EDUCATION AND TRAINING ACTIVITIES FOR ASIAN COUNTRIES AT JAEA Nuclear Technology and Education Center

International Workshop for Asian Nuclear Prospect
October 19-22, 2008

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Summary
Introduction

- Nuclear human resources development (HRD) is identified as one of the most important issues in Japan not only for Japan but also for Asian regional development and welfare.

- Nuclear HRD is identified as one of the missions of Japan Atomic Energy Agency (JAEA) established in 2005.

- Main features of the NuTEC’s training program:
  - Laboratory exercises using well-equipped facilities including research reactors (e.g., JRR-4).
  - Expertise of lecturers mostly from JAEA.
  - Many facilities are available for facility visits (large-scale and advanced facilities, J-PARC, NUCEF, NSRR, HTTR ...).
Outline of NuTEC Activities

**Domestic Training Courses**
- Radioisotope and Radiation Engineers
- Nuclear Engineers
- National Test Examinees
- JAEA Personnel

**Collaboration with universities**
- Graduate School of Univ. of Tokyo
- Cooperative Graduate School Program (incl. JNEN)
- Cooperation with Nuclear HRD program

**Cooperation with IAEA**
- Safeguards course
- ANSN (Asian Nuclear Safety Network)

**International Cooperation**
- Training in Asian countries (Indonesia, Thai, Vietnam)
- FNCA related activities

**Response to needs**

**Lecturers**

**Trainees**

**Students**

**NuTEC JAEA**
International Cooperation

(1) Instructor and Joint Training Courses for Asian Countries

**Purpose:**
Education and training for instructors in self-sustainable manner for Indonesia (since 1996), Thailand (since 1996) and Vietnam (since 2001)

**Training system:** two kinds of training course have been conducted.

**Instructor Training Program** (in Japan)

1st ITP1
2nd ITP2
3rd ITP3
4th ITP4
5th ITP1
6th ITP2
7th ITP3
8th ITP4

**Joint Training Course** (in each country)

JTC1
JTC2
JTC3
JTC4

**Self-sustainable course in four years**

FTC1
FTC2
FTC3

ITP: Train the instructors who take a role as instructor in JTC for 4-6 weeks in Japan

JTC: Accumulate teaching experiences as co-instructors with NuTEC’s instructors

FTC: The same course is repeated to ensure its self-sustainability.

ITP and JTC are conducted under entrustment by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.
International Cooperation
(2) Instructor and Joint Training Courses

Main features:

- Response to each country’s HRD needs decided by the steering committee
- Emphasis on exercises and experiments with well-equipped training facilities in JAEA and with key-equipments in each country
- Combination of ITP and JTC has proved very effective in technology transfer and stable enrollment of lecturers (70-92% of ITP trained lecturers are enrolled in JTC)
- Extended effects of ITP and JTC: development of local young lecturers, new training courses, stimulation of educational and research activities using supplied training equipments.

JTC in Thailand
International Cooperation
(3) Recent Instructor Training Program

28th Instructor Training Program (Radiation Safety Officer Training Course for Thailand) for Thailand July 14-Aug. 8, 2008

Example of lectures

- Radiation physics
- Measurement of radioactivity in air or surface contamination density

Example of exercises and others

- Gamma spectrometry
- Calibration of monitors and measurement of dose rate
- Facility visit to facilities in JAEA Tokai (J-PARC etc.)
- OJT (Radiation measurement in a research reactor)
International Cooperation
(4) Recent Instructor Training Programs

30th Instructor Training Program (Radiological and Nuclear Emergency Preparedness) for Indonesia, Thailand and Vietnam, Aug. 25-Oct. 2, 2008

Example of lectures
- JCO accident and emergency response planning
- Emergency monitoring
- Nuclear risk management, public relations in nuclear accident

Example of exercises and others
- Decontamination technique
- Measurement of radioactive concentration
- Radiation survey
- Visit to Tokai village office, Off-site center
International Cooperation
(5) Recent Instructor Training Programs

- Human resources developments in Asian countries previously focused on the area of radiation applications.

- The necessity of HRD toward nuclear energy has been expanding in Asia in the context of growing energy demands and the control of global warning.

- In response to the trend in Asia, JAEA launched Reactor Engineering Course for Vietnam and Malaysia.

**Example of lectures**

- Thermal engineering, Structural mechanics
- Reactor control, Overview of PWR and BWR
- Fuel engineering, Material engineering

**Example of exercises and others**

- Neutron moderation experiment, Shielding calculation
- Nondestructive test (UT, RT)
- Thermal hydraulic calculation, Boiling and heat transfer test
- Visit to Nuclear Power Plant, fuel fabrication facility
As a contribution to the peaceful use of nuclear energy in Asia, Pacific and former part of the USSR and Eastern Europe, JAEA regularly provides participants from such countries with Safeguards Training Course to initiate, operate and maintain the Safeguards and Material Control System to meet the IAEA Safeguards.

Countries that participated thus far:
- Philippine
- Indonesia
- Thailand
- Malaysia
- China
- Mongolia
- Myanmar
- Vietnam
- South Korea
- Japan
- Armenia
- Belarus
- Bulgaria
- Kazakhstan
- Latvia
- Uzbekistan
- Ukraine
- Lithuania
- Australia

Safeguards Training Course are conducted under entrustment by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.
Cooperation with IAEA

2008 Safeguards Training Course  October 20-31, 2008

Objective : To provide appropriate training in institutional and operational concepts and relevant technology in the areas of nuclear material accountancy and control system

Participants: About 10 participants, mainly from Asian countries (Kazakhstan, Uzbekistan, China, Bangladesh, Malaysia, Indonesia, Thailand, Myanmar, Vietnam, Singapore, Korea)

Instructors : IAEA, MEXT, NMCC and JAEA

Curriculum (Total:61.5 h) :
• International Safeguard (Legal Instruments and IAEA requirement)
• Nuclear Material Accounting and Control
• International Safeguard (Strategies and Verification Techniques)
• Strengthened Safeguard System
• Effectiveness of State Systems
• Establishment and Maintenance of a State System of Accounting for and Control of Nuclear Materials
• Miscellaneous
Cooperation with IAEA

ANSN (Asian Nuclear Safety Network)

- ANSN started in 1997 as an Extra Budgetary Program of IAEA supported by Japanese government.

- ANSN aims to strengthen nuclear safety of nuclear power plants and research reactors by pooling and sharing technical knowledge and practical experiences for the current and future Asian nuclear facilities.

- JAEA contributes to the ANSN activities by providing the internet-accessible database with technical information on the nuclear safety.
Growth of International Cooperation by NuTEC JAEA

Number of trainees by NuTEC international program in every five years (except 2006-2007)
FNCA Related Activities

What is FNCA?

Background

Establishment
At the 10th ICNCA meeting in Tokyo, March 1999.

Vision (stated in Joint Communiqué of the 1st FNCA Ministerial Meeting, 2000.11)
To be recognized as an effective mechanism for enhancing socio-economic development through active regional partnership in the peaceful and safe utilization of nuclear technology.

Participating Countries (10 countries)
Australia, Bangladesh, China, Indonesia, Japan, Korea, Malaysia, The Philippines, Thailand, Viet Nam

Since 1999, NuTEC has organized a workshop to promote FNCA/HRD activities (MEXT Project).

Project Leader of Japan, FNCA/HRD
Dr. Jun SUGIMOTO: Director, NuTEC, JAEA

In October 2007, Dr. Jun SUGIMOTO, Director, NuTEC, JAEA, served as the Chairperson of “1st Study Panel for Cooperation in the Field of Nuclear Energy in Asia (2nd Phase) “hosted by CAO.
Projects: FNCA/HRD activities
ANTEP: Asian Nuclear Training and Education Program

The Project has been focusing on **ANTEP (Asia Nuclear Training and Education Program)** activity, which aims at network system for information exchange on needs and educational programs by utilizing existing nuclear training and education resources.

Currently, sharing valuable information on HRD toward nuclear power has become the hot topic.

ANTEP is surveying the needs of Asian countries, and is coordinating the needs with educational programs currently provided.
Matching of New Needs at FNCA 2007 WS on HRD

<table>
<thead>
<tr>
<th>Field</th>
<th>No. of Needs</th>
<th>No. of Unmet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Preparedness</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Radioactive Waste Management</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Radiation Safety</td>
<td>4</td>
<td>1*</td>
</tr>
<tr>
<td>Radioisotope Production</td>
<td>6</td>
<td>6*</td>
</tr>
<tr>
<td>Neutron Beam Application</td>
<td>8</td>
<td>1*</td>
</tr>
<tr>
<td>Accelerator, Radiation Processing</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Industry and Environmental Application</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Agricultural Application</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Medical Application</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Research Reactor</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Reactor Engineering</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Reactor Safety</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td><strong>NPP Management</strong></td>
<td><strong>11</strong></td>
<td><strong>10</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>74</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

*May be covered by other activities, such as IAEA/RCA
Date: October 30-31, 2007  
Place: Tokyo, Japan  
Theme: Human Resource Development (HRD), one of the most important aspects of the infrastructure development.  
Chairperson: Dr. Jun SUGIMOTO, Director, NuTEC, JAEA

Conclusion:
International cooperation in HRD is important. More active promotion of the information exchange and experience sharing for better utilization and strengthening of existing tools is recommended.

Follow-up:
- A follow-up was decided at the 8th FNCA ministerial meeting (December 18, 2007) to build and utilize a web-based FNCA Database for HRD information toward Nuclear Power such as training courses and education programs.
- JAEA is now constructing the database under entrustment of the Cabinet Office of Japan.
Concept of FNCA Database for HRD toward Nuclear Power -1-

Users in FNCA Countries

Internet

Login Screen
User ID
Password
Enter

Country
Australia
Bangladesh
China
Korea

Subject of HRD program
Basic/General
Power Generation tech
Reactor engineering
Radiation
Safety

PWR core design

Search for HRD programs matching search conditions

Other information
Experiences on
- Building NPP
- Good practices
- Regulation
...
Concept of FNCA Database for HRD toward Nuclear Power -2-

Users in FNCA Countries

Internet

Search results of Programs

XXX training course
YYY exchange program
ZZZ introductory course
ABC expert class
......
......

Program details

1. Title of program
2. Organization
3. Objectives
4. Fields
5. Term
6. Conditions
7. Application method
8. Language
9. Venue
10. URL for details
...
...

-This database will be in service in April, 2009.
Summary

- NuTEC aims at comprehensive nuclear education and training activities in response to the needs in Asian countries, especially the emerging needs for nuclear power.
- The wide spectrum of cooperative activities have been pursued with international organizations, such as with FNCA countries and IAEA.
- The accumulated number of international trainees has amounted to 2,775.
- With more extended and close cooperation with international organizations, NuTEC’s HRD activities will further be conducted in more effective and efficient manner.