Development of Technology and Human-Capacity Building in the Nuclear-Nonproliferation and Nuclear-Security Fields to Support the Peaceful Use of Nuclear Energy

The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) has been conducting the following activities on technology and human-resources development related to nuclear nonproliferation and security in cooperation with affiliated domestic and overseas institutions toward a world without threats of nuclear weapons or nuclear terrorism (Fig.10-1).

Technology Development for Japanese and International Applications

A variety of technologies are under development to strengthen nuclear nonproliferation and security in accordance with domestic and international trends. Current projects on nuclear material detection and measurement technology development include the technology for detection of nuclear materials in heavily shielded containers using nuclear-resonance fluorescence (NRF) analysis, and non-destructive assay technology to measure nuclear material retaining high radiation levels by irradiating neutrons from an external pulsed neutron source. The development of software capable of calculating the photoelastic scattering probability affecting NRF measurement is outlined in Topic 10-1. The developed code was integrated into the Geant4 toolkit released in December 2018 and contributes to a wide range of research areas by improving the computation accuracy of photoelastic scattering. The accuracy and speed of nuclear forensics analysis technologies to identify the origin and processing history of nuclear materials used in criminal acts has been improved. A detector for first-responders following a nuclear terrorism events and artificial intelligence (AI) for analyzing nuclear forensic signature are also under development. Furthermore, evaluation metrics for the attractiveness of nuclear or radioactive material for nuclear security are being developed in collaboration with the U.S.

Policy Research Based on Technical Expertise

The factors affecting denuclearization have been studied based on requests from related administrative agencies through case studies of denuclearization in countries such as South Africa, Libya, Iran, and Iraq. This study has taken many factors into account, including the incentive for the development of nuclear weapons, situations at home and aboard, progress in development, and effectiveness of sanctions, as well as the technical procedures related to the disarmament, disabling, dismantlement, and verification in a view of peaceful use of nuclear energy.

Support for Human-Capacity Development

Following Japan's national statement at the April 2010 Nuclear Security Summit, ISCN has conducted capacity-building support activities targeting Asian countries since 2011. As of March 2019, about 4200 participants from Asian countries including Japan have joined in ISCN training activities on nuclear nonproliferation (safeguards) and nuclear security. ISCN's capacity-building support activities have contributed to human-resource development in Asia and have drawn high praise from the U.S. and Japanese governments.

Contributions to the International Verification Regime for CTBT

To establish a global verification regime for nuclear testing, the international monitoring system of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and a related national data center have been under provisional operation. The joint radioactive noble gas measurement project began with the CTBT Organization (CTBTO) to strengthen CTBTO's capability of detecting nuclear tests based on a voluntary contribution made to the CTBTO by the Government of Japan in February 2017. The project has been carried out by installing dedicated monitoring systems at Horonobe-Cho of Hokkaido and at Mutsu City of Aomori in January and March of 2018, respectively, and has contributed to the implementation of national policies for strengthening of nuclear test monitoring capability.

Support for JAEA's Nuclear-Fuel Transportation and Procurement of Research Reactor Fuels

Efforts towards nuclear transportation performed by our research and development centers are also supported, including by procuring fresh fuels and properly disposing of spent fuels for our research reactors. These activities have allowed for the contribution to the Global Threat Reduction Initiative (GTRI), which has been strengthening global nuclear security by promoting the systematic return of highly enriched uranium to the U.S.

Efforts to Promote Understanding

ISCN aims to help promote understanding of this field at home and abroad by investigating and analyzing international trends related to nuclear nonproliferation and security, by delivering the ISCN News Letter, and by holding the International Forum on Peaceful Use of Nuclear Energy, among other activities.

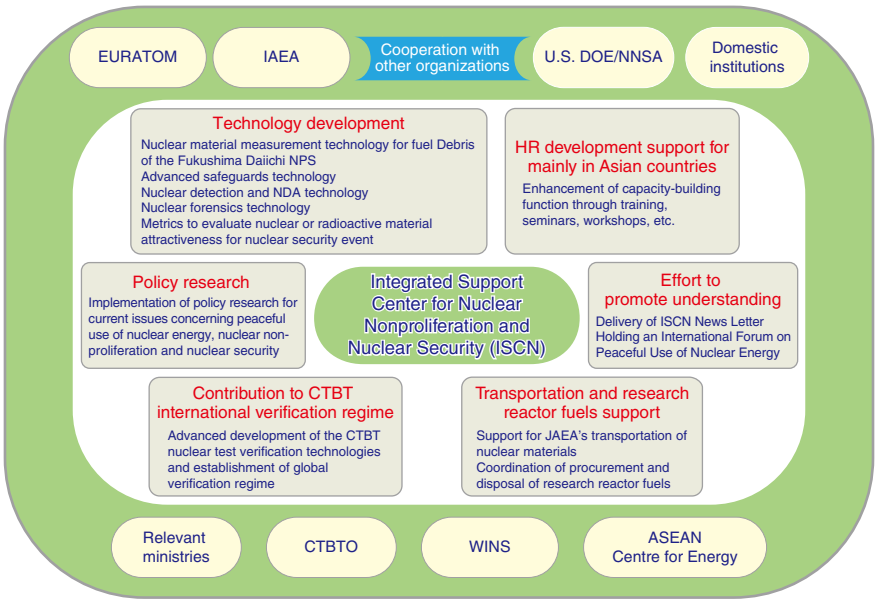

Fig.10-1 ISCN Activities and Affiliated Institutions
ISCN has played an active role in strengthening nuclear nonproliferation and nuclear security in cooperation with affiliated domestic and overseas institutions.