student, must know the locations of such equipment.
- 7) All personnel must receive training and acquire the knowledge required to use the protective equipment correctly.
- 8) Take special care to disinfect and maintain the protective equipment after use.

8.4 Environmental Safety

Take measures to minimize the negative influence of our educational and research activities on the neighboring area, and implement safety measures to protect our living environment.

- 1) With the Environmental Science Center as a core, we have been trying to minimize and neutralize waste at the university. The regulations specified by the Center must be strictly followed for the proper management of waste. See the website of the Environmental Science Center at <http://www.esc.u-tokyo.ac.jp> for further information.
- 2) Potentially hazardous chemical wastes must be treated properly, even if they are not regulated by law.
- 3) New types of hazardous wastes such as biological and medical wastes must be properly treated at their source.
- 4) The amount of daily waste, including trash, water and paper, is enormous. Strive continuously to reduce waste. Consider fundamental measures to achieve this aim.
- 5) To conserve resources and energy, collect paper, metal, glass and plastic separately for recycling. Actively seek solutions such as developing a recycling system for water and reagent waste in order to protect the environment.
- 6) Do not allow unknown reagents, chemicals and wastes to accumulate. They are a safety threat and require considerable expenditure and effort to dispose of properly. As such, all chemicals must be managed systematically so that unnecessary chemicals are disposed of promptly and unnecessary purchases are avoided. In addition, all chemicals, especially if transferred to different containers, must be properly labeled and immediately discarded when no longer needed.

8.5 Radiation and Radioisotopes (RI)

- 1) Radiation and RI may be used only when its benefit is greater than the risk of working with such

- materials (Justification). Make exposure to radiation as short as possible (optimization) and do not expose to radiation over a radiological dosage at any time (limit of a radiological dosage)
- 2) Radiation and RI must be handled properly in accordance with the Radiation Hazard Prevention Policy at the Faculty of Science (See “Regulations and Rules etc.” at ESM OFFICE HP).
 - 3) The Radiation Management Office was established as a central post to treat the work on the safety and management of radiation and RI at the Faculty of Science. A manager handling radiation is superintending the work on the safety and management for radiation and RI
 - 4) Handling radiation includes using particle accelerator facilities and an x-ray diffractometer or related equipment. Radioactive materials are classified as radioactive isotopes (RI) and nuclear fuel materials and so on.
 - 5) Radiation and RI must be handled only within a designated area (control area). Buying, disposing, and carrying in or out radioactive materials without permission are forbidden.
 - 6) Before using radioisotopes (RI) or a particle accelerator, register as a radiation user. For registration, all personnel wishing to use this must take the training programs offered by the university and faculty and undergo a specialized medical checkup for a person handling radiation and radioactive materials. The user of synchrotron radiation facilities also must follow the same procedure.
 - 7) Before using an x-ray diffractometer or related equipment, register as a radiation user. For registration, all personnel wishing to use this must take the training programs offered by the university and faculty and undergo a specialized medical checkup for a person handling radiation and radioactive materials. The user must follow the instructions of the personnel responsible for the equipment.
 - 8) Before using an electric microscope with accelerating voltage of more than 100 kV, register as a radiation user. For registration, all personnel wishing to use this must take the training programs offered by the university and faculty. The user must follow the instructions of the personnel responsible for the equipment.
 - 9) For the treatment of nuclear fuel materials, follow the instructions of Radiation Management Office, Faculty of Science.
 - 10) In the event of an emergency, take emergency measures and immediately contact the laboratory supervisor, the person in charge of the laboratory, and Radiation Management Office (ext. 24606).
 - 11) When using a radiation facility outside the School of Science, contact the Office of Faculty of Science or Radiation Management Office to request a radiation user certificate.
 - 12) For unclear matters, contact the Radiation Management Office.

Radiation Management Office, Faculty and Graduate School of Science

Tel: ext. 24606, 03-5841-4606 Fax: 03-5841-1363

E-mail: ri@chem.s.u-tokyo.ac.jp

8.6 Preventing Biohazards

- Biohazards are hazards that are posed by artificially modified living organisms or their metabolites that may present a risk to humans or the environment. It is important not only to secure the safety of researchers, but also to consider the environmental impact at all times.
- Biohazards are discussed by the Committee for Experimental Management of the Faculty of Science and are managed by the Biohazard Safety Officer of the Environment Management Office. See “Safety Instructions for Experiments of Life Science” at ESM OFFICE HP.
- Before carrying out recombinant DNA experiments, the person must apply to the Committee for

Experimental Management, the School of Science. The previously issued Instructions for Recombinant DNA Experiments were abolished on February 18, 2004. Thereafter, the use of recombinant DNA has been regulated by the Law concerning the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms. For further information on this law and related regulations, visit the “Instructions for Recombinant DNA Experiments” page at the Ministry of Education, Science, Sports and Culture website (http://www.mext.go.jp/a_menu/shinkou/seimei/dna.htm/). See the “Instructions for Recombinant DNA Experiments” at the ESM OFFICE HP)

9. Education and Research Activities in the Field Work

- 1) For responsibility and duty of field workers and for notification and treatment in the case of an accident, “Regulations of Health and Safety for Education and Research Activities in the Field Work” are established by the University of Tokyo. Field workers and their related persons must obey the regulations, see “Regulations and Rules” on the ESM OFFICE HP.
- 2) Because there are several dangers in field work in contrast to indoor work, read and carry the booklet “Prevention Policy of Accidents in the field work,” which is distributed to related laboratories, in order to prevent accidents.
- 3) Until one week before performing the field work the planning form for Education and Research Activities in the Field Work (download the form “Plan for Field Activity” on the EMS OFFICE HP) must be presented to the EMS OFFICE.

10. Electrical Apparatuses and Facilities

Wrong treatment of electrical apparatuses and facilities (wiring, table tap etc.) causes an electric shock, a fire by overheat, or ignition of a flammable gas by a spark. Most of these accidents can be prevented by the regular check on the following matters.

- 1) When feeling a shock on touching an apparatus, wiring and so on: contact a specialist since it is very dangerous situation due to a leakage of electricity.
- 2) Damage to a film of a code, especially a part of tail of a code and an old code.
- 3) Loose screw, which causes heat and a short circuit.
- 4) Color change of a code or a code with heat due to loose connection, a snap of a wire, or excessive electrical current.
- 5) Unusual sound due to a leakage and a discharge of electricity (Use an apparatus to stop a leakage of electricity)
Impossibility of rotation of a motor (causing over electrical current)
- 6) Bad smell caused by damage of insulation based on a leakage and a discharge of electricity and generation of heat.
- 7) Disconnection of a ground wire. Be careful not to forget to set it again when moving the apparatus.
- 8) Check on resistance of a ground wire more than once per year. Replacing the wrong wire by the correct one.
- 9) Submerged apparatus or a code buried by a heavy apparatus.
- 10) Thin code directly connected to an electric switch (fuse) or a breaker with large capacity. It

catches a fire upon short-circuiting because a fuse and a breaker do not melt and act, respectively, for resistance of the code

11) Self-inspections of protector for insulation must be carried out once every 6 months.

11. Emergency Procedures

- 1) Examples of actual accidents: See “Accident Report” on the ESM OFFICE HP.
- 2) For emergency medical procedures: See the “First aid treatments” page on the ESM OFFICE HP
- 3) For emergency procedures, see “Emergency Responses” (p. 5) of this manual.

Fire Response Manual

The fire alarm has not sounded, but a fire has been confirmed

(If a fire has not been confirmed around the searched area)

area has been

(If a fire has been confirmed)

Go to the fire alarm control room.

Follow the instructions in the manual in the fire alarm control room

Follow the instructions shown below:

1) Call out for other people's help.

Inform others of the fire, and cooperate in the initial response.

2) Press the fire alarm button.

Press the button to sound the alarm bell, which informs the Disaster Information Center. The fire hydrant water pump is activated and the fire hydrant can be used.

3) Take appropriate actions. (Change priorities in accordance with the situation.)

* If the situation is considered dangerous, avoid unnecessary risks – evacuate.

* If any directions are given from the fire alarm control room, follow the directions.

- Extinguish the fire.

Extinguish the fire using fire extinguishers, the fire hydrant, or extinguisher sand, etc. Avoid unnecessary risks.

If a room is locked: Unlock the room with the key kept at the office.

If there is no one in the office, contact the security guard who is responding to the fire alarm.

- Contact the fire alarm control room of the building.

Inform the fire alarm control room (ext. xxxx) of the fire and explain the situation.

If no one answers the call and contact cannot be made, have somebody go to the control room.

- Contact the Fire Department.

Call: 0-119 (outside line)

Say, for example:

There is a fire in Room X on the Xth Floor of Building X of the Faculty of Science at the University of Tokyo, 7-3-1 Hongo, Bunkyo-ku. We need a fire engine. My name is XXX, and I'm studying XXX.

- Evacuate the building.

Notify everybody in the building through the emergency public-address system, etc.

4) Call the Security Guard Room of Yasuda Auditorium, University of Tokyo.

Call: 119 (extension) or 0-5841-4919

Say, for example:

This is Building X of the Faculty of Science. There is a fire in Room X on the Xth Floor. A fire engine has been called. Please guide them to this building.

5) Contact the Head of the Department, the person responsible for fire prevention and the laboratory supervisor.

Contact these people using the communications list.

6) Restore the fire alarm and equipment.

Follow the manual to carry out the required operations in the fire alarm control room.

Numbers for Major Contacts

Emergency contacts	Extension	Direct line
Fire Department	0-119	119
Security Guard Room of Yasuda Auditorium	119	03-5841-4919
Disaster Center, Faculty of Science Area	24016, 28299	03-5841-8299, 03-5841-3299
General Affairs Department, Faculty of Science	24005	03-5841-4005

When the fire alarm sounds or the button is pressed, the alarm is communicated to the Security Guard Room of Yasuda Auditorium, the University of Tokyo, and the Disaster Center, Faculty of Science Area. Security guards will then be dispatched. Signs that indicate how to call these departments are displayed prominently in each room.

Table of Emergency Communications

	What to do	Contacts	TEL	What to report
Disease/Injury	1. Turn off the switch. 2. Call out to nearby people. 3. Apply first aid treatment. Bleeding: Compress with a towel. Unconscious: Perform CPR. 4. Stay calm and take a deep breath. Call the numbers listed in the column to the right. 5. If the injury is not serious, take the injured person to the hospital emergency room.	1. Hospital emergency room	<input type="text"/> ext. 34100 <input type="text"/> outside line/ <input type="text"/> mobile phone 03 (5800) 8683	_____ of the Faculty of Science is injured, and will be taken to the hospital.
		2. Fire Department (When calling an ambulance)	<input type="text"/> ext. 0119 <input type="text"/> outside line/ <input type="text"/> mobile phone 119	Send an ambulance. There is an injured/sick person in Room __ on the __th Floor of ___ Building of the Faculty of Science, XX Campus of the University of Tokyo. The address is XXX, and my name is XXXX.
		3. Security Section, Student Affairs Department	<input type="text"/> ext. 119	There is an injured/sick person in Room __ on the __th Floor of ___ Building of the Faculty of Science. An ambulance has been called. Please guide them here.
		4. General Affairs Department, Faculty of Science	<input type="text"/> ext. 24005	
Fire	1. Call out to nearby people. 2. Turn off switches. Close gas valves. 3. Stay calm. Call the numbers listed in the column to the right. 4. If the fire is small, try to extinguish it. If the fire is large, evacuate.	1. Fire Department	<input type="text"/> ext. 0119 <input type="text"/> outside line/ <input type="text"/> mobile phone 119	Send a fire engine. There is a fire in Room __ on the __th Floor of ___ Building of the Faculty of Science, XX Campus of the University of Tokyo. The address is XXX, and my name is XXXX.
		2. Security Guard Room of Yasuda Auditorium 3. General Affairs Department, Faculty of Science	<input type="text"/> ext. 119 <input type="text"/> ext. 24005	There is a fire in Room __ on the __th Floor of ___ Building of the Faculty of Science. A fire engine has been called. Guidance please.
Problem/Cr	Communicate the problem/crime by calling the numbers listed in the column to the right.	1. Security Guard Room of Yasuda Auditorium	<input type="text"/> ext. 119 <input type="text"/> outside line/ <input type="text"/> mobile phone 03 (5841) 4919	I witnessed _____ in _____ in the Faculty of Science.

		2. Police (If calling the police)	ext. 0110 outside line/ mobile phone 110	I witnessed _____ in _____ in the Faculty of Science, the University of Tokyo. The address is XXX, and my name is XXXX.
Report	In the event of an emergency, take appropriate measures in accordance with the situation, and then call one of the departments listed in the column to the right. If the event is not urgent, first call one of the groups listed in the column to the right.	1. General Affairs Department, Faculty of Science 2. Security Guard Room of Yasuda Auditorium	ext. 24005 ext. 119 outside line/ mobile phone 03 (5841) 4919	Report the details of the event, and the measures taken.