

**To: President George W. Bush
United States of America**

**To: President V.V. Putin
Russian Federation**

**Transmittal of the
Report of the United States and Russian Federation
Joint Working Group on the Development of a Bilateral Action Plan
To Enhance Global and Bilateral Nuclear Energy Cooperation**

December 15, 2006


At the St. Petersburg, Russia, G8 Summit on July 15, 2006, you directed us to establish a joint working group to develop a bilateral action plan for implementing our respective initiatives to enhance global and bilateral nuclear energy cooperation by December 15, 2006, and furthermore, at the Hanoi meeting on November 19, 2006, you entrusted us to accelerate implementation of our joint cooperation.

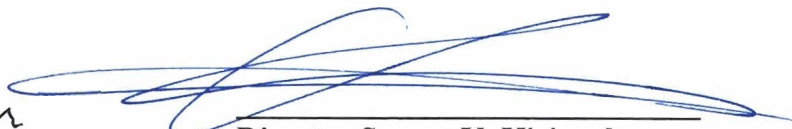
In our national strategies, both the United States and Russia see a strong need and role for nuclear power through the 21st century. Such commonality of views stems from concerns related to nonproliferation, energy security, sustainability, international stability, and environmental security. The joint working group has found considerable commonality in the research and development of the two countries that should provide a strong basis for meaningful cooperation.

The report of the joint working group outlines national strategies in nuclear power, identifies the common bases for U.S.-Russian cooperation in advanced reactors, exportable small and medium reactors, nuclear fuel cycle technologies, and nonproliferation, and defines a plan for cooperation.

The joint working group recommends that in the Winter and Spring 2007 subgroups be formed and workshops held to further define the technical content of the cooperative programs. The Provisional Action Plan for 2007 is included as Appendix A of the report.

Having completed the assigned task, the attached report of the joint working group is respectfully submitted to you.


Secretary Samuel W. Bodman
United States Department of Energy


Director Sergey V. Kiriyenko
Federal Atomic Energy Agency of
the Russian Federation

Report of the U.S.-Russian Civil Nuclear Energy Working Group: A Bilateral Action Plan to Enhance Global and Bilateral Nuclear Energy Cooperation

1. Introduction

In early 2006, the Presidents of the Russian Federation and the United States of America set forth—independently of each other—Initiatives concerning global nuclear energy expansion aimed at pursuing clean sustainable development in the world and concurrently addressing nonproliferation issues in a reliable manner. Based on the uniformity of the proposed Initiatives in terms of their goals and the similarity of a number of proposed solutions, the Presidents of the United States and Russia have articulated their common vision regarding the peaceful use of atomic energy while strengthening nuclear nonproliferation and have declared the intention of both countries to cooperate on longer term nuclear energy development. Their mutual goals are expressed in the following quotations.

"Advancing nuclear energy will require further development of innovative technologies that reduce the risk of proliferation, provide for safe management of waste, are economically viable, and are environmentally safe." ¹

"The Global Nuclear Energy Partnership aims to: ... Recycle nuclear fuel using new proliferation-resistant technologies to recover more energy and reduce waste....Encourage the growth of prosperity and sustainable development around the world." ²

"...Development of global nuclear energy infrastructure capable of providing equal access to nuclear energy for all concerned parties under sustainable compliance with nonproliferation requirements." ³

"...We will work with our partners to help developing countries meet their growing energy needs by providing them with small-scale reactors that will be secure and cost-effective. We will also ensure that these developing nations have a reliable nuclear fuel supply." ⁴

"The United States and the Russian Federation intend to work together, actively involving the IAEA, to allow all nations to enjoy the benefits of nuclear energy without pursuing uranium enrichment and reprocessing capabilities." ¹

In accordance with the Presidential Checklist approved by the Presidents of Russia and the United States on 15 July 2006 in St. Petersburg, a U.S.-Russian Working Group has been established and has developed a Bilateral Action Plan (this report) for implementing nuclear energy cooperation.

Implementing this Action Plan will:

- *Promote sustainable and safe nuclear energy use and expansion, in the U.S., Russian Federation, and worldwide, while strengthening nuclear nonproliferation and effectively addressing waste management; through bilateral cooperation to,*
- *Demonstrate advanced reactors, fuel cycle, and safeguards technology concepts, and develop associated criteria and principles in the context of a common vision for the structure of the global nuclear energy system of the future.*

A graphical representation of the Bilateral Action Plan structure is provided below. It shows clearly the interconnection and subordination of individual Action Plan components.

Bilateral Action Plan Structure

<i>Demonstrate advanced reactors, fuel cycle, and safeguards technology concepts, and develop associated criteria and principles in the context of a common vision for the structure of the global nuclear energy system of the future.</i>					
<i>Principal Areas of Cooperation</i>					
<i>Exportable small- and medium-power reactors</i>	<i>Advanced fast spectrum reactors</i>	<i>Integrated nonproliferation and safeguards concepts, methodology and technology</i>	<i>New types of fuel for fast spectrum reactors</i>	<i>New technologies for spent nuclear fuel reprocessing, separations (into fractions), transmutation and waste isolation</i>	
<i>Short-Term Cooperative Focus Areas</i>					
<i>Development of unified requirements for safety and nonproliferation for small and medium nuclear power plants offered for export</i>	<i>Joint experiments with transuranic fuels and structural materials</i>	<i>Development of methodology for establishing international nuclear fuel services centers</i>	<i>Development of new monitoring, control and accounting technologies</i>	<i>Increasing efficiency and safety of fast spectrum reactors</i>	<i>Development of unified requirements for the methods and technologies of spent nuclear fuel reprocessing and ultimate waste isolation</i>

The Working Group co-chairs are U.S. Assistant Secretary of Energy Dennis Spurgeon and Rosatom Deputy Director Nikolay Spasskiy. The U.S. membership of the Working Group is comprised of representatives of the Department of Energy, Office of Nuclear Energy (DOE/NE), the National Nuclear Security Administration Office of Defense Nuclear Nonproliferation (NNSA/NA-20), the Department of State, and the lead national laboratory for technical support. Representatives of the Russian side include Rosatom, Rostekhnadzor, Ministry of Foreign Affairs, and the Ministry of Defense.

At the technical level, the group's efforts and implementation of the action plan are supported by an expert team, composed of appropriate representatives of DOE and national laboratories participating in the Global Nuclear Energy Partnership (GNEP) Program and representatives of Russian organizations engaged in the implementation of President Vladimir Putin's initiative. To support implementation efforts by the expert team, issues to be addressed are arranged by areas (for example, nuclear fuel issues, spent nuclear fuels management, exportable reactors, etc.), in accordance with which a number of specialized expert subgroups are established. The membership of these subgroups will include representatives of specific U.S. national laboratories and Russian institutes conducting research and development in relevant areas. The Working Group will provide coordination and prioritization of subgroup activities.

2. Legal Framework for Cooperation

The Working Group notes that achieving the objectives established by the Presidents in the area of nuclear energy expansion requires large-scale cooperation in science and technology, including, *inter alia*:

- information exchange,
- mutual visits to scientific facilities and research centers, and
- transfer of source materials or special nuclear materials and equipment.

The Working Group recognizes that full implementation of this large-scale cooperation depends on the availability of the necessary legal framework (including a DOE – Rosatom research and development agreement with appropriate participation of Rostekhnadzor, which would include appropriate provisions for the protection and allocation of intellectual property, and, for most transfers of nuclear material or equipment, a government-to-government agreement on cooperation in the peaceful uses of nuclear energy) and supports the efforts to negotiate such agreements. These agreements will open the way to a consolidation of efforts by research and industry communities of both countries concerning the technical elements of the implementation plan for the proposed initiatives.

At the same time, in view of the dramatically changing situation in the global energy industry and its nuclear component, which imposes the need to accelerate our joint efforts, experts of the Working Group recognize the rich history of our past cooperative efforts and agree that it makes sense to identify and develop initial cooperation in areas authorized under existing legal and regulatory frameworks and to make use of existing mechanisms. Thus, for example, it may be possible to join our efforts on specific ongoing international projects, such as International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) and Generation IV

International Forum (GIF). In addition, the option of implementing individual projects on a contract basis and obtaining necessary export authorizations and licenses should be used in situations where the referenced international agreements are not required to proceed. Cooperative work conducted under other bilateral or multilateral arrangements should not be discarded either, as this work could receive a new impetus and be deepened by including it in the scope of the Action Plan to be developed by the Working Group.

Notwithstanding our countries' commitment to the most expedient deployment of a joint action program, expert consultations have identified the need to apply a cautious approach to the issue of legal and regulatory frameworks. Any initiation of active cooperation in science and technology must be undertaken in a manner that does not conflict with national nuclear laws and regulations.

3. Areas of Cooperation

3.1 Developing a Common Vision for the Future Global Nuclear Energy System

Bearing in mind the large scale of objectives set forth by the Initiatives, their respective commonality, but also the existence of significant differences in specific technical approaches to nuclear energy development, it is important first of all to begin efforts to outline a common vision of the future global system for nuclear energy. This effort by two leading developed nuclear countries will facilitate agreements on common approaches to future efforts. An example includes the development of agreed criteria and requirements for the nuclear energy system under development, without which it will be impossible to have efficient large-scale technical cooperation in place. In addition, developing such a common vision would demonstrate the compatibility of the Initiatives and our countries' commitment to addressing global energy problems. This includes a shared commitment to enabling countries to have assured access to the benefits of nuclear energy while strengthening the nonproliferation regime. An important way to accomplish this is discouraging the further spread of sensitive nuclear fuel cycle capabilities (enrichment and reprocessing) by developing comprehensive nuclear fuel services (e.g. supply and take-back).

The Working Group notes that the future nuclear energy concept to be developed is global in nature and, consequently, must be developed in cooperation with other interested countries. Such work can be implemented at 3 levels:

1. Developing the proposed concept in a bilateral format.
2. Joint work with other nuclear developed countries (the format of such cooperation is to be determined).
3. Development of the concept in cooperation with other interested countries, for example within the frameworks of the INPRO and GIF international projects.

Such efforts should serve as a basis for nuclear cooperation in the future and, therefore, should be initiated immediately. In addition, because of its essentially systemic and conceptual nature this effort would not require an additional legal framework for joint activities. A subgroup should be established under the auspices of the Working Group for developing the system vision as well as criteria and requirements to apply to the future system and its elements.

3.2 Principal Areas of Cooperation in Science and Technology

On the basis of already identified common elements in both countries' vision of the future architecture for the global nuclear energy system, the Working Group has determined the following avenues for bilateral cooperation:

- development of exportable small- and medium-yield reactors, sustainable in terms of safety and nonproliferation;
- use of advanced fast spectrum reactors;
- development and demonstration of new nuclear fuels for fast reactors and processes for their fabrication;
- development and demonstration of advanced methods for the reprocessing (recycling) of spent nuclear fuel, technologies of separation (into fractions) and transmutation, as well as for ultimate waste isolation; and
- development of nonproliferation and safeguard concepts, methodology and technology.

These avenues are critical for the success of practical implementation of the proposed Initiatives, and they will be split into an increasing number of individual projects and tasks as long as the implementation progresses. This being said, the Working Group underscores its understanding that major efforts along these avenues will be carried out only after the necessary legal and regulatory framework has been established and sufficient amounts of funding have been appropriated. At the same time, preparatory work (developing uniform approaches, determining the scope of cooperative research, carrying out preliminary contractual negotiations) must be initiated right now so we can implement large-scale cooperation without any delay as soon as legal and financial issues have been resolved.

3.3 Specific Areas of Short-Term Bilateral Cooperation

As indicated above, the Working Group has noted the need to accelerate joint efforts and develop cooperation at this stage in the areas authorized under the existing legal framework. Attention has been paid to the following opportunities:

- cooperation currently conducted under bilateral or multilateral arrangements, which could receive a new impetus and be deepened through inclusion in the scope of the Action Plan being developed by the Working Group;
- consolidation of our efforts on individual projects under the auspices and within the existing legal frameworks for international projects (some potential examples are listed in Section 2); and
- implementation of individual projects on a contractual basis, subject to obtaining necessary export authorizations and licenses.

The following specific technical projects have been singled out by experts of the Working Group

as appropriate for initiation as soon as possible, subject to availability of necessary funding.

3.3.1 Irradiating specimens of U.S.-designed transuranic fuels and structural materials on the basis of a Russian experimental unit (RIAR, BOR-60) for the purpose of their joint post-irradiation examination.

An individual contract can be concluded for implementing this experiment taking into account nuclear safety requirements and obtaining appropriate export authorization. Another possibility has also been noted. We could carry out such work by engaging a U.S. laboratory in a Russian-French transmutation program, currently implemented by RIAR and vested with the necessary legal status. To support this project, it is appropriate to establish a special working subgroup to take responsibility for the larger scope of objectives provided for in 3.2 above—development of new nuclear fuels for fast reactors and processes for their fabrication.

3.3.2 Developing nonproliferation and safety criteria and requirements to apply to small and medium nuclear power plants offered for export to third countries.

This project can establish uniform principles and approaches to developing such reactors in terms not only of safety and nonproliferation but also in terms of commercial attractiveness for third countries.

Activities could be started along this avenue using appropriate existing frameworks (some potential examples are listed in Section 2). Experts also noted the logic of engaging the International Atomic Energy Agency (IAEA) in this effort (after initial bilateral work), since it has a considerable track record and possesses databases on diverse nuclear power plant-related criteria and requirements. Experts also noted the recent IAEA General Conference resolutions calling on Member States to develop such reactors under the auspices of the IAEA and on the Agency to develop common user requirements through the INPRO project. Establishing a working subgroup has also been recommended for facilitating this task.

3.3.3 Developing a methodology for establishing international nuclear fuel cycle service centers.

This topic is of primary importance in addressing one of the major objectives of the Initiatives—discouraging third countries from developing uranium enrichment and spent nuclear fuel reprocessing technologies by means of establishing, with due account of national legislation, a commercially attractive international nuclear fuel cycle service network. It is necessary to develop a single approach to the applicability of safeguards to such centers and services, methods of assuring delivery guarantees for consumers, making such centers commercially attractive, guaranteeing their physical protection, etc., recognizing that many related proposals have been made within the international community. Efforts in this area will also be supported by an individual working subgroup. This subgroup is expected to be engaged in active working communication—primarily with the IAEA and major suppliers (after initial bilateral development)—for developing approaches to fuel services and to the applicability of safeguards to international centers and associated fuel cycle facilities.

3.3.4 Developing new technologies and methodologies for monitoring, accounting for, and controlling materials across the entire fuel cycle for the future global nuclear energy system.

This topic is important in view of the use of such new technologies to support the operation of international nuclear fuel cycle service centers. An objective to achieve unification of measurement and control systems is also proposed in order to facilitate operation in a “single coordinate system” when deploying the future global nuclear energy system. Ultimately, in the Working Group’s opinion, efforts in this area should result in developing an essentially new automated system for a virtually real-time process of monitoring and control.

3.3.5 Advancing the efficiency and safety of fast spectrum reactors.

The Working Group recognizes that a range of topics are of mutual joint interest. These include thermal efficiency, capital cost reduction, safety by design analysis techniques, large component testing, passive cooling and safety features, critical experiments and nuclear data. However, the Working Group notes that full scale technical cooperation in this area depends on the availability of the required legal framework. Additional discussions are required to determine which of these areas can be pursued as a part of short term cooperation under existing legal and regulatory frameworks and mechanisms. Appendix A includes a proposed workshop to explore this area further and identify specific potential opportunities. Based on the results of the workshop a decision will be made whether it makes sense to establish an appropriate specific subgroup.

3.3.6 Developing and demonstrating advanced technologies for processing spent fuel from current and future generation power reactors.

This topic addresses a key element of the common vision and is directed toward the development and practical demonstration of processing methods that support that vision. This includes not only chemical separations (into fractions) methods but the practical aspects of emission controls and production of robust waste forms for ultimate isolation. In the future cooperation is expected to range from technical workshops to collaborative experiments on key process features, carried out in both U. S. and Russian Federation laboratories. While the Working Group acknowledged the importance of this area to the future global nuclear energy system and expressed an interest in proceeding with cooperation as soon as possible, it will be necessary to ascertain whether necessary legal frameworks are available for this cooperation. Therefore, a workshop (included in Appendix A) will be required to identify specific projects of mutual interest and short-term work that could proceed using existing legal and regulatory frameworks and mechanisms. The Working Group noted that one of the possible areas of cooperation for the near-term is joint development of requirements (as a part of the common vision development) for the methods and technologies of spent nuclear fuel reprocessing and ultimate waste isolation.

4. Establishing Technical Subgroups

The following subgroups are proposed to enable the short-term bilateral cooperation in the areas described in Section 3 while laying the groundwork for longer-term planning and cooperative efforts. The composition of the subgroups will be modified as appropriate.

4.1 Global Nuclear Energy System Concept Development Subgroup

This subgroup will focus on developing a common vision for the future global nuclear energy system as well as criteria and requirements for such a system and its individual components. From the Russian side, this team will be staffed with representatives of IPPE, Kurchatov Institute, TsNII AtomInform, Science and Technology Center of Nuclear and Radiation Safety, and NIKIET (subject to formal clearance)—among others. U.S. participants are to be determined.

4.2 Transuranic Fuel Subgroup

In the initial phase, the objective of this group will be to implement the cooperation described in 3.3.1, including arrangements to conduct in the near future:

- the first workshop to identify objectives and conditions of the experiment; and
- consultations on a number of technical issues including determining fuel composition, content of elements, location of its fabrication (an option of manufacturing it in Russia is possible in order to avoid transportation), and irradiation techniques (in targets or incorporated in BOR-60 assemblies), etc.

From the Russian side, representatives of RIAR and Bochvar Institute (VNIINM) will be included, among others, in the subgroup (subject to formal clearance). U.S. participants are to be determined.

4.3 Exportable Small and Medium Nuclear Power Plants Subgroup

This group will work towards developing systemic criteria and requirements for exportable small and medium nuclear power plants. Representatives of IPPE, OKBM, NIKIET, OKB Gidropress, Science and Technology Center of Nuclear and Radiation Safety and Kurchatov Institute will be included in the subgroup (subject to formal clearance) from the Russian side. U.S. participants are to be determined.

4.4 Subgroup on the Methodology of Establishing International Nuclear Fuel Service Centers

From the Russian side, the subgroup will include representatives from IPPE, Science and Technology Center of Nuclear and Radiation Safety and certain Rosatom departments and facilities (subject to formal clearance). U.S. participants are to be determined.

4.5 Subgroup on Advanced Monitoring, Control and Accounting Technologies Throughout The Nuclear Fuel Cycle

From the Russian side, the subgroup will include representatives from Kurchatov Institute, VNIINM, TsNII Atominform, Science and Technology Center of Nuclear and Radiation Safety and NIKIET (subject to formal clearance). U.S. participants are to be determined.

4.6 Fast Spectrum Reactors Subgroup

This working subgroup will be established as appropriate; a decision will be made based on the results of the workshop held to evaluate areas of mutual interest, possible project activities, and appropriateness of existing legal and regulatory frameworks and mechanisms.

4.7 Advanced Spent Fuel Processing and Waste Management

Because the issues of spent fuel reprocessing and waste management are among the key elements of bilateral cooperation, the working group plans to conduct a specialized workshop in 2007 to identify which areas of cooperation are possible and can be implemented in the near term within the existing legal frameworks.

5. Milestones for 2007

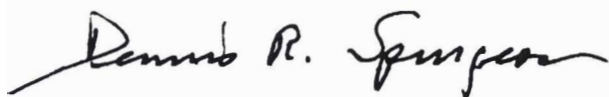
Milestones for initial joint work have been identified and are presented in Appendix A; this ambitious set of milestones clearly demonstrates the interest and commitment of both the U.S. and the Russian Federation to near-term initiation of meaningful collaboration. It is understood that these milestones are a work in progress and will continue to be refined and are contingent on adopting an agreed-upon decision for providing sufficient funding for the work. Venues for meetings and workshops as well as terms and conditions of their organization will be determined individually on a per-case basis.

6. Summary

The Working Group will assure that the needed integration of the joint activities occurs. This will enable implementing the Presidents' initiatives to achieve the mutually recognized benefits of global nuclear energy expansion while addressing nonproliferation issues in a reliable manner. Additional activities will be added as the cooperation matures.


7. References

1. Joint Statement by President George W. Bush and President V. V. Putin on Cooperation in the Peaceful Uses of Nuclear Energy and Countering Nuclear Proliferation, St. Petersburg, Russia, 15 July 2006.
2. Fact Sheet on Global Nuclear Energy Partnership Initiative (www.energy.gov/media/GNEP_factsheet.pdf).
3. Russian President's Initiative, 25 January 2006, St Petersburg.
4. U.S. President's Radio Address on Global Nuclear Energy Partnership.



D. Spurgeon, Assistant Secretary for Nuclear Energy,
U.S. Department of Energy

Date: 11 December 2006



N. Spasskiy, Deputy Director of Federal
Atomic Energy Agency, Russian
Federation

Date: 13. 12. 2006

Appendix A

Proposed Actions and Milestones for 2007

Proposed Delivery Date	Proposed Actions
December 2006–January 2007	<ol style="list-style-type: none"> 1. Identify membership of the subgroup for developing a <u>Common Vision</u> for the future global nuclear energy system as well as criteria and requirements for such a system in general and its individual components. Conduct the first working meeting separately—U.S. members in the United States and Russian members in Moscow.
	<ol style="list-style-type: none"> 2. Identify membership of the following subgroups: <ol style="list-style-type: none"> A: <u>Transuranic Fuels</u>, B: <u>Exportable Reactors</u> small and medium power, requirements and criteria, C: <u>International Nuclear Fuel Services</u> includes development of methodology for establishment of international fuel cycle services centers, D: <u>Monitoring, Control & Accounting Technologies</u>.
February 2007 <i>NOTE: Workshops A, B, C, D, and E are proposed to be held concurrently.</i>	<ol style="list-style-type: none"> 1. Conduct workshops in the areas of: <ol style="list-style-type: none"> A: <u>Common Vision</u> of the future global nuclear energy system (U.S. and Russian specialists will present their concepts and proposals), B: <u>Transuranic Fuels Development</u>, including preparation of objectives for experiments and irradiation, conditions of the experiment, and schedule of joint activities, C: <u>Fast Reactor Safety</u> for reactors with higher minor actinide content, D: <u>Advanced Spent Fuel Processing & Waste Management</u> for the purpose of planning subsequent activities, including establishment of a subgroup, E: <u>Nuclear Data of Actinides</u>.
March 2007	<ol style="list-style-type: none"> 1. Write Joint Report – summarizing outcome of Feb 2007 workshops including recommendations on possible joint research objectives, activities, schedule and deliverables for each side.

	2. Prepare terms of reference from the U.S. side for the transuranic fuel irradiation experiments.
April 2007	<ol style="list-style-type: none"> 1. Arrange a joint workshop with appropriate organization(s) (e.g. IAEA (INPRO)) after initial bilateral work on the criteria of safety, environmental sustainability and proliferation resistance of diverse types of small and medium reactors—with a team of Generation IV specialists invited. 2. Prepare a comment from NIKIET on the terms of reference received for irradiation experiments from the U.S. side, the possibility to carry out the experiment, and conclusion of an appropriate contract.
<p>May - August 2007</p> <p><i>NOTE: Workshops A, B, C, and D are proposed to be held concurrently</i></p>	<ol style="list-style-type: none"> 1. Conduct Workshops on: <ol style="list-style-type: none"> A: <u>Monitoring, Accounting, & Control Technologies</u>, B: <u>Fast Reactors</u> – Cost reduction and Efficiency, C: <u>International Nuclear Fuel Services</u> including developing a methodology for establishing international nuclear fuel cycle services, in particular on the basis of the International Uranium Enrichment Center being created in Angarsk, D: <u>Advanced Spent Fuel Processing & Waste Management</u> including technological flow charts for diverse spent nuclear fuel processing and tritium recovery and sequestration in waste processing. 2. <u>Common Vision</u> subgroup prepares a presentation on the future global nuclear energy system—to be delivered at the next IAEA General Conference – subject to approval by both countries.
September 2007	1. Transuranic Fuel sub-group holds review meeting to discuss preliminary results of implementation of the experimental program, write draft report summarizing activities, progress, and accomplishments to date.

	2. Presentation of the <u>Common Vision</u> of the future global nuclear energy system during the IAEA General Conference – subject to approval of both countries.
October 2007	<ol style="list-style-type: none"> 1. Working Group Program Review meeting summarizing accomplishments and deliverables. 2. Development of initial 2008 milestones.
November 2007	<ol style="list-style-type: none"> 1. Prepare 2007 Working Group Report, obtain approval to finalize as required. 2. Finalize 2008 milestones.