

MANAGEMENT OF EMERGENCIES

Group 4_Case Scenario D_The Chernobyl Radionuclear Event Former Ukrainian Soviet Socialist Republic, 1986

TASK VI: COUNTRY PERSPECTIVE ON THE CASE (Individual Work)

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Introduction

On April 26, 1986, a major reactor accident occurred at the Chernobyl Nuclear Power Plant. It was a radionuclear accident and emergency with Caesium-137. With lack of transparency in the beginning, few documents could be presented to track the event thoroughly from the beginning. With inadequacy of capacity prepared, limited professional responses were taken to contain and mitigate the disaster in the initial phase. However, reviewing the disastrous event and reflecting upon the suffering experience, we shall appreciate the advent of International Health Regulations (2005) (IHR(2005)), esp. in terms of all-hazard-approach, which covers public health events of the radio-nuclear nature.

In my country, there is a platform/network established for events of radio-nuclear nature. The Atomic Energy Council is defined as the central Competent Authority under the Nuclear Emergency Response Act. In order to carry out emergency response action effectively upon the occurrence or possible occurrence of a radio-nuclear accident, and according to the degree of possible impact of the nuclear accident, the central Competent Authority shall activate the National Nuclear Emergency Response Center and the Radiation Monitoring and Dose Assessment Center, the Ministry of National Defense shall activate Nuclear Emergency Support Center, and the local Competent Authority shall activate the Regional Nuclear Emergency Response Center. The central Competent Authority may call upon the Total Defense Mobilization Preparation System to carry out relevant emergency response actions when necessary.

Response Measures

Upon occurrence or possible occurrence of a nuclear accident, the nuclear reactor facility licensee shall promptly carry out response measures according to the Emergency Response Plans for the Nuclear Reactor Facility and notify competent authorities of various levels. Upon completion of the preceding notification, the nuclear reactor facility licensee shall send the

relevant information on the accident to competent authorities of various levels or their associated emergency response organizations at a given time interval according to the provisions laid down by the central Competent Authority.

Upon receipt of the notification, the central Competent Authority shall follow the Emergency Response Basic Plan to take the response measures promptly. When necessary it shall call the designated agency/agencies and the nuclear reactor facility licensee to activate the Nuclear Emergency Radiation Monitoring and Dose Assessment Center to carry out response operations. The central Competent Authority shall report to the Cabinet at appropriate time based on the development of the nuclear accident and set up the National Nuclear Emergency Response Center to proceed with response measures.

Upon receipt of the notification from the National Nuclear Emergency Response Center, the regional Competent Authority shall promptly activate the Regional Nuclear Emergency Response Center to carry out the response measures according to the Public Protection Plan within the emergency planning zone (EPZ) which refers to a zone where the emergency response plan must be carried out and the public protective measures must be taken immediately upon the occurrence of a nuclear accident. The central Competent Authority and the nuclear reactor facility licensee shall dispatch their staff to provide nuclear technical advice to the Regional Nuclear Emergency Response Center. Upon receipt of the notification from the National Nuclear Emergency Response Center, the Ministry of National Defense shall promptly activate the Nuclear Emergency Support Center to assist the disaster relief.

Upon occurrence of a nuclear accident, the turnover of daily necessities and personnel activities within the EPZ shall follow the guidance and control of personnel from emergency response centers of various levels. The designated agency/agencies, the regional Competent Authority, and the nuclear reactor facility licensee shall submit an emergency response working report within a limited period of time specified by the central Competent Authority. The central Competent Authority shall compile the reports into a summary report for the nuclear emergency response, submit it to the Cabinet and make public announcement.

Upon occurrence of a radio-nuclear accident, the government shall inform the neighboring countries and the associated international organizations, e.g. the International Atomic Energy Agency (IAEA) and the Radiation Emergency Medical Preparedness and Assistance Network (REMPAN), at appropriate time, for information sharing and response collaboration.

At the same time, as an event with potential public health risks constitutes the basic notion of a PHEIC when risks of international spread and international travel or trade restrictions are taken into consideration, the State Party shall report a potential PHEIC to WHO in a timely manner. For any event of potential international public health concern, including that of radio-nuclear nature, a potentially notifiable event shall be considered. For potentially notifiable events, there are four questions as criteria in the decision instrument IHR(2005) Annex 2: is the public health impact of the event serious; is the event unusual or unexpected;

is there a significant risk of international spread; is there a significant risk of international travel or trade restrictions. If the answer is yes to any two of the questions, the State Party shall notify WHO within 24 hours of assessment. As to the final determination of a PHEIC, WHO shall make the decision as described in Article 12 of IHR(2005). Specifically, under Article 12, the Director-General shall determine, on the basis of the information received, in particular from the State Party within whose territory an event is occurring, whether an event constitutes a PHEIC in accordance with the criteria and the procedure set out in the Regulations. Taiwan Centers for Disease Control (TCDC), being the National IHR Focal Point (NFP), is responsible for communications with WHO IHR Contact Point based at the Headquarters and for real-time management of information and efficient communications.

The collaborating authorities relevant to radio-nuclear events at the national level include Ministry of Health, Environmental Protection Administration, Council of Agriculture, Ministry of Transportation and Communications, Coast Guard Administration, Ministry of the Interior, Ministry of Economic Affairs, Fair Trade Commission, Council for Economic Planning and Development, Ministry of Justice, Government Information Office, National Communications Commission, Ministry of Education, Central Personnel Administration, Council of Labor Affairs, Veterans Affairs Commission, Ministry of National Defense, Mainland Affairs Council, Ministry of Foreign Affairs, Ministry of Finance, Directorate-General of Budget, Accounting and Statistics, and Financial Supervisory Commission. As an event of radio-nuclear nature may involve issues of, among others, health, environment, agriculture, food-safety, points of entry, human rights, society, and economics, the collaborating authorities thus have pertinent roles in a radio-nuclear event.

All of the stakeholders listed above have local counterparts which are subordinate to or coordinated at the 25 local governments (intermediate level). The levels of involvement are defined in the relevant legal, administrative, or other governmental instruments, which includes legally-binding ones, legally non-binding ones, and other instruments that applicable in all relevant sectors and at all levels. As to non-governmental actors, nationally or locally, relevant stakeholders are recruited according to the legislations and as required. The profiles include health care systems, professional societies, community leaders, industrious sectors, non-governmental organizations, etc.

Recovery Measures

Upon elimination of the causes for the nuclear accident, and the confirmation of completion of every emergency response measure, the National Nuclear Emergency Response Center shall relieve the responsibilities of various emergency response organizations. When necessary, the central Competent Authority shall call upon relevant government agencies of various levels and the nuclear reactor facility licensee to activate the Nuclear Emergency Recovery Committee to take recovery measures, and make the affected regions recovered promptly to normal conditions.

Provisions for the activation, organization, and operation of the preceding Nuclear Emergency Recovery Committee have been laid down by the central Competent Authority. The responsibilities of the Nuclear Emergency Recovery Committee are:

- (1) to determine recovery measures and supervise the implementation of these measures,
- (2) to notify relevant government agencies of various levels and the nuclear reactor facility licensee to implement relevant recovery measures,
- (3) to coordinate the dispatch of manpower and resources for recovery,
- (4) to announce orders for public protective actions during the recovery period,
- (5) to issue press release for recovery, and
- (6) to carry out any other recovery measure.

Communications

Under the IHR(2005) capacity building requirements for surveillance and response, risk communication for public health emergencies includes the range of communication capacities required through the preparedness, response and recovery phases of a serious public health event to encourage informed decision making, positive behaviour change and the maintenance of trust. Through the process of public health emergency communication, assessment, coordination, transparency, and learning to listen shall be practiced. Proactive communication and first announcement of real or potential risks shall be exploited as the event comes up. Analysis of the stakeholders, including the affected, the public, the interested (including the mass media), and the influential parties and their concerns shall be made in advance and updated as the event goes on. Therefore, target messages shall be addressed to the questions and concerns of important stakeholders to ensure public security, protect human rights, and dissolve ethical dilemma.

According to the IHR(2005), National IHR Focal Point (NFP) shall be accessible at all times for communications with the WHO IHR Contact Point. NFP shall send to WHO IHR Contact Point urgent communications, disseminate information to, and consolidate input from, relevant sectors of the administration of the State Party, including those responsible for surveillance and reporting, points of entry, public health services, clinics and hospitals and other government departments. WHO shall collect information regarding events through its surveillance activities and assess their potential to cause international spread and possible interference with international traffic.

Under the Early Notification Convention, the IAEA is the designated international organization that is officially notified by the accident or affected country and provided with relevant information about the accident. WHO, as well as other cooperating international organizations, are notified and provided with further relevant information through the IAEA. WHO helps establish a link between the country making the request and the Radiation Emergency Medical Preparedness and Assistance Network (REMPAN) assisting center(s) and Regional Offices, keeping all REMPAN centers informed about the details of the accident and progress in its management.

The State Party shall assess events occurring within its territory by using the decision instrument in Annex 2. The State Party shall notify WHO, by the most efficient means of communication available, by way of the National IHR Focal Point, and within 24 hours of assessment of public health information, of all events which may constitute a public health emergency of international concern within its territory in accordance with the decision instrument, as well as any health measure implemented in response to those events. If the notification received by WHO involves the competency of the International Atomic Energy Agency (IAEA), WHO shall immediately notify the IAEA. Therefore, the IAEA could also be informed of the event through WHO.

Following a notification, the State Party shall continue to communicate to WHO timely, accurate and sufficiently detailed public health information available to it on the notified event, where possible including case definitions, laboratory results, source and type of the risk, number of cases and deaths, conditions affecting the spread of the disease and the health measures employed; and report, when necessary, the difficulties faced and support needed in responding to the potential public health emergency of international concern. For an event like the Chernobyl radionuclear accident, capacity surge shall be required to monitor on and respond to the event. Professional capacity can be recruited from IAEA, REMPAN, and the international communities as required.

Even in the case of events not requiring notification as provided in Article 6, in particular those events for which there is insufficient information available to complete the decision instrument, the State Party may nevertheless keep WHO advised thereof through the National IHR Focal Point and consult with WHO on appropriate health measures. The State Party in whose territory the event has occurred may request WHO assistance to assess any epidemiological evidence obtained by that State Party.

WHO may take into account reports from sources other than notifications or consultations and shall assess these reports according to established epidemiological principles and then communicate information on the event to the State Party in whose territory the event is allegedly occurring. States Parties shall, as far as practicable, inform WHO within 24 hours of receipt of evidence of a public health risk identified outside their territory that may cause international disease spread. Thereon, WHO could still take actions in pursuit of the pertinent Articles.

WHO shall request verification from the State Party of reports from sources other than notifications or consultations of events which may constitute a public health emergency of international concern allegedly occurring in the State's territory. In such cases, WHO shall inform the State Party concerned regarding the reports it is seeking to verify. When requested by WHO, the State Party shall verify and provide: (a) within 24 hours, an initial reply to, or acknowledgement of, the request from WHO; (b) within 24 hours, available public health information on the status of events referred to in WHO's request; and (c) information to WHO

in the context of an assessment under Article 6, including relevant information as described in that Article. When WHO receives information of an event that may constitute a public health emergency of international concern, it shall offer to collaborate with the State Party concerned in assessing the potential for international disease spread, possible interference with international traffic and the adequacy of control measures. Such activities may include collaboration with other standard-setting organizations and the offer to mobilize international assistance in order to support the national authorities in conducting and coordinating on-site assessments. When requested by the State Party, WHO shall provide information supporting such an offer. If the State Party does not accept the offer of collaboration, WHO may, when justified by the magnitude of the public health risk, share with other States Parties the information available to it, whilst encouraging the State Party to accept the offer of collaboration by WHO, taking into account the views of the State Party.

WHO shall send to all States Parties and, as appropriate, to relevant intergovernmental organizations, as soon as possible and by the most efficient means available, in confidence, such public health information which it has received and which is necessary to enable States Parties to respond to a public health risk. WHO should communicate information to other States Parties that might help them in preventing the occurrence of similar incidents. WHO shall use information received for verification, assessment and assistance purposes under these Regulations. WHO shall consult with the State Party in whose territory the event is occurring as to its intent to make information available. When information received by WHO is made available to States Parties in accordance with these Regulations, WHO may also make it available to the public if other information about the same event has already become publicly available and there is a need for the dissemination of authoritative and independent information.

At the request of the State Party, WHO shall collaborate in the response to public health risks and other events by providing technical guidance and assistance and by assessing the effectiveness of the control measures in place, including the mobilization of international teams of experts for on-site assistance, when necessary. If WHO, in consultation with the States Parties concerned as provided in Article 12, determines that a public health emergency of international concern is occurring, it may offer further assistance to the State Party, including an assessment of the severity of the international risk and the adequacy of control measures. Such collaboration may include the offer to mobilize international assistance in order to support the national authorities in conducting and coordinating on-site assessments. When requested by the State Party, WHO shall provide information supporting such an offer. When requested, WHO shall provide appropriate guidance and assistance to other States Parties affected or threatened by the public health emergency of international concern. In cases in which notification or verification of, or response to, an event is primarily within the competence of other intergovernmental organizations or international bodies, WHO shall coordinate its activities with such organizations or bodies in order to ensure the application of adequate measures for the protection of public health.

States Parties shall undertake to collaborate with each other, to the extent possible, in: (a) the detection and assessment of, and response to, events as provided under these Regulations; (b) the provision or facilitation of technical cooperation and logistical support, particularly in the development, strengthening and maintenance of the public health capacities required under these Regulations; (c) the mobilization of financial resources to facilitate implementation of their obligations under these Regulations; and (d) the formulation of proposed laws and other legal and administrative provisions for the implementation of these Regulations. WHO shall collaborate with States Parties, upon request, to the extent possible. Collaboration under this Article may be implemented through multiple channels, including bilaterally, through regional networks and the WHO regional offices, and through intergovernmental organizations and international bodies.

Governance and Responsibilities

To establish an emergency response system in the event of a radio-nuclear accident, and to strengthen the emergency response functions so as to ensure the safety and health of the public and to protect their properties, the emergency response for radio-nuclear accidents is stipulated in accordance with the Act; situations not covered by the Act are to be dealt with according to the Disaster Prevention and Relief Act and the provisions of other relevant codes.

The Competent Authority is the Atomic Energy Council (AEC) of the Cabinet at the central government level. The central Competent Authority shall properly classify degrees of possible impact of the nuclear accident, and lay down response and notification provisions accordingly. At the local government level are the municipal government and the county (city) government governing the EPZ.

In order to carry out emergency response action effectively upon the occurrence or possible occurrence of a nuclear accident, and according to the degree of possible impact of the nuclear accident, the central Competent Authority shall activate the National Nuclear Emergency Response Center and the Radiation Monitoring and Dose Assessment Center, the Ministry of National Defense shall activate Nuclear Emergency Support Center, and the local Competent Authority shall activate the Regional Nuclear Emergency Response Center. The central Competent Authority may call upon the Total Defense Mobilization Preparation System to carry out relevant emergency response actions when necessary.

The activation timing, operational procedures, and grouping of the preceding National Nuclear Emergency Response Center and the Radiation Monitoring and Dose Assessment Center have been laid down by the central Competent Authority. The operational procedures and grouping of the Nuclear Emergency Support Center have been laid down by the Ministry of National Defense. The operational procedures and grouping for the Regional Nuclear Emergency Response Center have been laid down by the local Competent Authority.

The nuclear reactor facility licensee shall set up a dedicated Nuclear Emergency Response Unit, and activate the Nuclear Emergency Response Organization within the facility upon the occurrence or possible occurrence of a nuclear accident. The establishment of the Nuclear Emergency Response Unit and the activation timing, operational procedures and grouping of the Nuclear Emergency Response Organization within the facility have been drawn up by the facility licensee and submitted to the central Competent Authority for approval.

The National Nuclear Emergency Response Center shall:

- (1) plan and supervise the implementation of response measures,
- (2) analyze, assess, and manage the nuclear accident,
- (3) notify the local Competent Authority to activate the Regional Nuclear Emergency Response Center,
- (4) notify the Ministry of National Defense to activate Nuclear Emergency Support Center,
- (5) issue press release and activate public notification systems,
- (6) announce orders for public protection actions,
- (7) dispatch manpower and resources of the designated agencies, and
- (8) implement any other measure to prevent enlargement of the hazard.

The Regional Nuclear Emergency Response Center shall:

- (1) carry out the protective actions of sheltering, iodine tablet distribution, and public evacuation/transportation in accordance with the command given by the National Nuclear Emergency Response Center,
- (2) assist in issuing press release and activating public notification systems,
- (3) arrange accommodations, temporary relocation, and emergency medical aid for the evacuees,
- (4) carry out traffic control, security, and order maintenance of the accident affected area, and
- (5) implement any other measure to prevent enlargement of regional hazard.

The Nuclear Emergency Radiation Monitoring and Dose Assessment Center shall:

- (1) carry out radiation measurements for personnel, vehicles, and the environment,
- (2) assess the degree and affected area of the accident, evaluate public radiation dose, and propose protective actions,
- (3) provide sufficient information and technology to the various levels of emergency response centers, and
- (4) implement any other measure as assigned by the National Nuclear Emergency Response Center.

When the Nuclear Emergency Radiation Monitoring and Dose Assessment Center carries out the preceding items, the designated agencies and the nuclear reactor facility licensee shall dispatch staff to assist.

The nuclear reactor facility licensee shall provide a workplace and necessary equipment at an appropriate location for the Nuclear Emergency Radiation Monitoring and Dose Assessment

Center. The licensee is responsible for the maintenance, management, and testing of the workplace and various equipment at ordinary times.

The Nuclear Emergency Support Center shall:

- (1) carry out the decontamination of contaminated personnel, vehicles, and major roads,
- (2) assist the Regional Nuclear Emergency Response Center in carrying out public sheltering, evacuation/transportation, accommodation of evacuees, temporary relocation, emergency medical aid, iodine tablet distribution, traffic control, security, and order maintenance,
- (3) assist the Nuclear Emergency Radiation Monitoring and Dose Assessment Center in radiation measurement, and
- (4) implement any other measure as assigned by the National Nuclear Emergency Response Center.

The Nuclear Emergency Response Unit shall:

- (1) provide relevant support, coordination, and suggestion for the emergency response operations within the nuclear reactor facility upon the occurrence or possible occurrence of a nuclear accident,
- (2) collect and analyze accident information, and assess radiation dose and its degree of impact,
- (3) coordinate with emergency response centers of various levels to carry out relevant response measures,
- (4) notify, communicate, and coordinate with competent authorities of various levels and seek outside support, and
- (5) supervise and evaluate emergency response affairs within the nuclear reactor facility, and conduct exercise planning.

The Nuclear Emergency Response Organization within the Facility shall:

- (1) control, analyze, and assess accident conditions and take proper response,
- (2) conduct environmental radiation measurement and dose assessment,
- (3) direct and implement the emergency response actions within the facility,
- (4) make accident notification and communication and provide relevant information, and
- (5) implement protective actions for workers and control measures within the facility.

The nuclear reactor facility licensee shall follow the provisions laid down by the central Competent Authority to define the Emergency Planning Zone (EPZ) in the surrounding area of a nuclear reactor facility, and review and revise periodically; its definition or revision shall be submitted to the central Competent Authority for approval and announcement. The nuclear reactor facility licensee shall periodically submit the analysis and planning of the public protective measures within the EPZ to the central Competent Authority for approval, and set up necessary places and equipment according to the approved analysis and planning. For the preceding necessary places and equipment to be set up, the competent authorities of various levels and the designated agencies shall provide necessary assistance.

The central Competent Authority shall consult each designated agency to lay down the Emergency Response Basic Plan and the Nuclear Emergency Public Protective Action Guides, submit them to the Cabinet and make public announcement upon approval. The regional Competent Authority shall lay down the Public Protection Plan within the EPZ according to the Emergency Response Basic Plan and the Nuclear Emergency Public Protective Action Guides. The nuclear reactor facility licensee shall draw up the Emergency Response Plan for the Nuclear Reactor Facility. The Public Protection Plan within the EPZ and the Emergency Response Plan for Nuclear Reactor Facility shall be submitted to the central Competent Authority for approval and announcement.

The central Competent Authority shall periodically select an EPZ and conduct exercise according to the approved Emergency Response Basic Plan. The designated agencies, the regional Competent Authority, the nuclear reactor facility licensee, and the public and private schools, local government agencies, organizations, companies, factories, and the public shall cooperate in carrying out the preceding exercise. The preceding schools, local government agencies, organizations, companies and factories shall grant an official leave of absence to those personnel who participate in the exercise. For each nuclear reactor facility, the licensee shall periodically carry out the exercise according to the Emergency Response Plans for the Nuclear Reactor Facility.

The central Competent Authority shall conduct the following according to the approved Emergency Response Basic Plan:

- (1)operations of the National Nuclear Emergency Response Center,
- (2)planning, supervision, and coordination of preparedness, training, and exercise,
- (3)personnel grouping and training, and equipment testing and maintenance,
- (4)inspection and testing of preparedness measures of nuclear emergency response,
- (5)compilation and revision of operational procedures,
- (6)planning and implementation through empowerment of research and development items and
- (7)other relevant items.

The designated agency/agencies shall follow the Emergency Response Basic Plan to carry out personnel grouping and training, and equipment testing and maintenance. When the designated agency carries out personnel grouping and training, competent authorities of various levels and the nuclear reactor licensee shall provide necessary assistance.

In order to effectively carry out public protective actions, the regional Competent Authority shall follow the approved Public Protection Plan within the EPZ to:

- (1)conduct personnel grouping, training, and exercise,
- (2)install, test, and maintain equipment and facility,
- (3)store, inspect, and dispatch public protective materials and equipment, and
- (4)plan and implement items of other emergency response and preparedness measures.

When the regional Competent Authority carries out the preceding items, the central Competent Authority, the designated agency/agencies, and the nuclear reactor facility licensee shall provide necessary assistance.

The nuclear reactor facility licensee shall follow the approved Emergency Response Plan for the Nuclear Reactor Facility to:

- (1)conduct personnel grouping and exercise,
- (2)install, test, and maintain equipment and facility,
- (3)establish and revise operational procedures,
- (4)record and safekeep documents and data, and
- (5)carry out other relevant items.

The central Competent Authority shall inspect and test, at anytime, relevant measures regarding nuclear emergency response and preparedness as implemented by the designated agency/agencies, the regional Competent Authority and the nuclear facility licensee. The organizations being inspected shall not evade, interfere, or refuse.

Upon completion of the preceding inspection and testing or deemed necessary, the central Competent Authority may require the designated agency/agencies, the regional Competent Authority, and the nuclear reactor facility licensee to correct or improve the emergency response and preparedness measures, and equipment as well, within a limited period of time.

Competent authorities of various levels shall educate the public in the EPZ and its nearby regions in the emergency response plan. The nuclear facility licensee shall provide necessary assistance to the preceding public education.

According to the Nuclear Emergency Response Act, penalties will be applied to being irresponsible, failure to provide assistance, failure to revise EPZ, failure to provide public protection measures, refusal of inspection and testing, failure to carry out maintenance, management, and testing, failure to correct and improve, necessary assistance, etc.

In order to implement the preparedness measures for nuclear emergency response, and to support response operations during the occurrence or possible occurrence of an accident, the central Competent Authority shall collect a certain amount of money from the nuclear reactor facility licensee each year for every nuclear reactor facility to set up a Nuclear Emergency Response Fund. The income and expenditure, the safekeeping, and the utilization of the fund are prescribed by the Cabinet.

For the events of radio-nuclear nature per se, besides the Nuclear Emergency Response Act, the legislations further include the Atomic Energy Law, the Nuclear Damage Compensation Law, the Ionizing Radiation Protection Act, the Nuclear Materials and Radioactive Waste Management Act, the Nuclear Reactor Facilities Regulation Act, the Regulations for the Review and Approval of Applications for Construction License of Nuclear Source Material and

Nuclear Fuel Production and Storage Facilities, the Regulations for the Review and Approval of Applications for Decommissioning Permit of Nuclear Reactor Facilities, the Regulations for the Nuclear Source Materials Operational Safety Management, the Regulations for the Nuclear Fuels Operational Safety Management, the Regulations on Treatment and Storage of Radioactive Waste and Safety Management of the Facilities, the Radioactive Substance Transportation Regulations, the Administrative Regulations for Waste Generated from Naturally Occurring Radioactive Materials, the Radioactive Workplace Management and Surveillance Guideline, the Radio-nuclear Protection Safety Standard, etc.

Reference

IHR(2005) Implementation Course Materials

Nuclear Emergency Response Act

Atomic Energy Law

Nuclear Damage Compensation Law

Ionizing Radiation Protection Act

Nuclear Reactor Facilities Regulation Act

Nuclear Materials and Radioactive Waste Management Act

Regulations for the Nuclear Source Materials Operational Safety Management Regulations for Nuclear Fuels Operational Safety Management

Radioactive Workplace Management and Surveillance Guideline

Radio-nuclear Protection Safety Standard

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Group 4_Case Scenario D_The Chernobyl Radionuclear Event Former Ukrainian Soviet Socialist Republic 1986