

# **NRC International Activities**

**Annual Report FY 2007**



**Office of International Programs**

**October 2007**

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## Foreword


I am pleased to present the FY 2007 Annual Report of the Office of International Programs. This report, the Office's first, outlines international activities carried out by the NRC, along with our key accomplishments during FY2007. As the report suggests, through the course of our international activities we have seen many new countries begin to seriously consider nuclear energy as a means of diversifying their own national energy programs. At the same time, we have observed in areas of the world experiencing increased demographic trends accompanying increases in commerce of nuclear materials for medical or industrial purposes.

Over the next five years, our goal is to provide a key role in the Nuclear Regulatory Commission's efforts to ensure the safety and security of the American public and contribute to an overall increase in nuclear safety internationally. Nuclear power plant licensing in the U.S. is being enhanced by leveraging our experience with that of our foreign counterparts who are building new reactors. Our international nuclear safety cooperation is creating the opportunity for sharing knowledge on power plant construction projects currently in progress in Finland, China and other countries, recognizing that manufacturing of large components for new U.S. plants will most likely take place in facilities around the globe including, Japan, Korea and elsewhere.

Similarly, we will take advantage of global experience to continue to enhance our materials licensing program in the U.S. We expect safe and secure commerce in nuclear materials to be most effective in a stable regulatory environment that is synergized with regulatory programs along the various materials transportation routes around the world. In our fuel cycle program, we can learn from other countries as our nations consider a recycling option, and as global uranium operations and transportation increases.

Joint research programs to address nuclear safety internationally will support to an even greater degree, the regulatory programs of our long standing partners as well as our newest. Combined international research projects and outreach activities with our international partners to exchange security information will also help achieve an increase in the overall level of nuclear safety world wide.

My tenure as Director of the Office of International Programs has not been long, and I am honored and humbled by those who have held this position before me over the past thirty years. I am also grateful to the Commission for this opportunity to provide leadership in the conduct of the Agency's international activities, and for the staff of the Office of International Programs, I am determined to create the best working environment possible for carrying out our important mission.

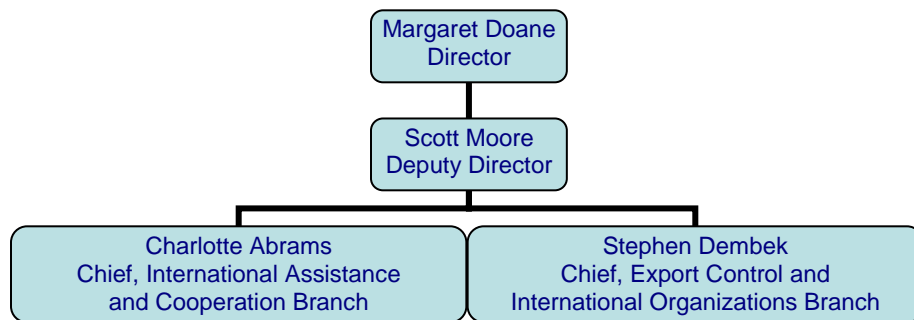


Margaret M. Doane  
Director  
Office of International Programs

# Office of International Programs

- Five major areas of NRC's international programs: implementing U.S. Government international legal commitments, export and import licensing, bilateral arrangements, work with multinational institutions, and cooperative research.
- Success in each of these categories depends on Commission and management leadership, skilled and engaged staff, sustained funding, the ability to set priorities and to manage complex programs in a dynamic environment, and to understand the importance of incorporating in our own programs the advances made by other countries.
- The Office of International Programs (OIP), in consultation with other Program Offices, administers the NRC's international programs and provides policy advice and assistance to the Chairman, the Commission, and to NRC management and staff.

## OIP Organization Chart



- Currently 32 FTE.
- Increasing workload and retirements over the past four years have required 40 personnel actions (recruitments, departures, and reassignments).



*"We have great people. We have always had great people. We are committed to training the new generation of folks to NRC's high standards." – Commissioner Edward McGaffigan †, NRC*

# Conventions and Treaties

The obligations incurred by U.S. Government negotiated legally binding conventions and treaties include nuclear non-proliferation, safety, physical protection, waste and spent fuel management, emergency preparedness and response, and counter-terrorism. In some cases NRC has a leadership role; in others NRC provides technical support to other U.S. Government agencies. Major fiscal year 2007 accomplishments:

- NRC's leadership role at the April 2007 Review Meeting of Contracting Parties to the Joint Convention on the Safety of Spent fuel Management and the Safety of Radioactive Waste Management.
- In July 2007, the NRC also provided technical support to the meeting of adhering countries to the Convention on Early Notification of a Nuclear Accident,
- The staff is also preparing the U.S. National Report to the Convention on Nuclear Safety, which, like the Joint Convention, provides a forum for enhancing nuclear safety through the exchange of information and best practices.

## Legal and Policy Basis for NRC's International Activities

- Statutory Requirements
  - Atomic Energy Act of 1954, as amended
  - 1978 Nuclear Non-Proliferation Act
  - Cooperative Threat Reduction Act
  - Freedom Support Act
- U.S. Government Obligations & Commitments Participation
  - International Atomic Energy Agency (IAEA)
  - Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA)
  - Nuclear Suppliers Group (NSG)
  - Zangger Committee
  - Group of Seven Nuclear Safety Working Group (G-7 NSWG)
  - Group of 24 Nuclear Safety Coordination (G-24 NUSAC) Mechanism
  - Nuclear Safety Activities at EBRD — Nuclear Safety Account, Chernobyl Sarcophagus Fund
  - Vice Presidential Commissions
- International Treaties and Agreements
  - Nuclear Non-Proliferation Treaty (NPT)
  - IAEA-U.S. Safeguards Agreement
  - Convention on the Physical Protection of Nuclear Material
  - Convention on Early Notification of a Nuclear Accident
  - Convention on Assistance in Case of a Nuclear Accident & Radiological Emergency
  - Convention on Nuclear Safety (CNS)
  - Convention on Supplemental Liability and Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- Executive Orders and Presidential Decision Directives
  - President Clinton's September 1993 Non-proliferation Initiative
  - Presidential Decision Directive/National Security Council-41 "U.S. Policy on Improving Nuclear Material Security in Russia and the Other Newly Independent States" (September 20, 1995)

Source: NRC, OIP

## Nuclear Exports and Imports

The NRC ensures that exports and imports of nuclear materials facilities and equipment under the Agency's jurisdiction are licensed in accordance with applicable U.S. statutory and regulatory requirements, as well as U.S. Government commitments towards legally binding international treaties and multilateral and bilateral agreements. In addition, the NRC continues to exercise global leadership by adhering to and promoting the adoption of international guidance such as the Code of Conduct on the Safety and Security of Radioactive Sources. Examples of specific accomplishments include:

- Refining criteria for approving exports of Category 1 and 2 radioactive sources.
- Participating in international regulatory meetings to strengthen controls on transfers of radioactive sources of concern without disrupting legitimate commerce.
- Maintaining close relationships with our hemispheric neighbors to continue refining export and import protocols, procedures and controls.
- Participating in meetings of the Nuclear Suppliers Group.

### Completed Export/Import Licensing Actions for January 2000 - August 2007

Year	Byproducts	Components	Moderator Material	Reactors & Major Reactor Components	Special Nuclear Material	Source Material	Waste Exports	Waste Imports	Total
2000	1	13	4	4	50	10	2	3	87
2001	0	19	2	5	86	17	3	4	138
2002	0	5	3	2	68	2	1	0	81
2003	2	7	3	0	53	14	4	2	85
2004	6	15	6	1	56	11	1	2	98
2005	7	10	3	3	51	4	5	3	86
2006	2	11	1	1	64	5	2	3	89
2007	1	12	2	3	35	6	4	6	69
<b>Total</b>	19	92	24	19	463	69	22	23	733

### Appendix P Licenses Issued January 2005 - August 2007

Year	Combination License	Export License	Import License	Total
2005	15	0	0	15
2006	49	15	19	83
2007	37	9	8	54
<b>Total</b>	101	24	27	152

Source: NRC, OIP



*“Regardless of whether there is a so-called nuclear renaissance, government radiation safety agencies will continue to have important public health responsibilities dealing with the current fleet of reactors and the thousands of radioactive sources used commercially each day.” – Chairman Dr. Dale E. Klein, NRC*



# Bilateral Cooperation

Bilateral arrangements with 36 countries and Taiwan.

- NRC is at the forefront of U.S. Government nuclear safety initiatives, such as sharing operational experiences for new reactors with Finland and France, the training and inspection of irradiation facilities with Canada, and in developing relationships with India and China.
- Staff participated in a number of exchanges with Iraq, focusing on the development of regulatory infrastructure, training, and decommissioning.
- Staff provided key technical support to the Department of Homeland Security-led trilateral nuclear and radiological exchanges with Canada and Mexico.
- As part of the U.S. Government’s developing relationship with China, staff supported meetings concerning nuclear and radiological security preparations for the 2008 Olympics in Beijing.
- Staff is preparing a Memorandum of Understanding that will enable other countries to cooperate in nuclear safety regulatory training and assistance related to China’s purchase of a U.S.-origin nuclear power plant.
- Hosted over 300 foreign assignees since 1974.

## Technical Information Exchange and Cooperation Arrangement and Letter of Agreement Partners

<ul style="list-style-type: none"> <li>• Argentina</li> <li>• Armenia</li> <li>• Australia</li> <li>• Belgium</li> <li>• Brazil</li> <li>• Bulgaria</li> <li>• Canada</li> <li>• China</li> <li>• Czech Republic</li> <li>• Egypt</li> <li>• Finland</li> <li>• France</li> </ul>	<ul style="list-style-type: none"> <li>• Germany</li> <li>• Greece</li> <li>• Hungary</li> <li>• Indonesia</li> <li>• Israel</li> <li>• Italy</li> <li>• Japan</li> <li>• Kazakhstan</li> <li>• Lithuania</li> <li>• Mexico</li> <li>• Netherlands</li> <li>• Peru</li> </ul>	<ul style="list-style-type: none"> <li>• Philippines</li> <li>• Romania</li> <li>• Russia</li> <li>• Slovak Republic</li> <li>• Slovenia</li> <li>• South Africa</li> <li>• South Korea</li> <li>• Spain</li> <li>• Sweden</li> <li>• Switzerland</li> <li>• (Taiwan)</li> <li>• Ukraine</li> <li>• United Kingdom</li> </ul>
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Source: NRC, OIP



*“Transparency and openness really go hand in hand towards the NRC achieving public credibility and public acceptance of decisions that we make.”- Commissioner Gregory B. Jaczko, NRC*

# Multilateral Cooperation

- Completed stages 1 and 2 of the Multinational Design Evaluation Program (MDEP), for which the Nuclear Energy Agency is providing essential support. The MDEP was created to share the resources and knowledge accumulated by national nuclear regulatory authorities during their assessment of new reactor designs, with the aim of improving both the efficiency and the effectiveness of the process.
- The NEA’s ongoing work in safety, research and waste management continues to contribute to NRC’s safety and effectiveness strategic goals.
- NRC supports the IAEA by participating in activities such as:
  - Assessment missions
  - Development of international safety, security, transportation and emergency preparedness guidelines
  - Implementation of international safeguards at NRC licensees.
- NRC co-hosted two international conferences in fiscal year 2007:
  - Provided a venue to get public input to the proposed International Council on Radiation Protection recommendations
  - Co-hosted a conference with the IAEA to discuss issues associated with digital instrumentation and controls in nuclear power plants.

## Multilateral Nuclear Safety Exchanges

- Group of Eight (G-8)
- Treaty Implementation
- International Atomic Energy Agency (IAEA)
- OECD Nuclear Energy Agency (NEA)
- International Nuclear Regulators Association (INRA)
- Multinational Design Evaluation Program (MDEP)

Source: NRC, OIP

## NRC Participation in IAEA and NEA Committees

IAEA	NEA
<ul style="list-style-type: none"> <li>• Committee on Safety Standards</li> <li>• Nuclear Safety Standards Committee</li> <li>• Radiation Safety Standards Committee</li> <li>• Transport Safety Standards Committee</li> <li>• Waste Safety Standards Committee</li> </ul>	<ul style="list-style-type: none"> <li>• Steering Committee for Nuclear Energy</li> <li>• Committee on the Safety of Nuclear Installations</li> <li>• Committee on Nuclear Regulatory Activities</li> <li>• Radioactive Waste Management Committee</li> <li>• Committee on Radiation Protection and Public Health</li> </ul>

Source: NRC, OIP



*“It is becoming increasingly clear that nuclear energy can no longer be regarded as a strictly domestic matter for any individual country. Nuclear power is now a truly international industry, from the upstream mining of the uranium ore, through nearly all the downstream steps of the fuel cycle.” - Chairman Dr. Dale E. Klein, NRC*

# Cooperative Research

International cooperative research supports NRC nuclear safety programs. The heavy financial burden of the research is shared by countries through the joint use of research facilities and cost-sharing. The benefits are sharing of expertise and maintaining up-to-date infrastructures to implement a risk-informed, performance-based, realistically conservative regulatory framework.

- Research areas:
  - Reactor vessel and piping integrity
  - Aging of reactor components
  - Thermal-hydraulic code assessment and application
  - Nuclear fuels analysis
  - Plant performance
  - Seismic safety
  - Probabilistic risk assessment
  - Severe accidents
  - Reactor containment structural integrity
  - Dry cask storage and transport
  - Decommissioning
  - Fire protection
  - Human reliability
- The program has been very active with new countries joining the thermal-hydraulics code applications and maintenance (CAMP) and the severe accident (CSARP) research programs. In August 2007 Canada signed an implementing arrangement to join CAMP, focusing on improving the TRACE code used by the NRC to evaluate transient and accident scenarios and to assess generic safety and licensing issues for both operating plants and new reactor designs.
- As of September 2007 NRC maintains cooperative research agreements with these countries and/or entities: Armenia, Belgium, Brazil, Bulgaria, Canada, Croatia, Czech Republic, Finland, France, Germany, Hungary, Japan, OECD/NEA, Russia, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, and AIT and TECRO (Taiwan).
- NRC contributes approx. \$3.9M/year to international programs conducted in the U.S. and abroad. NRC contributions range between \$10K/yr to \$1.2M/year.
- Participants contribute approx. \$1.1M/year to NRC programs.



*“A significant challenge moving forward into the future will be to keep regulatory guidance current with the pace of digital technology progress.” - Commissioner Dr. Peter B. Lyons, NRC*

# Future Challenges

## Conventions and Treaties

- 2008 Convention on Nuclear Safety Review Meeting of Parties
- The 2009 Joint Convention Review Meeting
- The 2010 Nuclear Non-Proliferation Treaty Review Conference
- The current U.S. Government effort to ratify the amended Convention on the Physical Protection of Nuclear Material
- Likely entry into force of the Additional Protocol for implementing IAEA safeguards in the U.S.

## Nuclear Exports and Imports

- Changes in the international nuclear industry will require a new look at NRC's export and import licensing regime.
- Staff preparing to revise 10 Code of Federal Regulations Part 110 to streamline processes and incorporate many of the ad hoc changes made due to increased security for nuclear and radiological materials.
- Anticipating an increase in exports of reactors and major components
- Evolving complexity of licensing in areas such as waste requires staff to broaden experience and in-depth knowledge of domestic and international export-import licensing regimes.

## Bilateral Cooperation

- A likely growth area in the bilateral cooperation area is in licensing new reactors.
- Anticipating doing vendor inspections in Canada, Europe and Japan and taking training on irradiators and related inspection practices in Canada.
- Shadowing Chinese, Japanese and South Korean regulators as they inspect nuclear power plants under construction, and visiting European fuel cycle facilities.
- Global Nuclear Energy Partnership (GNEP)
- New regulatory source security programs with Iraq, Georgia and Azerbaijan will likely span 2-4 years (using experience gained from the successful regulatory source security project in Armenia as template).

- Global Initiative to Combat Nuclear Terrorism (GI): participation in 1-2 international workshops, seminars, and associated activities each year for the next several years.
- Increase in requests for bilateral exchanges of technical information, assignments for the staff, participation in seminars, workshops and assessment missions over the next three-to-five years.

### Status of World Nuclear Power Reactors July 2007

	Operating		Construction		Planned		Proposed	
	No.	MWe	No.	MWe	No.	MWe	No.	MWe
Argentina	2	935	1	692	0	0	1	700
Armenia	1	376	0	0	0	0	1	1,000
Belgium	7	5,728	0	0	0	0	0	0
Brazil	2	1,901	0	0	1	1,245	4	4,000
Bulgaria	2	1,906	0	0	2	1,900	0	0
Canada	18	12,595	2	1,540	4	4,000	0	0
China	11	8,587	4	3,170	25	26,860	86	70,000
Czech Republic	6	3,472	0	0	0	0	2	1,900
Finland	4	2,696	1	1,600	0	0	0	0
France	59	63,473	1	1,630	0	0	1	1,600
Germany	17	20,303	0	0	0	0	0	0
Hungary	4	1,826	0	0	0	0	0	0
India	17	3,779	6	2,976	4	2,800	15	11,100
Iran	0	0	1	915	2	1,900	3	2,850
Japan	55	47,577	2	2,285	11	14,945	1	1,100
Lithuania	1	1,185	0	0	0	0	1	1,000
Mexico	2	1,310	0	0	0	0	2	2,000
Netherlands	1	485	0	0	0	0	0	0
Pakistan	2	400	1	300	2	600	2	2,000
Romania	1	655	1	655	0	0	3	1,995
Russia	31	21,743	7	4,920	7	7,800	18	21,600
Slovakia	5	2,064	2	840	0	0	0	0
Slovenia	1	696	0	0	0	0	1	1,000
South Africa	2	1,842	0	0	1	165	24	4,000
South Korea	20	17,533	1	950	7	8,250	0	0
Spain	8	7,442	0	0	0	0	0	0
Sweden	10	9,086	0	0	0	0	0	0
Switzerland	5	3,220	0	0	0	0	0	0
Ukraine	15	13,168	0	0	2	1,900	20	21,000
United Kingdom	19	10,982	0	0	0	0	0	0
USA	104	99,049	0	0	2	2,716	21	24,000
(Taiwan)	6	4,884	2	2,600	0	0	0	0
WORLD	438	371,258	32	25,073	70	80,531	206	179,345

Sources: WNA, IAEA

- According to press reports these countries are considering the construction of nuclear power plants: Algeria, Australia, Belarus, Chile, Egypt, Indonesia, Israel, Jordan, Kazakhstan, Libya, Nigeria, North Korea, Philippines, Saudi Arabia, Thailand, Turkey, Vietnam, and Yemen.

## Multilateral Cooperation

- New nuclear power programs and expansion of present ones will increase collaboration with the NEA, the IAEA, and other multilateral organizations.
- Improve the balance of safety and security in regulating the nuclear industry in the U.S. and achieve an international consensus.
- Find common ground with the IAEA when developing addressing the various aspects of safety, from the design basis threat to insider threats and sabotage.
- Over the next 2-3 years, staff anticipates that the IAEA will seek to develop and promulgate over a dozen documents relating to security, as well as revise many safety documents. The process of reviewing these documents is resource intensive for the NRC staff, which is simultaneously revising and promulgating national regulations.

## Cooperative Research

- Preparing for the challenges associated with the construction and regulation of new reactors, long-term safe operation of existing reactors, and study of new fuels and materials.
- Review of proposed NEA programs to ensure that they are directed to regulatory needs.
- NRC will need to assure that it continues to have access to foreign facilities, that NRC staff have opportunities build on their knowledge through interaction with counterparts, and that current and future research reflect the new security challenges.

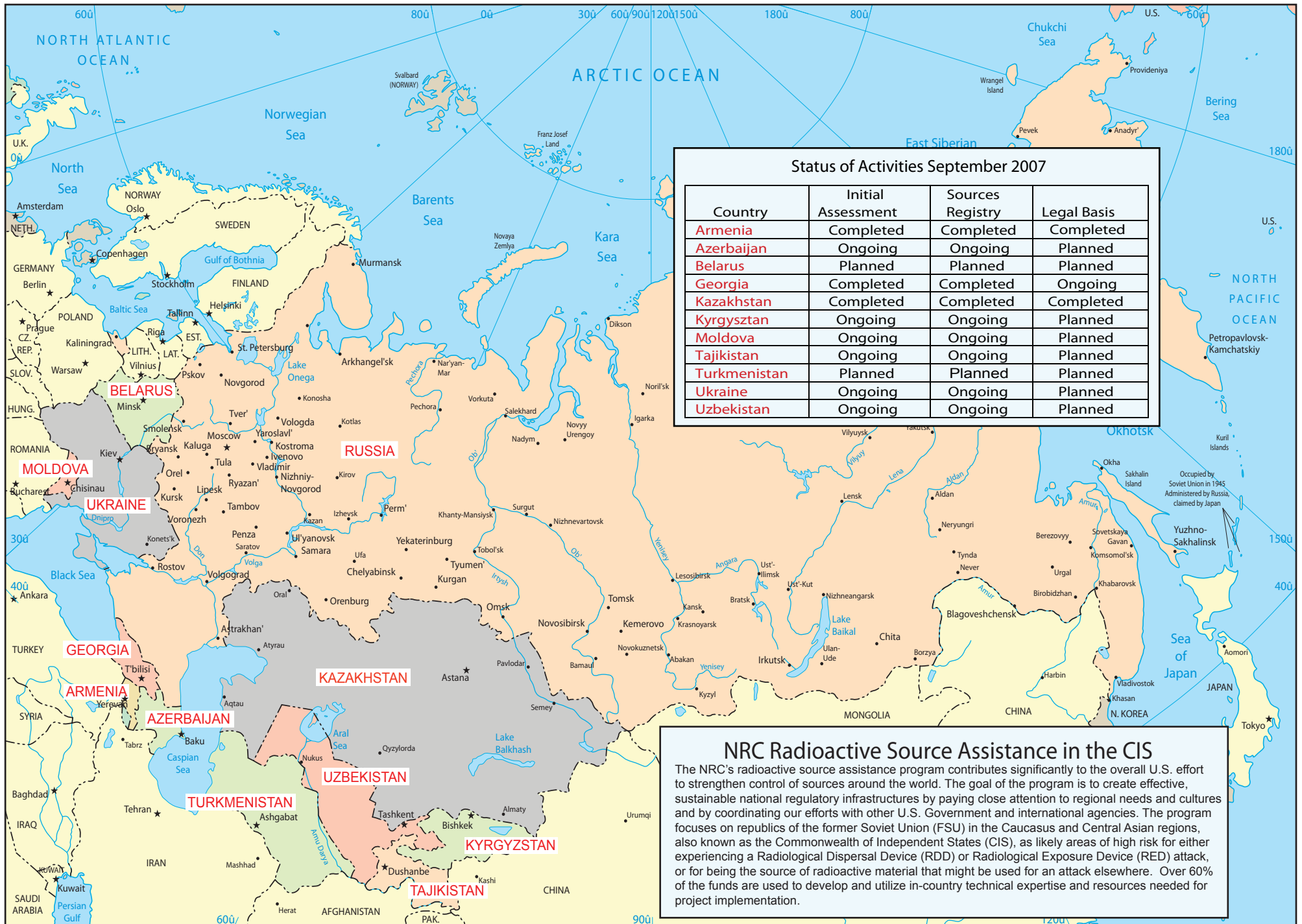
### Long-Term Research Areas and Activities

- Global Nuclear Energy Partnership (GNEP)
- Reactor License Renewal Beyond 60 Years
- Test Facilities
  - Integrated Digital Instrumentation and Control and Human Machine
  - Interfaces Research Facility
  - Integral Effects Test Facilities for Advanced Non-Light Water Reactors
- Cross-Cutting Research
  - Advanced Analytical Capabilities
  - Advance Fabrication Techniques
  - Extended In-Situ and Real-time Inspection & Monitoring Capabilities
  - Offsite Mitigation Strategies
  - Nanotechnology for Nuclear Power Applications
  - Fire Effects on Fiber Optic Cables
  - Risk Assessment for Advanced Reactors and Fuel Cycle Facilities
  - Formal Decision Analysis Methods

*Source: U.S. Nuclear Regulatory Commission Long-Term Research: FY 2009 Activities, March 2007, DRAFT - Unlimited Release*

[http://adamswsearch2.nrc.gov/idmws/doccontent.dll?library=PU\\_ADAMS^PBNTAD01&ID=071380282](http://adamswsearch2.nrc.gov/idmws/doccontent.dll?library=PU_ADAMS^PBNTAD01&ID=071380282)





**NRC Radioactive Source Assistance in the CIS**

The NRC's radioactive source assistance program contributes significantly to the overall U.S. effort to strengthen control of sources around the world. The goal of the program is to create effective, sustainable national regulatory infrastructures by paying close attention to regional needs and cultures and by coordinating our efforts with other U.S. Government and international agencies. The program focuses on republics of the former Soviet Union (FSU) in the Caucasus and Central Asian regions, also known as the Commonwealth of Independent States (CIS), as likely areas of high risk for either experiencing a Radiological Dispersal Device (RDD) or Radiological Exposure Device (RED) attack, or for being the source of radioactive material that might be used for an attack elsewhere. Over 60% of the funds are used to develop and utilize in-country technical expertise and resources needed for project implementation.