Contents
Training Course of Nuclear Plant Safety (NPS)

Lectures:

<L-1> Nuclear Power in Japan

- ✓ Efforts for nuclear power generation in Fukui prefecture: History, Accident response and Consensus building
- ✓ The Japanese nuclear regulation law
- ✓ Introduction of the environmental impact assessment law

<L-2> Radiation and Impact on the Human Body

- ✓ Effects of radiation: Deterministic and stochastic health effects, Radiation doses exposed in the daily life
- ✓ Type of exposure: Internal and external exposure, Acute and Chronic exposure and Others
- ✓ Measures for food and drinking restriction implemented by the government after the Fukushima Daiichi Nuclear Accident
- ✓ International framework of radiation protection

<L-3> IAEA Safety Standards

- ✓ Different in regulations between nuclear and conventional industries
- ✓ IAEA Safety Standard – Safety Fundamentals
- ✓ IAEA Safety Standard – Safety Requirements
- ✓ IAEA Safety Standard – Safety Guides

<L-4> Nuclear Regulation in Japan

- ✓ Introduction of Japanese nuclear regulation authority
- ✓ Legislation of nuclear regulation in Japan
- ✓ New safety standards for NPP

<L-5> Fundamentals of Reactor Physics -Fission reaction and reactivity-

- ✓ Nuclear reactions
- ✓ Diffusion theory
- ✓ Reactivity coefficients
- ✓ Understanding of reactivity accident

<L-6> Nuclear Non-proliferation and Nuclear Security

- ✓ Nuclear Nonproliferation and Safeguards
- ✓ Nuclear security against various threats
- ✓ Capacity building support activities of ISCN*

  * ISCN is a support center aimed at strengthening nuclear security in the Asia.

<L-7> Severe Accident in the Fukushima Daiichi Nuclear Power Plant and Lessons- Learned

- ✓ Outline of the Fukushima Daiichi Nuclear Accident
- ✓ Technical findings
- ✓ Lessons learned from the accidents

<L-8> Safety Design Feature for New Reactor

- ✓ Explanation of new reactor's design concept, characteristic and safety systems
- ✓ New reactor's economy and reliability
- ✓ Systems for mitigating severe accident
- ✓ Defense in Depth (DiD) concept

<L-9> Decommissioning of Nuclear Power Plants and Management of radioactive waste

- ✓ Measures of decommissioning dismantling, site release and technology development
- ✓ Decommissioning of usual NPPs in Japan
- ✓ Disposal system and concept of Low Level Waste (LLW) and High Level Waste (HLW)
- ✓ Deep geological disposal and long-term safety assessment

<L-10> Outline of Project Management for Nuclear Power Plant Construction

- ✓ Outline of Tsuruga units 3 and 4 construction project
- ✓ Outline of procedures: Site selection, Environmental survey, Installation permission, Construction and Pre-Service inspection

<L-11> Emergency Preparedness and Response

- ✓ Outline and actual condition of damage of Great East Japan Earthquake and the Fukushima Daiichi Nuclear Accident
- ✓ Preparedness and response for radiological emergency in Japan
- ✓ Emergency preparedness: Criteria of IAEA and Example of Tsuruga city

<L-12> Nuclear Safety Culture

- ✓ Concept of Nuclear Safety Culture
- ✓ Past Nuclear Accidents and Safety Culture
- ✓ Actual examples for safety culture developing activity of plant operators
- ✓ Self-check of your safety culture

<L-13> Safety Assessment of Reactor Plants (PWR, BWR)

- ✓ Introduction of safety assessment
- ✓ DiD concept
- ✓ IAEA's requirements
- ✓ Deterministic Safety Assessment (DSA) and Probabilistic Safety Assessment (PSA)

<L-14> Safety management, operation management and radiation management of NPP

- ✓ Basic requirements for Managing Operational Safety in NPP ; Safety culture, Leadership, Quality Management Systems, Human Resource Development and others
- ✓ Safety management system in NPP
- ✓ Plant operation management, Maintenance management and Periodic inspection
- ✓ Radiation control of NPP

<L-15> Maintenance of Nuclear Power Plants

- ✓ Outline of the Kansai Electric Power Co., LTD. (KEPCO)
- ✓ Maintenance activities in KEPCO: Inspection plan and Periodic inspection

<L-16> Human Resource Development (HRD) for Nuclear Power

- ✓ Educational system and training management for Nuclear power sector
- ✓ Response to issues pertaining to fostering of human resources
- ✓ Outline of the nuclear power training center and the operation support center

<L-17> Approach to Human Factors in Nuclear Power

- ✓ Introduction of Human factor
- ✓ Required consciousness and behavior of people working at NPP
- ✓ Japan's effort based on the IAEA Safety Culture

<L-18> Role of Research Reactors

- ✓ Role of research reactors for power generation, medical use, HRD and others
- ✓ Major research reactors in Japan
- ✓ Research reactors in the world

<L-19> Nuclear Technology for Global Society and Economy

- ✓ Outline of nuclear power: world energy demand and Nuclear fuel cycle
- ✓ Non-power applications of nuclear technology

<L-20> Outline of Nuclear Fuel Cycle

- ✓ Uranium resource
- ✓ FBR cycle and Monju
- ✓ Outline of nuclear fuel cycle including mining, Enrichment, Reprocessing
- ✓ LWR cycle

Facility Visit:

<V-1> Mitsubishi Heavy Industries, Ltd. (Kobe Shipyard & Machinery Works)

- ✓ Factory visit of a major vendor company in Japan where main components of nuclear power plant is manufactured

<V-2> Tsuruga Nuclear Power Station of Japan Atomic Power Company (JAPC)

<V-3> Nuclear Emergency Response Operation Facility - Off-Site Center of the Nuclear Regulation Authority (NRA)

<V-4> Fukui Prefectural Environmental Radiation Research and Monitoring Center of the Fukui Prefectural Government

<V-5> Decommissioning Engineering Center Fugen of Japan Atomic Energy Agency (JAEA)

<V-6> Preparatory Work Field of Units 3 and 4 of Tsuruga NPP Construction (JAPC)

<V-7> The Wakasa Wan Energy Research Center (WERC)

- ✓ Research facility including accelerator for mutation breeding of plants

<V-8> The Prototype Fast Breeder Reactor Monju (JAEA)

Discussion:

<Discussion-1> Strategy and challenge of nuclear energy development in my country

<Discussion-2> Leadership on nuclear safety

<Discussion-3> Challenges of Asian countries confronting nuclear power programs

Practice:

<P-1> UTR-KINKI Reactor Training (Kindai University)

- ✓ Reactor operation and Reactivity Measurement
- ✓ Neutron Radiography

<P-2> Practice by Nuclear Power Plant Simulator (JAPC)

- ✓ Practical operation of nuclear power plant using simulator

<P-3> Practice for Body Sensing Safety (JAPC)

- ✓ Hands on training against danger in the job situation, such as electrification, job in high place, and others

Country Report

On the Discussion-1, participants are required to make 10 minutes presentation on "Strategy and challenge of nuclear energy development in my country".

Participants are requested to prepare a presentation that includes as following contents;

- ✓ Electric power situation and challenges in your country
- ✓ Nuclear power situation in your country
- ✓ You and your Institution's role for nuclear power
- ✓ Motivation to participate in this training course
- ✓ Other necessary contents as appropriate