

NUCLEAR SAFETY RESEARCH COLLABORATIONS BETWEEN THE U.S. AND RUSSIAN FEDERATION INTERNATIONAL NUCLEAR SAFETY CENTERS

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СОТРУДНИЧЕСТВО В ИССЛЕДОВАНИЯХ ПО ЯДЕРНОЙ БЕЗОПАСНОСТИ МЕЖДУНАРОДНЫХ ЦЕНТРОВ ПО ЯДЕРНОЙ БЕЗОПАСНОСТИ США И РФ

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The Russian Federation Ministry for Atomic Energy (MINATOM) and the U.S. Department of Energy (USDOE) have formed International Nuclear Safety Centers to collaborate on nuclear safety research. USDOE established the U. S. Center (USINSC) at Argonne National Laboratory (ANL) in October 1995. MINATOM established the Russian Center (RINSC) at the Research and Development Institute of Power Engineering (RDPE) in Moscow in July 1996. In April 1998 the Russian center became an independent, autonomous organization under MINATOM.

The goals of the centers are to:

- Cooperate in the development of technologies associated with nuclear safety in nuclear power engineering.
- Be international centers for the collection of information important for safety and technical improvements in nuclear power engineering.
- Maintain a base for fundamental knowledge needed to design nuclear reactors.

The strategic approach that is being used to accomplish these goals is for the two centers to work together to use the resources and the talents of the scientists associated with the US Center and the Russian Center to do collaborative research to improve the safety of Russian-designed nuclear reactors.

The two centers started conducting joint research and development projects in January 1997. Since that time the following ten joint projects have been initiated:

- INSC Databases. Web Server and Computing Center
- Coupled Codes: Neutronic and Thermal-Hydraulic
- Severe Accident Management for Soviet-designed Reactors
- Transient Management and Advanced Control
- Survey of Relevant Nuclear Safety Research Facilities in the Russian Federation
- Computer Code Validation for Transient Analysis of VVER and RBMK Reactors
- Advanced Structural Analysis
- Development of a Nuclear Safety Research and Development Plan for MINATOM
- Properties and Applications of Heavy Liquid Metal Coolants
- Material Properties Measurement and Assessment

Currently, there is activity in eight of these joint projects.

The USINSC and the RINSC have made the following achievements:

- Joint Research - ten joint nuclear safety projects have been established, 15 technical papers have been presented, and 12 technical papers are currently being prepared.
- Technical Exchange - 54 technical working meetings have been held - 13 in US, 41 in Russia.
- Personnel Exchange - 323 person-days of personnel exchange in the US; 354 person days of personnel exchange in the RF.
- Technology - One of the most significant achievements has been the development of a Computing Center at RINSC. This center is a repository for nuclear safety codes in Russia and it is used as a training center for nuclear safety codes. In addition, other institutes in Russia are now using the codes in the computing center remotely. The center is also providing services to several branches of the USDOE, in addition to the branch that sponsored the development of RINSC.
- The RINSC has been designated by MINATOM to be the center for foreign computer codes used for nuclear safety analysis.

- The RINSC has coordinated the development of a "Safety Research Strategic Plan for Russian Nuclear Power Plants." This plan was reviewed by an OECD NEA international team of nuclear safety experts prior to final approval of the Plan by MINATOM. This was an important part of the effort to have Russia share its research plans with the international nuclear safety community.
- The US and Russian INSCs have been providing support to other institutes in the FSU and are assisting similar centers that are being developed in Kazakhstan, Lithuania, Ukraine, and Armenia.

The activities of the two INSCs support the improvement of nuclear safety in the Russian Federation in many ways. Some of the most significant support is the following:

- INSC database development supports the joint development and open exchange of nuclear safety data, in particular the results of generic nuclear safety calculations performed to support in-depth plant safety assessments.
- U.S. accident management technology is being used to assist MINATOM organizations in the development of severe accident management guidelines for Russian-designed RBMK and VVER reactors.
- Improved coupled neutronic/thermal hydraulic computer codes are being used to better characterize the risks attributable to a wider variety of plant upsets and postulated accidents in the in-depth safety assessments.
- U. S. computer codes for the transient analysis of design basis accidents are being validated against Russian reactor and experiment data. These codes can then be used in in-depth safety assessments with confidence that their results are valid for RBMKs and VVERs.
- Modern three-dimensional structural analysis software and computer models for seismic, thermal, external and internal shock waves and loadings are being developed for in-depth safety assessments.

The two INSCs are open to co-operation with international and other national organizations.

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