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Introduction to Regulatory Framework of RP Education & Training for Radiation Workers in Korea

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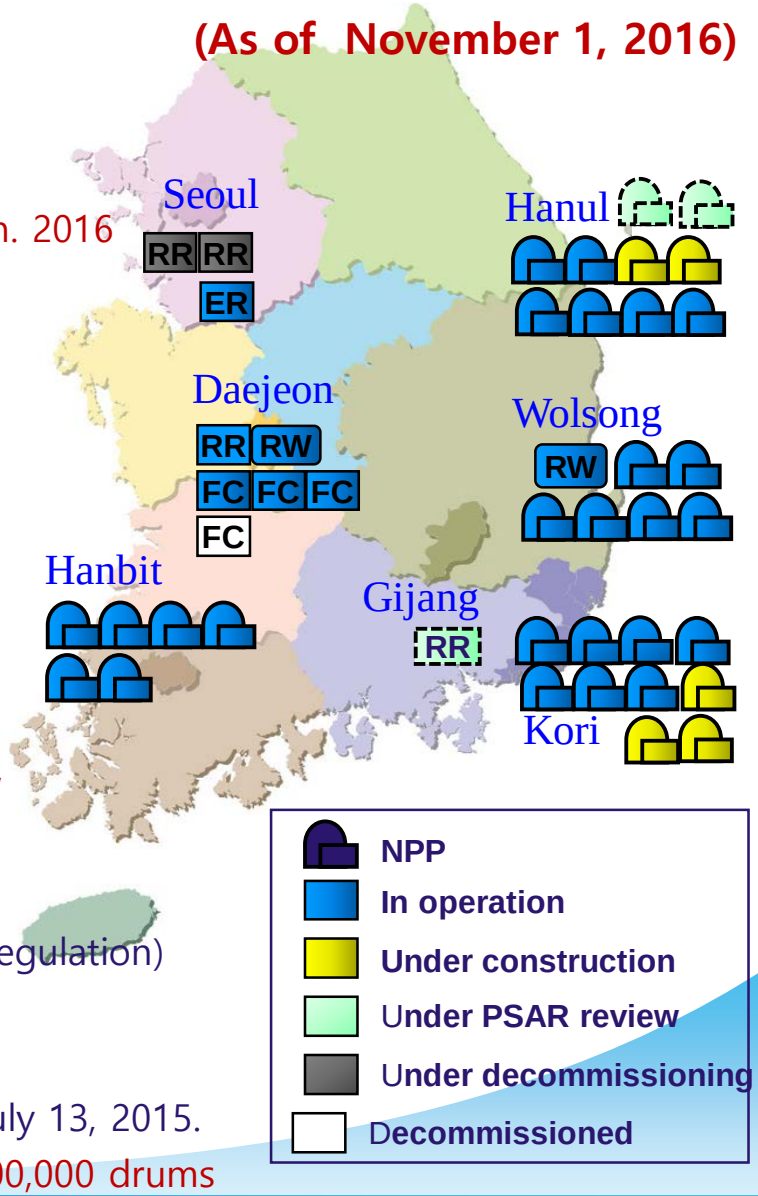
Contents

1. Major Nuclear Facilities in Korea

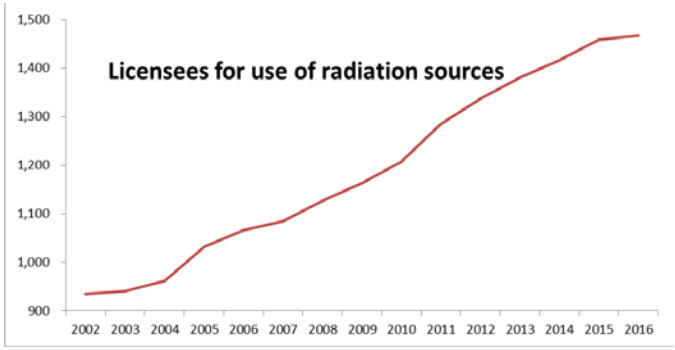
- **Nuclear Power Plant (NPP)**
  - 25 units in operation and 5 units under construction
    → SHIN-KORI Unit 5 & 6 : CP issued on June, 2016
  - 2 units under PSAR review for CPs
    → SHIN-HANUL Unit 3 & 4 : Safety review began on Jan. 2016
- **Research Rector (RR) / Education Reactor (ER)**
  - KRR 1 and 2 (RR, under decommissioning)
    → SFs (KRR 1 & 2) were returned to USA in 1998.
  - AGN (ER)
  - HANARO (RR)
  - Gijang (RR, under review for CP)
    → Gijang Research Reactor : under safety review for CP
- **Nuclear Fuel Cycle Facility (FC)**
  - Fuel Fabrication Plant for NPP
    → Additional NPP Fuel Fab. Facility : under safety review
  - Fuel Fabrication Facility for RR
  - Post-Irradiation Examination Facility (PIEF)
  - Uranium Conversion Facility (Decom. & Released from Regulation)
- **Radioactive Waste Management Facilities (RW)**
  - Daejeon RI Waste Management Facility
  - Wolsong LILW Disposal Center : 1st disposal in Silo on July 13, 2015.
    → Disposed (Dec. 31, 2015) : 3008 drums vs. Designed 100,000 drums



1.1 Licensees for Use of Radiation Sources in Korea

Date : Aug., 2016

Licensees for Use of	Total Facilities
Radiation Sources	1466



The number of licensees for use of radiation sources in Korea is increasing gradually every year.

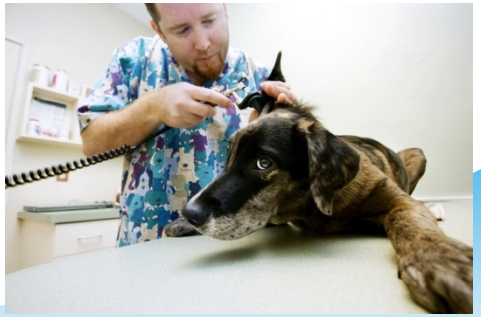
2. Regulatory Framework for Radiation Workers

- **3 different authorities are responsible for radiation workers.**
  - (1) NSSC : Nuclear Safety and Security Commission
    - Responsible for radiation workers, such as in nuclear power plants, nuclear facilities and nuclear medicine, other than medical diagnostic radiology and veterinary medicine
  - (2) MOHW : Ministry of Health and Welfare
    - Responsible for radiation workers in medical diagnostic radiology
  - (3) MAFRA : Ministry of Agriculture, Food and Rural Affairs
    - Responsible for radiation workers in veterinary medicine

Nuclear Safety and Security Commission

Ministry of Health and Welfare

Ministry of Agriculture, Food and Rural Affairs



2.1 Rad. Workers in Medical Diagnostic Radiology

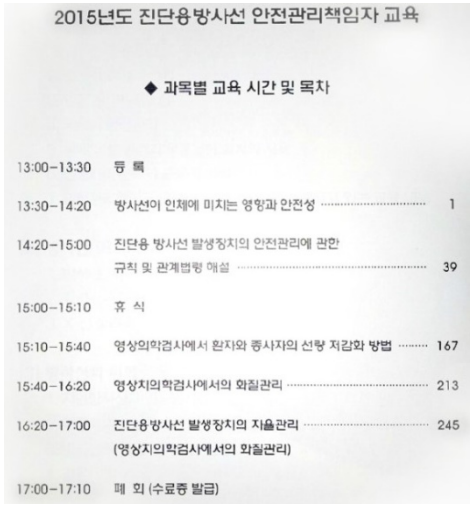
- **Enactment of rules on radiation safety management (Jan. 6, 1995)**
  - Periodic inspections on radiation generators and etc.
  - Designation of a radiation safety manager
  - Measurement of exposure doses of radiation workers (TLD: quarterly)
  - Periodic medical surveillance (every two years)
  - Applied to medical institutions : X-ray, CT, PET-CT, etc. are utilized
  - Not Applied to small hospitals : where only X-ray is utilized and the maximum operational load per week is less than 10mA-min
    - For small hospitals, Only periodic inspection on the facilities is applied.
    - Other regulations (measurement of doses, classification of radiation areas, designation of radiation safety manager, periodic medical surveillance) are not applied
- **After Fukushima accident in Japan (March, 2011)**
  - Regulations continued to be asked to be more strengthened.
  - However, actual strengthening was not attained yet in Medical Diagnostic Radiology.
    - Plan to strengthen RP E&T by implementing Periodic E&T for radiation safety manager & Direct E&T of radiation workers

2.1 Rad. Workers in Medical Diagnostic Radiology

- **Radiation protection education and training in med. diag. radiology**
  - RP E&T for radiation workers are conducted by radiation safety managers themselves.
  - RP E&T for radiation safety managers are conducted by an institute (names as Korea Foundation of Medical Radiology) approved by the authority (MOHW, Ministry of Health & Welfare).
  - Usually, radiation safety managers E&T duration is less than 4 hrs.

Registration

During RP E&T

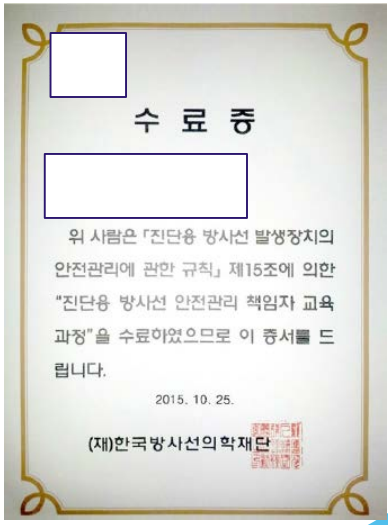


2015년도 진단용방사선 안전관리책임자 교육

◆ 과목별 교육 시간 및 목차

13:00–13:30	등 록	
13:30–14:20	방사선이 인체에 미치는 영향과 안전성	1
14:20–15:00	진단용 방사선 발생장치의 안전관리에 관한 규칙 및 관계법령 해설	39
15:00–15:10	휴 식	
15:10–15:40	영상의학검사에서 환자와 종사자의 선량 저감화 방법	167
15:40–16:20	영상치의학검사에서의 화질관리	213
16:20–17:00	진단용방사선 발생장치의 자율관리 (영상치의학검사에서의 화질관리)	245
17:00–17:10	폐 회 (수료증 발급)	

Time Table



수 료 증

위 사람은 「진단용 방사선 발생장치의 안전관리에 관한 규칙」 제15조에 의한 "진단용 방사선 안전관리 책임자 교육 과정"을 수료하였으므로 이 증서를 드립니다.

2015. 10. 25.

(재)한국방사선의학재단

Certificate

2.1 Rad. Workers in Medical Diagnostic Radiology

- **Possible issues on RP E&T**
  - Possibility of ineffective or insufficient RP E&T for radiation workers due to self-education that is conducted by radiation safety managers.
  - Lack of periodic RP E&T for radiation safety managers, because RP E&T for a radiation safety manager is conducted only once when a person is designated as a radiation safety manager.
- **RP E&T in medical diagnostic radiology is necessary to be strengthened, so that radiation workers and radiation safety managers are informed periodically of safely managing radiation risks.**

- **Claims from some medical institutions**
  - They claim "RP E&T contents are not changed each time. Taking RP E&T one or two times is sufficient. So, Periodic E&T is not necessary."
- **However, Lessons-learned notify us that Periodic RP E&T is important for radiation workers to keep alert on radiation risks.**
  - Necessary for RP E&T contents to keep updated to make listeners feel useful and alert, such as by useful knowledge, near misses or accidents.

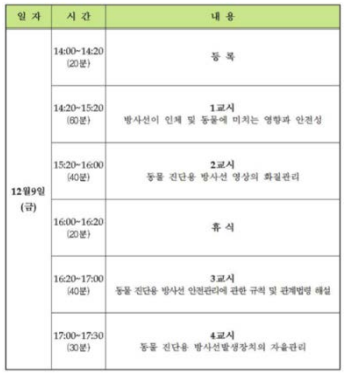
2.2 Radiation Workers in Veterinary Medicine

- **Enactment of rules on radiation safety management (Jan. 26, 2011)**
  - Regulations on rad. safety management between med. diagnostic radiology and veterinary medicine are similar to each other.
    - Periodic inspections on radiation generators and etc.
    - Designation of a radiation safety manager
    - Measurement of exposure doses of radiation workers (TLD: quarterly)
    - Periodic medical surveillance (every two years)
    - Applied to animal hospitals : where X-ray and/or CT are utilized
    - Not Applied to small hospitals : where only X-ray is utilized and the maximum operational load per week is less than 10mA-min
      - For small hospitals, Only periodic inspection on the facilities is applied.
      - The Other regulations (radiation safety manager, measurement of doses, medical surveillance) are not applied
- **After Fukushima accident in Japan (March, 2011)**
    - Regulations continued to be asked to be more strengthened.
- **A range of application extended to small hospitals (May 13, 2016)**
    - The range modified from (less than 10mA-min) to (less than 8mA-min)
      - It means 96 shots per week, based on 1 shot of 5mA-sec

2.2 Radiation Workers in Veterinary Medicine

- **Radiation protection education and training in veterinary medicine**
  - RP E&T for radiation workers are conducted by radiation safety managers themselves.
  - RP E&T for radiation safety managers are conducted by an institute (Korean Veterinary Medical Association) approved by the authority (MAFRA, Ministry of Agriculture, Food and Rural Affairs).
  - Usually, radiation safety managers E&T duration is less than 4 hrs.

Notice for RP E&T



일 자	시 간	내 용
12월9일 (금)	14:00~14:20 (20분)	등 록
	14:20~15:20 (60분)	1교시 방사선이 인체 및 동물에 미치는 영향과 안전성
	15:20~16:00 (40분)	2교시 동물 진단용 방사선 영상의 화질관리
	16:00~16:20 (20분)	휴 식
	16:20~17:00 (40분)	3교시 동물 진단용 방사선 안전관리에 관한 규칙 및 관계법령 해설
	17:00~17:30 (30분)	4교시 동물 진단용 방사선발생장치의 자율관리

Time Table

- **Possible issues on RP E&T are similar to possible issues in medical diagnostic radiology in the previous slide.**
  - Because regulations on RP E&T in veterinary medicine are similar to those of medical diagnostic radiology.

2.3 Radiation Workers in Nuclear Facilities

- **On the contrary to radiation workers in medical diagnostic radiology and veterinary medicine,**
  - **Radiation workers in nuclear facilities** have a wide spectrum of **various jobs and workplaces**, such as universities, research laboratories, industrial factories, nuclear medicine, NDT, and NPPs.
  - And also the workplaces have **a wide range of radiation risks**.

- **Regulations on RP E&T in nuclear facilities are more complicated, strict, formal and detailed than med. diag. radiology & vet. med.**

- **Also, Some major accidents (such as Fukushima accidents, over-exposure of NDT workers) have strengthened the regulatory framework for RP E&T.**

3. Regulatory Framework related to RP E&T

- Nuclear Safety Act (in enforcement by Korean nuclear regulatory authority, NSSC)
  - Regulations for mandatory RP E&T for normal radiation workers
    - **Initial** RP E&T before occupation into radiation works
      - RP E&T of **Basic** level (>= 8hrs)
      - RP E&T of **Job-related** level (4hrs)
    - **Periodic (annually)** RP E&T for existing radiation workers
      - RP E&T of **Basic** level
        - Radiation safety managers (**RSM**) (3hrs)
        - **Radiation workers** other than RSM (3hrs)
      - RP E&T of **Job-related** level (3hrs)
  - Regulations for mandatory RP E&T for radiation workers in NDT workplaces
    - **Initial** RP E&T before occupation into radiation works
      - RP E&T of **Basic** level (12hrs)
      - RP E&T of **Job-related** level (6hrs)
    - **Periodic (annually)** RP E&T for existing radiation workers
      - RP E&T of **Basic** level
        - Radiation safety managers (**RSM**) (5hrs)
        - **Radiation workers** other than RSM (5hrs)
      - RP E&T of **Job-related** level (5hrs)

* NSSC : Nuclear Safety and Security Commission

3. Regulatory Framework related to RP E&T

- Nuclear Safety Act (in enforcement by Korean nuclear regulatory authority, NSSC)
  - → mandatory RP E&T for person with frequent access to radiation area (Person-FA)
    - → **At each time for entry** to radiation area, safety rules for radiation protection should be informed.
    - → **If RP E&T of basic** or job-related level same as that for radiation workers is taken, then (education at each entry) is not needed.
      - → Person-FA in normal workplaces
        - → **Periodic (annually)** RP E&T of **Basic** level (>= 3hrs)
      - → Person-FA in NDT workplaces
        - → **Periodic (annually)** RP E&T of **Basic** level (5hrs)

* NSSC : Nuclear Safety and Security Commission

3.1 Person with frequent access to radiation area

- **Person with frequent access to radiation area (Person-FA) is defined as the person who enter the radiation area and do something related to his job.**
  - **However, he doesn't do something related to radiation works.**
  - Typically, a person with jobs such as Elevator-check-up or Light bulb-exchange can be classified as Person-FA in Korea.
  - Person-FA in Korea is similar to Category B radiation workers in European countries.

- **Recently (Oct. 2016), regulations for Person-FA were stengthend.**
  - Regulations for radiation workers were additionally required such as periodic (annual) medical surveillance, keeping documents of records of exposure doses.
  - Two options to take RP E&T were prepared as the previous slide.

- **Sometimes, it is not easy to classify a worker as radiation worker or Person-FA. (=> To be clear, FAQs open in NSSC website.)**

3.2 Revision of regulations on RP E&T

- **Enactment of rules on Nuclear Act (Mar. 11, 1958)~(Sept. 29, 1982)**
  - Most regulations for academic improvement & industrial promotion
  - However, since revision (Sept. 30, 1982), Safety promotion against radiation risks officially added into the purpose of Nuclear Act
- **When Revised (Sept. 30, 1982), regulation on RP E&T introduced**
  - Documents for RP E&T activities became required.
- **When Revised (May 27, 2000), detailed regulations on RP E&T**
  - Radiation workers : 20 hrs at first entry & 6 hr every year
  - Person with frequent access : 4 hrs at first entry & 4 hrs every year
  - Contents of RP E&T definitely described
- **When Revised(July 25, 2001), clarification on RP E&T**
  - Radiation workers : 20hr before starting work & 6hr every year
  - Person with freq. access : 4 hrs at first entry, Education at each entry (or educations at each entry can be replaced by 4 hrs every year)
- **Revised (Aug. 16, 2013), (Basic || Job-related) & (Normal || NDT)**
- **Revised (Nov. 24, 2014), (Rad. Safety Manager || Rad. workers)**
- **Revised (Oct. 13, 2016), Two options of RP E&T for Person-FA**

4. Possible Issues on RP E&T

- **Strong points of regulatory framework for RP E&T in Korea**
  - Optimized for the various conditions of workers & workplaces.
    - Classification of Radiation Worker Level (New || Regular)
    - Classification of RP E&T Contents Level (Basic || Job-related)
    - Responsibility (Radiation Safety Manager || Radiation worker)
    - Radiation Workplaces (Normal || NDT)
    - Supply of Two options for Person-FA
  - Professional institutes responsible for RP E&T
    - In case of Basic level of RP E&T, only one professional institute (Korea Foundation of Nuclear Safety) is approved by Korean regulatory authority (NSSC). => Diret controls of the Quality of Basic E&T.
    - In case of Job-related level, there are several professional institutes that applicants, who should train their radiation workers, can choose.
- **Possible issues still could be from variety itself of nuclear facilities.**
- **Another possible issues in initial enforcement of revsion 2013**
    - Not easy for applicants to freely select class time of Basic E&T
    - Not easy to accept the foreign E&T records of foreign workers

5. Concluding Remark

- **3 different authorities responsible for 3 kinds of radiation workers.**
  - NSSC responsible for nuclear facilities
  - MOHW responsible for medical diagnostic radiology
  - MAFRA responsible for veterinary medicine
- **RP E&T regulatory framework between MOHW and MAFRA similar**
  - Possible issues could be similar to each other.
- **RP E&T regulatory framework for nuclear facilities continue to be updated to optimize various conditions of various radiation workers & workplaces.**
  - Nonetheless, Possible issues still could be from variety itself of nuclear facilities.
- **Lessons-learned, experiences or information on near misses are necessary to be kept updated and shared.**
  - So that RP E&T works effectively to minimize potential events or accidents from the ignorance of or neglecting radiation risks.

Thank You.