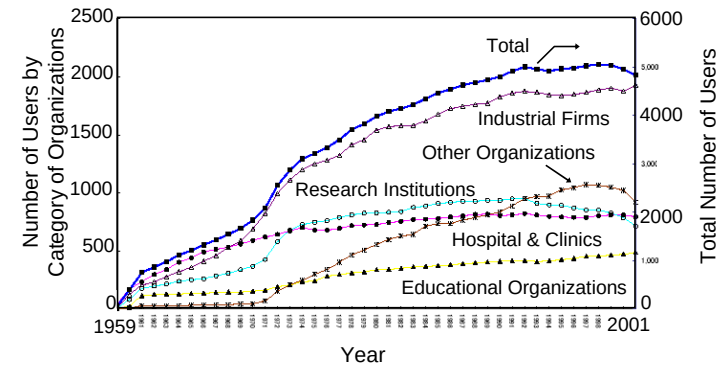


Japanese Status of Radiation Protection

Takashi Nakamura
Deputy President of Radiation Council of Japan

The national policy on research, development, and utilization of nuclear energy and radiation in Japan is authorized by Japan Atomic Energy Commission (AEC). AEC releases the Long-term Program for Research, Development and Utilization of Nuclear Energy almost every five years. The latest program refers to the importance of researches on low-dose radiation effects, radiation risk assessment, environmental behavior of radioactive materials, and radiation protection technologies. Details of research programs on radiation protection are summarized in the Annual Program for Safety Research on Environmental Radioactivity authorized by Nuclear Safety Commission of Japan. The research and development on radiation protection have been carried out by universities, research institutes, such as JAERI, NIRS and JNC, medical organization, and industries. The Japanese government has respect for ICRP recommendations in a revision of national regulations related to radiation protection. The national regulations in which the ICRP 1990 recommendations were incorporated came into force in April 2001. This paper describes an overview of the present status and various activities of radiation protection in Japan, including the national policy on radiation protection, the national legislative and regulatory framework, research and development, operational experiences, and prospects of radiation protection.

Annual Trends of the Number of RI Facilities



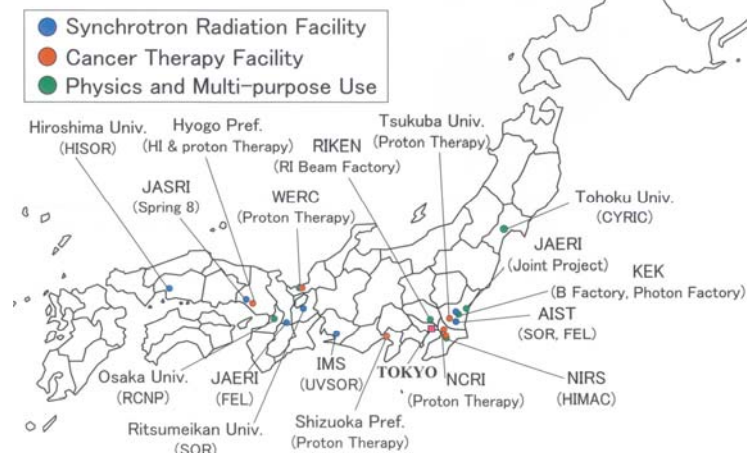
○ Number of Radiation Workers in Japan in 2000 ~ 2001

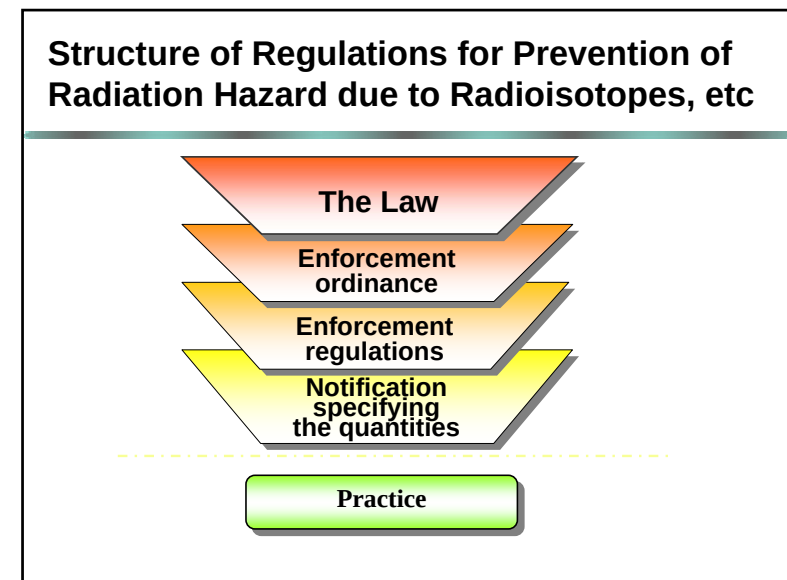
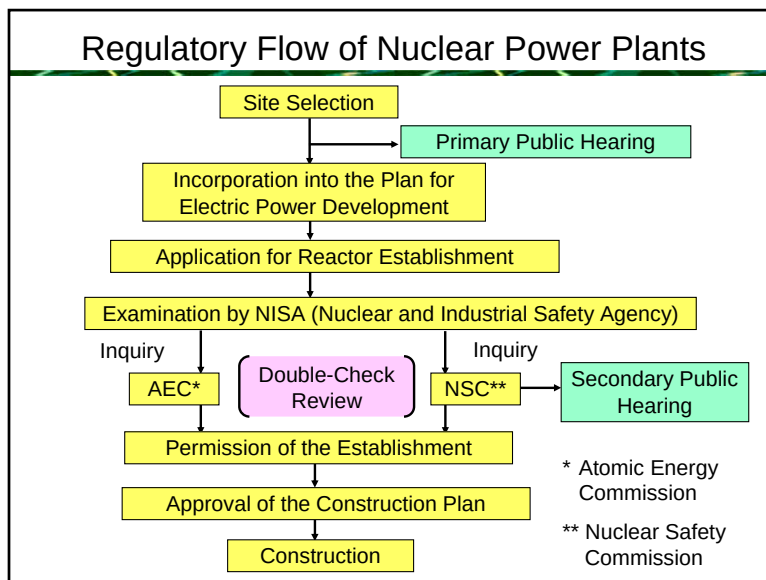
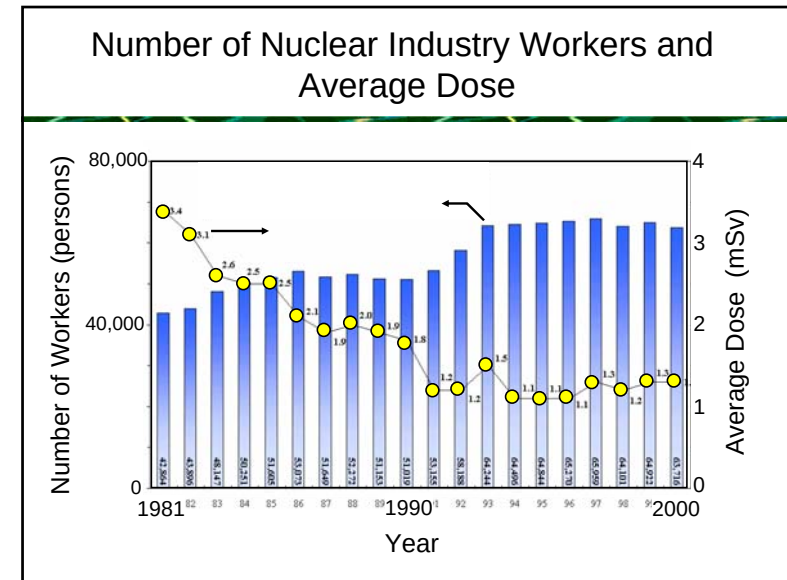
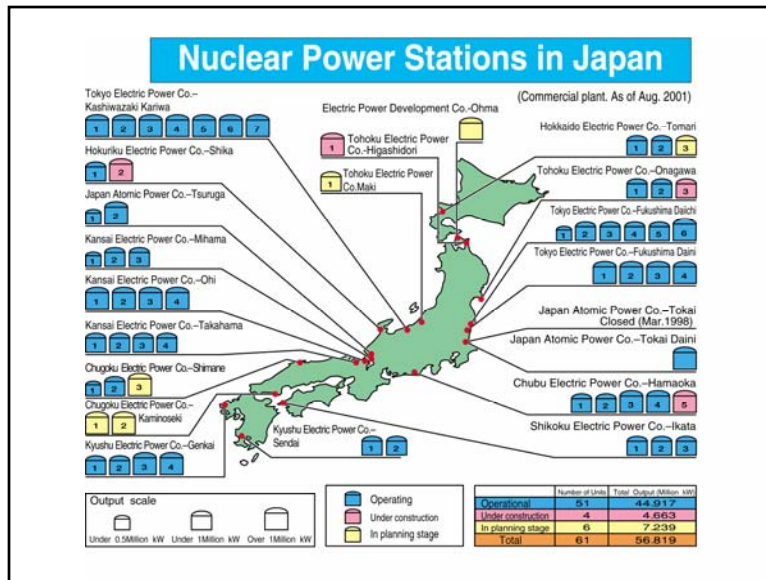
140,000 for medical staffs
50,000 for engineering
50,000 for research and education
60,000 for nuclear industry
60,000 for others
360,000 in total

○ Number of Radiation Generators in Use (as of March 31, 2000)

Radiation Generators	Total (Ratio %)	Hospitals & Clinics	Educational Organization	Research Institute	Industrial Firms	Other Organization
Total (Ratio %)	1136 (100)	767 (67.5)	58 (5.1)	163 (14.3)	141 (12.4)	7 (0.6)
Cyclotrons	63 (5.5)	25	-	16	21	1
Synchrotrons	31 (2.7)	1	3	21	6	-
Synchrocyclotrons	- (-)	-	-	-	-	-
Linear Accelerators	836 (73.6)	709	11	47	66	3
Betatrons	14 (1.2)	6	-	1	7	-
Van de Graaff Accelerators	41 (3.6)	-	16	23	1	1
Cockcroft-Walton Accelerators	91 (8.0)	-	25	33	31	2
Transformer-type Accelerators	25 (2.2)	-	1	19	5	-
Microtrons	34 (3.0)	26	2	2	4	-
Plasma Generators	1 (0.1)	-	-	1	-	-

Map of present and planned high-to-medium energy accelerator facilities





Implementation of National Regulation

- The amendment of regulations for preventing radiation hazard which incorporated ICRP 1990 recommendations were came into force in April 2001, after the review and the opinion proposition by the Radiation Council for general and specific requirements for the incorporation.
- The technical sub-committee had been setup for the investigation of internal dose and external dose evaluation.

Several main points of the amendment of the regulations

- 1) Change of terms and new weighting factors for dose evaluation
 - Terms of effective dose and equivalent dose are used.
 - Dose coefficients are used instead of ALI
- 2) Dose limit for occupational exposure
 - Effective dose of 20 mSv per year averaged over 5 years (100 mSv in 5 years) not exceeding 50 mSv in any fiscal year
 - Dose limit for women who are not pregnant is prescribed as 5 mSv in 3 months.

Several main points of the amendment of the regulations (Continued)

- 3) Controlled area
 - Effective dose of 1.3 mSv per 3 months for external exposure is prescribed at the boundary of the controlled area.
- 4) Concentration of effluents
 - Concentration of effluents are derived based on 1 mSv effective dose per year, averaged of 50-year committed dose from intake of radionuclides over the age interval from child to age 70 years.
- 5) Emergency Exposure
 - Effective dose limit of 100 mSv and equivalent dose limits to lens of eye of 300 mSv and to skin of 1 Sv

Recent Amendment of Japanese Radiation Protection Law

approved by the Radiation Council of Japan in 2004

public comments

passed the Japanese two houses of the Diet on June 2, 2004

Recent Amendment of Enforcement Ordinate, Enforcement Regulations

approved by the Radiation Council of Japan on February 28, 2005

public comments

Enforcement from June 1, 2005

3 main points

- Introduction of the IAEA BSS Exemption Levels
- To Enhance Improvement of Radiation Users' Safety Management
- Establishment of Regulation on Radioactive Waste Burial Disposal

1. Introduction of the IAEA BSS Exemption Levels

1) Items: Exemption levels

2) What does it mean?

Anyone can use radioisotopes
under the exemption levels
without any requirement by the law.

3) What is the current regime?

Current exemption levels were defined in 1960.

Sealed sources: 3.7MBq 74Bq/g

Unsealed sources: 4 groups

- Sr-90 and alpha nuclides : 3.7kBq
- half-life 30 days~ : 37kBq
- half-life ~30days : 370kBq
- H-3, Be-7, C-14, F-18... : 3.7MBq

4) Why is the amendment necessary?

Exemption levels:
to be on a more scientific basis

The Radiation Council of Japan checked over
the BSS and NRPB of UK Exemption Levels

- updated parameters
- additional scenarios
 - a child's exposure
 - drinking underground water

EU, China, South Korea, ICAO, IMO...

4) What will happen after the amendment?

Exemption levels to be defined by each nuclide

- the BSS Exemption Levels
- the NRPB Exemption Levels

	H-3	1000MBq	$1 \times 10^6 \text{Bq/g}$
	Co-60	0.1MBq	10Bq/g
	Sr-90	0.01MBq	100Bq/g
...			
765 nuclides			

1) Items:

Conditional Exemption: Design Certification

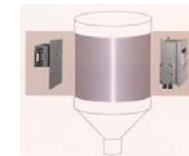
(especially for equipments with a small quantity of radioisotopes)

2) What is the current regime?

Users are not required to take any radiation protection measures.



Fire Alarms



Liquid Level Gauge
for factory fire extinguishers



Checking Sources

4) What will happen after the amendment?

Manufacturers and Importers may be certified design of equipments by a registered agency.

(to be checked: product design, quality control, a time limit not beyond 1mSv/y)

Users shall notify for use after its operation.

Users of extremely low-risk equipments do not have to notify for use.

(Users should return equipments to manufacturers)



2. To Enhance Improvement of Radiation Users' Safety Management

1) Why is the amendment necessary?

a high rate of accidents from insufficient safety management,

not caused by defective facility

18 of 23 accidents (78%) these 5 years



1) Items: **Regularly Check of Users' Record**

2) What is the current regime?

Radiation users should record the treatment of radioisotopes in detail.
(date of transfer, radiation monitoring, employee's training, etc.)

The records are only checked by the government at random on-site inspection.

At the regular inspection by the government-assigned agency, safety management is not to be checked, only the facility itself is to be checked.

4) What will happen after the amendment?

Records of high-risk sources users should be checked periodically by a registered checking agency.



1) Items:

Periodical Training courses of Facility Supervisors

2) What is the current regime?

Users should assign
a Supervisor of Radiation Protection
from staff who passed a national examination

No obligation for Supervisors
for improving their capabilities



4) What will happen after the amendment?

Users are obliged their Supervisor of Radiation Protection to take courses provided by a registered training agency every 2 or 3 years.

- lessons from accidents
- amended regulations
- brush up on safety management



3. Establishment of Regulation on Radioactive Waste Burial Disposal

1) Why is the amendment necessary?

Radioactive waste

Reached 220,000 drums (FY02)



1) What is the current regime?

Technical standards
for incineration, solidification and storage
but not for burial disposal.

4) What will happen after the amendment?

- license for burial disposal
- Pre-service inspection for disposal facilities
- Safety verification at the stage of each burial disposal



4. Regulation Reform on Selling Business and Leasing Business

1) What is the current regime?

Sellers and leasing companies should

- obtain the license
- keep a storage facility

2) Why is the amendment necessary?

Equipments directly sent from makers to end-users
No touch by seller or leasing company

Only 2 radioisotopes leasing companies

In other fields, financial leasing business increased

4) What will happen after the amendment?

No license but notification
for selling business and leasing business

Not necessary to keep a storage facility

Additional user license
for touching sources on one's business

5. Security of Radioactive Sources

IAEA Code of Conduct September, 2003

No amendment

to apply the IAEA Code of Conduct

To strengthen Import and Export Control

is under consideration by METI

