

**Project Fiche – 2009 IPA Horizontal Programme
on Nuclear Safety and Radiation Protection**

1. Basic information

- 1.1 CRIS Number:** 2009/021-640
1.2 Title: Part 2 of the project for repackaging and transport of spent nuclear fuel
1.3 ELARG Statistical code: 03.64 - Nuclear safety
1.4 Location: Vinča Institute in Serbia

Implementing arrangements:

1.5 Contracting Authority:

The European Union represented by the European Commission for and on behalf of Serbia in joint management with the International Atomic Energy Agency (IAEA).

1.6 Implementing Agency:

The International Atomic Energy Agency (IAEA), Technical Co-operation Department

1.7 Beneficiary:

The Republic of Serbia
Vinča Institute of Nuclear Sciences
11001, Belgrade, P.O Box 522
Dr. Jovan Nedeljkovic, Director General

Financing:

- 1.8 Overall cost (VAT excluded)¹:** EUR 3 300 000
1.9 EC contribution: EUR 3 300 000
1.10 Final date for contracting: No later than 31 March 2013
1.11 Final date for execution of contracts: No later than 31 March 2015
1.12 Final date for disbursements: No later than 31 March 2016

2. Overall Objective

To improve nuclear safety at the Vinča Institute in line with the EU *acquis* and the best EU practices.

¹ The total cost of the project should be net of VAT and/or other taxes. Should this not be the case, the amount of VAT and the reasons why it should be considered eligible should be clearly indicated

2.1 Project purpose:

To contribute to the implementation of the Vinča Nuclear Institute Decommissioning project (VIND) through financing of the retrieval and repackaging of spent nuclear fuel from the RA research reactor in preparation for transport to the country of origin – Russian Federation.

2.2 Link with AP/NPAA/EP/SAA

Article 110 of the draft SAA with the Republic of Serbia explicitly mentions nuclear safety as one of the cooperation topics.

As short term priority for Serbia mentioned in Annex 2 of European Partnership with Serbia, continuation of dismantling of the Vinča research reactor is stated.

The Serbia 2008 progress report mentions that "Plans on management of sealed radioactive sources, environmental monitoring and radiation protection in the context of medical and industrial applications have to be further developed. An appropriate regulatory authority has still to be established. Serbia has not yet acceded to the Convention on Nuclear Safety and to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management".

2.3 Link with MIPD

The IPA Multi-beneficiary Multi-annual indicative Planning Document (MIPD) 2009-2011², *section 2.3.3.11 - Nuclear Safety and Radiation Protection*, mentions that "in Serbia [...], the operation, refurbishment and dismantling of nuclear research reactors constitute additional sources of radiation risks that would require investment, in particular for the management of spent nuclear fuel and radioactive waste".

2.4 Link with National/Sectoral Investment Plan

- Decision of the Serbian government to decommission the RA research reactor located at the Vinča Institute and approval of the VIND programme (2002 and 2004)
- Draft of the Serbian new Law on ionising radiation protection and on nuclear safety (2006) and existing Serbian Law on Protection against Ionising Radiation (1996)
- Activity framework in the field of nuclear safety and radiation protection for the period 2008-2010 decided by the government of Serbia.

3. Description of project

3.1 Background and justification:

Operation of the RA nuclear research reactor at Vinča until 1983 has generated spent nuclear fuel and many types of radioactive waste that need to be properly managed. This is the main aim of the VIND programme that was established in 2002 based on a decision of the Serbian government to decommission the Vinča RA research reactor.

² C(2009)4518 of 16 June 2009

The VIND programme comprises a number of successive phases of implementation that are covering the period 2006-2013.

Management of spent nuclear fuel is considered as the most urgent problem to be solved and therefore the three first phases addressed the characterisation, repackaging, transport to the Russian Federation and reprocessing/disposal operations. The subsequent phases are covering radioactive waste management issues (see the phases constituting the current VIND programme listed hereafter together with their corresponding funding).

- Phase 1: Removal, characterisation and repackaging of spent nuclear fuel in store at the Vinča Institute (IAEA and other donors funding; IPA funding);
- Phase 2: Preparations for and transport of Russian-origin spent nuclear fuel from the Vinča Institute to the Russian Federation (only partly funded by IPA, complementary funding still lacking);
- Phase 3: Reprocessing and disposal of the Russian-origin spent nuclear fuel in the Russian Federation (IAEA and other donors funding);
- Phase 4: Design and construction of a waste processing and storage facility at the Vinča Institute for all types of radioactive waste to be generated during decommissioning operations of the RA nuclear research reactor (IAEA and other donors funding);
- Phase 5: Provisions of equipment for a waste processing facility at the Vinča Institute (IPA funding);
- Phase 6: Conditioning, packaging and storage of disused sealed radioactive sources (IAEA and other donors funding, IPA funding);
- Phase 7: Conditioning and processing of improperly stored and unconditioned radioactive waste (IAEA and other donors funding, IPA funding);
- Phase 8: Decommissioning of the old storage facilities for sources and radioactive waste (IAEA and other donors funding, IPA funding);
- Phase 9: Dismantling of the old piping system and tanks containing radioactive liquid waste (funding not yet determined), and
- Phase 10: Radioactivity survey of the Vinča site (IPA funding for the first investigations).

Therefore the aim of this project is to contribute to the VIND programme via the support to the Vinča Institute in the implementation of Phase 2 for which complementary funding was still lacking. This project focuses on loading the repackaged fuel into fuel transport packages, movement to the rail yard, and shipment to the Russian Federation border. (Transport within the Russian Federation is separately funded under Phase 3).

The project is supported by the technical and safety expertise of IAEA under its Technical Cooperation programme. So far the IAEA plays a central role in the implementation of the VIND programme in collecting funds from various donors, funding a number of activities with their own funds, and providing technical expertise while coordinating the whole programme.

This project is the continuation of the work initiated under the EC Contribution Agreement with IAEA (2008/149-555) under IPA 2007.

3.2 Assessment of project impact, catalytic effect, sustainability and cross border impact

The project will reduce the radiological risks related to the unsafe and unsecured storage of spent nuclear fuel. The spent nuclear fuel is currently stored in a degraded condition, and radiological monitoring has demonstrated an increase in fuel leakage by at least a factor of five in the past 12 months. Storage is currently being accomplished in close proximity (2-3 km) to the Danube River, which serves as an international border with EU countries.

This project has a catalytic effect in the sense that the funding will allow completion of the spent fuel repackaging operations, will support repatriation of the spent fuel out of Serbia and out of the region, and will enable the whole sequence of operations leading to a safer and more secure Vinča nuclear site to become effective.

3.3 Results and measurable indicators:

Results:

1. Acquisition, testing and installation completed for equipment procured for cask loading and transport activities;
2. All transport package certificates of compliance and all transit licenses received;
3. Acquisition and testing of all Spent Nuclear Fuel (SNF) transport cask loading equipment complete;
4. Training of all SNF cask loading personnel complete, as evidenced by training documentation;
5. All 32 SNF casks loaded, dried, sealed, leak tested, and all documentation completed;
6. All SNF shipping documents and repatriation preparatory actions for shipment completed;
7. SNF transport casks loaded in ISO containers, placed on trucks, and ready for shipment;
8. All on site post-shipment recovery activities completed;
9. All safeguards support activities for repackaging, preparations for transport, and transport completed;
10. All transport security activities completed.

Measurable indicators:

1. Acceptance protocol received;
2. Documentation package;
3. All equipment delivered to work site; acceptance tests successful;
4. Training records;
5. Loaded casks sealed & secured in reactor building;
6. Documents completed;
7. ISOs loaded on trucks and secured;
8. Facility equipment secured & fully accessible;
9. SG seals installed; SG electronic file sent;
10. Fuel received in RF

3.4 Activities:

The following activities began following the successful SNF repackaging campaign, which was partly supported under EC Contribution Agreement with the IAEA (2008/149-555) under IPA 2007. These activities focus on removal of the repackaged SNF canisters from the fuel storage pool, loading them into SNF transport packages for temporary storage on site (note that ‘temporary storage’ refers to the short period of less than 120 days while all 32 casks are being loaded and all documentation is being prepared for shipment), movement of all transport packages to the rail yard, and shipment by a combination of rail and sea to the Russian Federation. The activities of the overall SNF repatriation project ends when the transport packages arrive in Russia and are transferred to rail cars; transport within the Russian Federation is addressed under Phase 3 and is funded by Serbia and international donors.

1) Development & Use of Technology & Equipment for SNF Shipment: Assistance in the development and use of technology and equipment for spent nuclear fuel (SNF) shipment, including receipt, inspection, survey, quality control, and temporary storage of 32 empty fuel transport casks, spent fuel transport baskets, cask loading equipment, and fuel transfer flask; leasing, receipt and testing of mobile crane for cask handling; installation of motorized trolley system for movement of casks into fuel storage room and reactor building; assembly, testing and adjustment of cask loading equipment; development of training program, local procedures and operation manuals for all SNF loading and transport preparation activities; and staff training on technology for cask loading;

2) Transport Package Certification and Transit Licenses: Assistance with transport package certification and transit licenses within Serbia and related interface and cooperation with transit countries (Hungary and Slovenia) and final destination country (Russian Federation), including obtaining certificates of compliance for Russian TUK-19 transport cask and SKODA V/VRM transport cask; and obtaining transit licenses;

3) Loading casks & Shipment: Assistance with preparatory actions for shipment, including establishing contract for leasing crane for receipt of empty shipping casks and cask handling equipment, as well as second lease of crane for transferring loaded shipping casks onto trucks at Vinča and from trucks to rail cars at the rail yard; identify transport trucks licensed for transport of spent nuclear fuel (16 each are needed; 0 currently available in Serbia); implementation of advance notification requirements for affected all local law enforcement agencies and national authorities for Serbia, Hungary, Slovenia and Russian Federation; implementation of transport insurance requirements; preparations for implementation of Serbian road/rail carrier services; preparations for implementation of sea transport carrier services;

4) Documentation for Shipment: Assistance with documentation for SNF shipment, including preparation and maintenance of Control Procedures and Documents Plan for shipment; determination of all required approvals, permits and fees for transport (including specific agencies within Serbia, Hungary, Slovenia and Russian Federation); determination of all Customs requirements and operations for export of SNF from Serbia; documentation of all SNF passports; obtaining certifications for mobile cranes at Vinča site and rail yard; licenses and permits within Serbia for highway transport from Vinča site to rail yard (e.g., dangerous materials, radioactive materials and fissile

materials); and identification and preparation of complete shipping documentation package, including manifest, for Serbia, Hungary, Slovenia and Russian Federation;

5) Preparatory Actions for Shipment: Assistance with loading and shipment of transport casks, including final comprehensive QA of all shipping documents and manifests; verification that all advance notifications complete; loading canisters containing SNF into fuel transport baskets, drying of fuel canister/basket assemblies, loading into fuel transport flask (for TUK-19 casks), and transfer/loading into fuel transport casks for temporary storage; performing radiation/contamination surveys on casks and decontaminating as necessary to meet transport requirements; safeguards sealing and leak testing of each transport cask; loading of auxiliary equipment into the auxiliary equipment ISO container for concurrent shipment to Russian Federation; updating all documentation, including safeguards documentation; containerising and managing all SNF-related radioactive and non-radioactive wastes per local procedures; securing all fuel handling equipment in preparation for cask transfer to loading area;

6) Deliver packages to departure point: Assistance with movement of all SNF transport packages and auxiliary handling equipment from Vinča temporary storage to rail yard and subsequent shipment to Russian Federation, including loading of SNF transport packages and handling equipment onto trucks at Vinča; movement to rail yard; transfer from trucks to rail cars; shipment by rail to sea port; and sea transport to Russian Federation;

7) SG Activities in Support of SNF Repatriation: Assistance with safeguards (SG) requirements required for SNF repatriation, including SG activities in support of SNF cask loading/storage; SG activities in support of shipment; local support for witnessing and verification of loading and sealing of SNF transport packages by the Serbian regulatory body, IAEA and Mayak in the Russian Federation (consignee); registration of SNF burn-up calculation information in the national system for accountancy and control of nuclear materials; and providing electronic fuel data files to the IAEA;

8) Security Considerations for Shipment: Assistance with implementation of security considerations and requirements for SNF shipment, including preparation of the security plan for repackaging, loading and transport (design-basis threat analysis, emergency action plan/card, etc.); implementation of security plan for cask loading and temporary storage within reactor building; implementation of security plan for SNF transport; and local coordination of police/security guards during transport;

9) Onsite Post-shipment Recovery Activities: Assistance with on-site post-shipment recovery and stabilisation activities, including decontamination of SNF transfer flask, flask packaging, and return shipment to Magurele near Bucharest in Romania; cleaning and decontamination of the reactor building cask storage area and all handling equipment not to be returned to Russian Federation; stabilisation of all SNF repatriation-related radioactive and non-radioactive wastes per site procedures; perform radiation/contamination surveys, followed by decontamination and control as appropriate; and decontaminate and move motorised trolley/rail system to storage location in the waste storage facility.

10) Primary Contractor Support for SNF Package Loading

Task 1 – Loading of canisters with SNF into Packages and delivery of Packages to departure point:

- (a) The design of the transport package components (baskets, canisters, casks, etc.) are developed in the preceding tasks and detailed in the Safety Analysis Report or the Transportation Safety Report.
- (b) Perform all activities for loading of and handling of Packages.
- (c) If the Contractors' Coordinator determines that Vinca personnel shall participate in any aspect of loading and handling of Packages, then the involved Vinca personnel shall be trained by the Contractors to perform the related work, and such training shall occur within thirty (30) calendar days prior to starting to the work. The training shall be performed using uncontaminated equipment and without SNF, and it shall be accomplished at no additional cost to the IAEA.
- (d) The loading of canisters with SNF into Packages shall include the following:
 - (1) Canisters with SNF shall be loaded into Packages in accordance with the report "Technology for loading canisters with SNF into Packages" and in accordance with the requirements of the document "Technical Specifications of SNF delivery to Contractor Mayak" ;
 - (2) Each Package shall have a loading cartogram specifying the number of the accounted items (i.e., the canisters with SNF to be loaded into each Package and their position within the Package);
 - (3) After each Package is loaded, seals shall be placed on the Package, and the Package shall be transported to the area specified by Vinca for preparation for transport and temporary storage;
 - (4) The IAEA seals shall be installed by IAEA Safeguards inspectors, and the Serbian seals shall be installed as required; and
- (e) The preparation of Packages for shipment shall include the following:
 - (1) Each Package shall be subjected to the following in preparation for shipment:
 - (i) Drying;
 - (ii) Sealing;
 - (iii) Leakage testing with the results recorded in the protocol;
 - (iv) Decontamination and dosimetry monitoring with the results recorded in the protocol; and
 - (v) Installation of seals;
 - (2) The Package preparation activities specified above shall be performed in accordance with the operation manuals for Packages, "Technology for loading canisters with SNF into Packages" and the document "Technical Specifications for SNF delivery to Contractor Mayak;"
 - (3) When Packages are prepared for transport, a passport for each Package shall be completed in accordance with the requirements of document "Technical Specifications of SNF delivery to Contractor Mayak;" and
 - (4) Solid and liquid radioactive wastes arising from Package decontamination are handled in accordance with the regulations and guidelines available at the

Facility.

- (f) The loading of Packages with SNF onto vehicles and delivery to the point of transfer to the carrier shall include the following:
 - (1) The Packages shall be delivered by trucks to the point of transfer to the carrier (railway station or port of Belgrade);
 - (2) The Packages shall be loaded onto the vehicle and delivered to the railway station or port in accordance with the operation manuals for the Packages, “Technology for loading canisters with SNF into Packages” and the document “Technical Specifications of SNF delivery to Contractor Mayak;” and
 - (3) Mandatory conditions for transfer of the Packages to the carrier, which consist of the following:
 - (i) perform radiation monitoring of Packages as specified in the protocol;
 - (ii) specify the data on Package seals in the accompanying consignment documentation;
 - (iii) issue shipping permission bill; and
 - (iv) sign the protocol for Package transfer to the carrier.
- (g) Expected dose to workers:
 - (1) Dose to workers supporting transport operations is not expected to exceed 1 mSv/worker nor more than 5 mSv for the entire task.
 - (2) Dose to drivers transporting packages to rail head will not exceed 0.02 mSv/hr in the cab of the vehicle and is not expected to exceed 0.2 mSv for the entire task.

11) Primary Contractor Support for SNF Package Leasing and SNF Transport:

Task 2 – *Lease of Packages for all Project stages:*

- (a) Arrangements and payment for the leasing of all required Packages which are not supplied by the IAEA.
- (b) Delivery of all Packages, regardless of origin or ownership, to the Facility.
- (c) Bear the cost of the transport of Packages from the storage place at NRI, Rez, Czech Republic, to the Facility, as well as the cost of returning the Packages to NRI, Rez, Czech Republic, from the Facility. In no instance shall the IAEA be liable for costs due to Package non-availability or costs associated with Package usage except as specified in the Contract.

Task 3 – *Transport of SNF Packages from Facility to Consignee facility:*

- (a) Develop a protocol for the transfer of SNF Packages from the Facility to the Consignee.
- (b) Consistent with the specifications of the above protocol, all arrangements shall be made for the transport of the SNF Packages and all SNF Packages shall be transported from the Facility to the Consignee’s facility.
- (c) Current plans are for transport by rail and with a duration of less than 30 days from initial movement from Vinca to arrival at Mayak.

The part of these activities, which have been financed by other donors has already been contracted by the IAEA following an international call for tender. The contract was awarded to a consortium of Russian companies, consisting of: the Research and Development Company "Sosny", the Federal State Unitary Enterprise PA "Mayak", and the TENEX Joint Stock Company. The consortium is considered as the 'primary contractor' with clearly and narrowly defined activities and responsibilities, including those detailed below. In contrast, the activities 1-9 are locally contracted within Serbia.

3.5 Conditionality and sequencing:

Sequencing for this project is captured in the above list of Activities.

3.6 Linked activities:

All the other phases of the VIND programme and notably the Contribution Agreement with the IAEA No 2008/149-555.

3.7 Lessons learned

Since 2004 the implementation of the VIND programme under the coordination of the IAEA is proceeding according to the time schedule. However, the latest developments of this programme showed that supplementary technical expertise would be required for the monitoring taking into account the increasing number of projects being implemented and their high technical complexity.

4. Indicative Budget (amounts in EUR)

			SOURCES OF FUNDING									
			TOTAL EXP.RE	IPA EU CONTRIBUTION		NATIONAL CONTRIBUTION					PRIVATE CONTRIBUTION	
ACTIVITIES	IB (1)	INV (1)	EUR (a)=(b)+(c)+(d)	EUR (b)	%(2)	Total EUR (c)=(x)+(y)+(z)	% (2)	Central EUR (x)	Regional/ Local EUR (y)	IFIs EUR (z)	EUR (d)	% (2)
Activity 1		x	3 300 000	3 300 000	100							
Contribution Agreement with IAEA		x	3 300 000	3 300 000	100							
TOTAL IB												
TOTAL INV			3 300 000	3 300 000	100							
TOTAL PROJECT			3 300 000	3 300 000	100							

Amounts net of VAT

- (1) In the Activity row use "X" to identify whether IB or INV
- (2) Expressed in % of the **Total** Expenditure (column (a))

Additional Funding from Government, IAEA and Other Contributors

As discussed in preceding paragraphs, this project is intended to support the Vinča Institute Nuclear Decommissioning (VIND) programme, which is Serbia's priority nuclear safety and radiation protection support programme. For more than 40 years, Serbia was the central collection centre for all disused sealed sources and radioactive waste from the former Yugoslavia, including countries which are now EU Member States. These sealed sources and wastes are found in rooms and degraded storage facilities located all over Vinča. Only a few of the thousands of disused sealed sources and the thousands of waste containers have ever been conditioned, and the conditioning methods for those few items does not meet current international standards. Construction of proper waste processing facilities, secure storage facilities, and source conditioning facility, as well as conditioning and storage of the resultant wastes and sources, is estimated to cost more than EUR 8 million.

VIND is also intended to repatriate more than 8000 highly enriched and low enriched spent fuel elements to Russia from the RA Research Reactor. The total cost of the repackaging, transport, spent fuel reprocessing, and disposal of the resultant waste will exceed EUR 36 million.

Finally, decommissioning of the RA Research Reactor and degraded support facilities, including site-wide radiological characterization, remediation or resolution of identified sources of radiation and contamination, and upgrading the capabilities of the radiation protection programme, is estimated to cost an additional EUR 25 million or more.

The VIND programme has been in progress since 2004 and has received more than EUR 16 million in contributions through 2008 from sources other than the EC; this includes nearly EUR 9 million in support from the Serbian Ministry of Science. An additional EUR 14 million is currently approved for 2009-11, including EUR 10 million from the Serbian

Ministry of Science. The EC has committed to a EUR 5.46 million through a Contribution Agreement with IAEA (IPA 2008/149-555).

A summary of the VIND funding approvals is included in the following table. It should be noted that funding for decommissioning activities, sealed sources, and waste management decline sharply in 2009-11, as the government, IAEA, and other contributors are shifting their financial resources toward spent fuel repatriation. However, it is still anticipated that the Ministry of Science will contribute more than EUR 1 million annually to waste management and decommissioning activities, mostly in terms of local labour resources.

Existing VIND Funding Approvals

Spent Fuel Repatriation Project (EUR)/ Phases 1, 2 and 3 of the programme			
	2004-08 Funding	2009-11 Funding	Total
European Commission	885 000	3 545 000	4 430 000³
IAEA	1 910 152	526 667	2 436 819
Nuclear Threat Initiative (NGO)	2 578 820	-	2 578 820
USA	550 000	4 000 000	4 550 000
Czech Republic	250 000	500 000	750 000
Russia *	-	-	-
Total	6 173 972	8 571 667	14 745 639

* IAEA is negotiating with Russia additional funding of more than EUR 7 million.

Sealed Sources and Waste Management (including Nuclear Security) (EUR)/ Phases 4 to 7 of the programme			
	2004-08 Funding	2009-11 Funding	Total
European Commission	715 000	315 000	1 030 000⁴
IAEA	1 065 724	200 000	1 265 724
Nuclear Threat Initiative (NGO)	334 333	-	334 333
USA	566 667	300 000	866 667
UK	40 000	40 000	80 000
Slovenia	30 000	40 000	70 000
Total	2 751 724	895 000	3 646 724

Decommissioning (EUR)/ Phases 8 to 10 of the programme			
	2004-08 Funding	2009-11 Funding	Total
European Commission	-	-	-
Nuclear Threat Initiative (NGO)	125 671	-	125 671
IAEA	314 618	-	314 618
USA	6 833	-	6 833
Total	447 122	-	447 122

Serbia Funding from Ministry of Science (EUR)	
	2004-08 Funding
2004	500 000
2005	800 000
2006	1 100 000
2007	2 500 000
2008	4 000 000
Total	8 900 000

³ Under the 2007 IPA horizontal programme on nuclear safety and radiation protection

⁴ Idem

5. Indicative Implementation Schedule (periods broken down per quarter)

Contracts	Start of Tendering	Signature of Contract	Project Completion
Contribution Agreement with IAEA	Not applicable	Q3 2010	Q4 2011

6. Cross cutting issues**6.1 Equal Opportunity:**

The project will benefit both women and men through improvements in environmental protection and safety. On all activities, both men and women will have equal opportunities to compete for contracts and to work on any related activities.

6.2 Environment

This project will improve radiological conditions within the Vinca site and the surrounding environments by reducing the potential for release of radioactivity via groundwater, airborne activity, or malicious intent. All radioactive materials, sources, etc. will be removed from areas of little control and placed in proper storage, including extensive radiological characterization and conditioning; this will ensure graded levels of security and radiological controls so as to reduce the impact on the environment, workers and the general public.

6.3 Minorities

On all activities, minorities will have equal opportunities to compete for contracts and to work on any related activities.

ANNEXES

- I- Log frame in Standard Format
- II- Amounts (in EUR) contracted and disbursed per quarter over the full duration of the project
- III- Description of Institutional Framework
- IV- Related laws, regulations and strategic documents
- V- Details per EC funded contract

ANNEX I: Logical framework matrix in standard format

LOGFRAME PLANNING MATRIX FOR Project Fiche	Programme name and number – 2009 IPA horizontal programme on nuclear safety and radiation protection – 2009/021-640	
Part 2 of the project for repackaging and transport of spent nuclear fuel in Serbia	Contracting period expires – No later than 31 March 2013.	Disbursement period expires – No later than 31 March 2016
	Total budget : EUR 3 300 000	IPA budget: EUR 3 300 000

Overall objective	Objectively verifiable indicators	Sources of Verification	
To improve nuclear safety at the Vinča Institute in line with the Community <i>acquis</i> and the best EU practices.	Spent HEU and LEU Nuclear Fuel from the Vinča RA research reactor repatriated to the country of origin.	Acceptance-Transfer Protocol signed by RF FSUE Federal Centre for Nuclear and Radiation Safety (FCNRS)	
Project purpose	Objectively verifiable indicators	Sources of Verification	Assumptions
To contribute to the implementation of the Vinča Nuclear Institute Decommissioning project (VIND) through financing of the retrieval and repackaging of spent nuclear fuel from the RA research reactor in preparation for transport to the country of origin – Russian Federation.	Spent HEU and LEU Nuclear Fuel from the Vinča RA research reactor repatriated to the country of origin.	Acceptance-Transfer Protocol signed by RF FSUE Federal Centre for Nuclear and Radiation Safety (FCNRS)	

Results	Objectively verifiable indicators	Sources of Verification	Assumptions
<p>1 - Acquisition, testing and installation completed for equipment procured for cask loading and transport activities;</p> <p>2 - All transport package certificates of compliance and all transit licenses received;</p> <p>3 - Acquisition and testing of all Spent Nuclear Fuel (SNF) transport cask loading equipment complete;</p> <p>4 - Training of all SNF cask loading personnel complete;</p> <p>5 - All 32 SNF casks loaded, dried, sealed, leak tested, and all documentation completed;</p> <p>6 - All SNF shipping documents and preparatory actions finalized;</p> <p>7 - SNF transport casks loaded in ISO containers, placed on trucks, and ready for shipment;</p> <p>8 - All on site post-shipment recovery activities completed;</p> <p>9 - All safeguards support activities for repackaging, preparations for transport, and transport completed;</p> <p>10 - All transport security activities completed;</p>	<p>1 – Acceptance protocol received</p> <p>2 – Documentation package</p> <p>3 - All equipment delivered to work site; acceptance tests successful.</p> <p>4 - Training records</p> <p>5 – Loaded casks sealed & secured in reactor building</p> <p>6 – Documents completed</p> <p>7 – ISOs loaded on trucks and secured</p> <p>8 – Facility equipment secured & fully accessible</p> <p>9 – SG seals installed; SG electronic file sent</p> <p>10 – Fuel received in RF</p>	<p>1 – Records review; phys inspection</p> <p>2 – Document review</p> <p>3 - Physical inspection</p> <p>4- Training records</p> <p>5 – Physical inspection; records</p> <p>6 – QA review</p> <p>7 – Physical inspection</p> <p>8 – Physical inspection</p> <p>9 - Document review</p> <p>10 – RF Acceptance-transfer protocol received</p>	
Activities	Means	Costs	Assumptions
All the following activities should be contracted through a Contribution Agreement with the IAEA. The number of contracts identified so far is only indicative	CA with IAEA	EUR 3 300 000	
<p>1) Development & Use of Technology & Equipment for SNF Shipment:</p> <ul style="list-style-type: none"> • TA 4.3 Delivery of cask loading equipment to Vinca, Installation, Manuals & Training • TA 4.3.2 Delivery of loading equipment to the facility, including QA documentation and certification of conformity • TA 4.3.4 Delivery of baskets & Skoda casks to Vinca, including QA documentation and certification of conformity • TA 4.3.5 Delivery of Skoda and TUK-19 casks to Vinca 	Contract local support		Repackaging of SNF has been initiated

<ul style="list-style-type: none"> • TA 4.3.5a Receipt of Skoda & TUK-19 casks • TA 4.3.5b Crane delivered and motorized trolley system installed • TA 4.3.5c All Skoda casks inspected, rad surveys documented, secured in reactor bldg. • TA 4.3.5d All TUK-19 casks inspected, rad surveys documented, secured in reactor bldg. • TA 4.3.6 Delivery of TUK-19 Transfer Flask to Vinca • TA 4.3.6.1 Define mechanism for transfer of TUK-19 transfer flask from ROM to RS • TA 4.3.6.2 Define decontamination limits and methodology for decontamination (ROM) • TA 4.3.6.3 Ship TUK-19 transfer flask from ROM to Vinca • TA 4.3.6.4 Receive and inspect TUK-19 transfer flask at Vinca • TA 4.3.7 Assembling and adjusting cask loading equipment at the Facility • TA 4.3.8 Development of the Training Program • TA 4.3.9 Development of operation manuals • TA 4.3.10 Training of the Vinca staff on the technology of loading SNF into Packages 			
<p><u>2)Transport Package Certification and Transit Licenses</u></p> <ul style="list-style-type: none"> • LRA 1.3.1 Certificate of TUK-19 package design & shipment certificate provided by RF • LRA 1.3.2 Certificate of SKODA package design & shipment certificate provided by RF • LRA 1.3.3 Certificates of Compliance (endorsement) of TUK-19 package design in RS • LRA 1.3.4 Certificates of Compliance (endorsement) of SKODA package design in RS • LRA 1.3.5 Certificates of Compliance (endorsement) of TUK-19 package design by HUN • LRA 1.3.6 Certificates of Compliance (endorsement) of SKODA package design by HUN • LRA 1.3.7 Certificates of Compliance (endorsement) of TUK-19 package design by SLO • LRA 1.3.8 Certificates of Compliance (endorsement) of SKODA package design by SLO • LRA 1.4.1 Import License received for Russia • LRA 1.4.2 Export license received for 	Contract local support		

<p>Serbia</p> <ul style="list-style-type: none"> • LRA 1.4.3 Transit license/authorization received for Hungary • LRA 1.4.4 Transit license/authorization received for Slovenia 			
<p>3) Loading casks & Shipment</p> <ul style="list-style-type: none"> • TA 4.4.1 Loading canisters with SNF to baskets & casks • TA 4.4.1a Perform radiation/contamination surveys before loading casks • TA 4.4.1d Provide video footage and still photos of loading, drying, leak testing processes • TA 4.4.1e Containerize and manage all SNF-related radioactive and non-radioactive wastes per site procedures • Task 4.4.1f All loose equipment in Room 141 and Reactor bldg secured (not removed) as needed for cask shipment 	Contract local support		Repackaging of SNF completed
<p>4) Documentation for Shipment</p> <ul style="list-style-type: none"> • TA 4.4.2a Dedicated individual to prepare a Control Procedures and Documents Plan for shipment • TA 4.4.2b Determine all required approvals, permits, fees for transport • TA 4.4.2d Determine & complete all Customs requirements and operations for export from RS • TA 4.4.2i RS documentation for SNF passports; approving authorities identified • TA 4.4.2j Obtain crane company certifications for mobile cranes • TA 4.4.2k Highway transport equipment licenses & permits within RS (e.g., dangerous materials, radioactive materials & fissile materials) • TA 4.4.2L Identify and prepare all shipping documents prior to shipment for RS, HUN, SLO & RF • TA 4.4.2m Translation of all required documents into all required languages (Serbian, English & Russian) 	Contract local support		
<p>5) Preparatory Actions for Shipment</p> <ul style="list-style-type: none"> • TA 1.4.10 Establish contract for lease of crane for receipt of empty shipping casks & handling equipment • TA 1.4.11 Establish contract for lease of crane for loading shipping casks & ISOs for shipment • TA 4.4.3a Identify transport trucks (16 each with proper licenses; 0 currently available in SRB) • TA 4.4.3b Determine reloading station (truck to train) AND lifting equipment required • TA 4.4.3c Advance notification by Mayak to Vinca of empty container delivery (same for Rez) 	Contract local support		

<ul style="list-style-type: none"> • TA 4.4.3e Request that Mayak provide one or more reps to observe the transport preps, cask load • TA 4.4.3f Implement any transport insurance requirements • TA 4.4.3g Preparations for implementing RS road/rail carrier services (Vinca) • TA 4.4.3h Preparations for implementing sea transport carrier services (Vinca) • TA 4.4.3i Place auxiliary equipment into the auxiliary equipment ISO container for shipment to Mayak 			
<p>6) Deliver packages to departure point</p> <ul style="list-style-type: none"> • TA 4.4.4a Comprehensive QA of shipping docs and manifests • TA 4.4.4b Verification that all advance notifications complete <p>TA 4.4.4c Crane delivered and motorized trolley system installed</p>	Contract local support		
<p>7) SG Activities in Support of SNF Repatriation</p> <ul style="list-style-type: none"> • SGA 3.1 SG activities in support of SNF repackaging and cask loading/storage • SGA 3.2 SG activities in support of package shipment • SGA 3.3 Arrange for SRA and IAEA to verify loading & sealing of casks • SGA 3.4 Arrange for Mayak to witness cask loading & to supervise during drying & leak tests • SGA 3.5 Register SNF burn-up calculation information in Nat'l System for Accountancy and Control of Nuclear Materials • SGA 3.6 Provide electronic of fuel data files to IAEA 	Contract local support		
<p>8) Security Considerations for Shipment</p> <ul style="list-style-type: none"> • SGA 4.2 Prepare Security Plan for Repackaging, Loading and Transport (DBT, emergency action plan/card, etc.) • SGA 4.4 Implement security plan for repackaging and storage within reactor building • SGA 4.5 Implement security plan for cask loading and storage within reactor building • SGA 4.6 Implement security plan for transport • SGA 4.7 Coordinate police/security guards during transport 	Contract local support		
<p>9) Onsite Post-shipment Recovery Activities</p> <ul style="list-style-type: none"> • TA 4.4.6 Return of TUK-19 Transfer Flask to ROM • TA 4.4.6a Decontaminate transfer flask and prepare for return shipment to Romania • TA 4.4.6b Ship transfer flask to Romania • TA 4.4.7a Clean and decontaminate the reactor building cask storage area and all cask handling equipment 	Contract local support		

<ul style="list-style-type: none"> • TA 4.4.7b Stabilize all SNF repatriation-related radioactive and non-radioactive wastes per site procedures • TA 4.4.7c Survey, decon and move motorized trolley/rail system to storage location in Waste Storage Facility (H-2 or H-3) 			
<p><u>10) Primary Contractor Support for SNF Package Loading</u></p> <ul style="list-style-type: none"> • <u>1 Loading of canisters with SNF into Packages and delivery of Packages to departure point; Management of the Project while implementing Task 6.1</u> 	Internationally contracted support		
<p><u>11) Primary Contractor Support for SNF Package Leasing and SNF Transport</u></p> <ul style="list-style-type: none"> • <u>2 Lease of Packages for all Project stages</u> • <u>3 Transport of SNF Packages from Facility to Russian Federation (excluding transport within Russia)</u> 	Internationally contracted support		

ANNEX II: Amounts (EUR) contracted and disbursed per quarter over the full duration of the project

Contracted	Q2 2010	Q3 2010	Q4 2010	Q1 2011	Q2 2011	Q3 2011
Contribution Agreement with IAEA		3 300 000				
Cumulated		3 300 000	3 300 000	3 300 000	3 300 000	3 300 000
Disbursed						
Contribution Agreement with IAEA		3 300 000				
Cumulated		3 300 000	3 300 000	3 300 000	3 300 000	3 300 000

ANNEX III: Description of Institutional Framework

The responsibilities for the fields related to the peaceful use of nuclear energy (health, the environment, science and technology, nuclear safety and radiation protection, agriculture, transport, etc) rest with several ministries.

The Ministry of Science and Technological Development (MSTD) is responsible for R&D in the nuclear sector, for nuclear safety, nuclear materials and radioactive waste management in the country. Under the Ministry's competence and financing are the R&D, including the Vinča Institute of Nuclear Sciences, the Institute of Technology of Nuclear and Other Mineral Raw Materials (ITNMS), the Institute of Geology, the Institute of Nuclear Energy Application in Agriculture (INEP) and others. The Ministry ensures that the law on the nuclear safety and the related regulations are carried out and provides the financial resources for the activities. The MSTD is responsible for bilateral and multilateral international scientific-technical cooperation of Serbia, including the cooperation with the IAEA.

The Ministry for Environment and Spatial Planning (MESP) is responsible and leading in radiation protection and monitoring of the environment, emergency planning etc.

In force is the Law on Protection against Ionizing Radiation that was enacted in 1996 (46/96). It establishes measures for the protection against ionising radiation, as well as nuclear safety measures, liability for nuclear damages, supervision and authorization, penalties. Based on the Law on Protection against Ionizing Radiation, there are 11 regulations related to protection against ionizing radiation and for the safety of radiation sources and 5 regulation related on nuclear safety and security.

Currently, there is no effectively independent Serbian regulatory body for radiation and nuclear safety. Law 46/96 does not make provision for the establishment of a regulatory body, although it makes reference to the 'competent Ministry'. Currently, in accordance with the *Law on Ministries*, the MSTD and MEPS are identified as the competent Ministries.

A temporary regulatory body called the 'Regulatory Commission on Radiation and Nuclear Safety' has been established by the MSTD to administer the decommissioning of the research reactor at the Vinca Institute, the shipment of spent nuclear fuel to the original Russian supplier, and the treatment of radioactive waste.

The Vinca Institute of Nuclear Sciences was founded in 1948. It is the main institute involved in research and applications in nuclear science (since 1968 multidisciplinary, not only nuclear) and covers a wide range of scientific and engineering fields; 800 employees, out of which 400 is research staff, organized in 16 laboratories (actually departments) from Nuclear Physics, Theoretical Physics and Physics of Condensed Matter, Radiation and Environmental Protection, Nuclear Engineering to Multidisciplinary Research and Engineering which are, to a large extent, independent.

The Radiation and Environmental Protection Laboratory covers: environmental radioactivity control, ionization radiation dosimetry, metrology analyses, radiation protection, radioactive waste arrangement and decontamination, reactor dosimetry, instrumentation servicing and operative dosimetry. The Nuclear Engineering Laboratory covers: reactor physics, safety and control of nuclear reactors, nuclear engineering and radiation protection. Together with the Reactor Department, it is responsible for two research reactors: RA (shut down for decommissioning) and RB (zero power, requiring upgrading).

The RA research reactor went into operation in 1959 and has been shut down since 1984 due to fuel corrosion problems and for the refurbishment of the reactor control and safety system. Since the date, it stays with a partially loaded core containing 480 fuel slugs with 80% enriched uranium. In addition, 6656 spent fuel slugs with 2% enriched uranium and 884 slugs with 80% enrichment are located in a spent fuel storage pool containing about 200 tons of stagnant water of poor quality to minimize the corrosion process.

ANNEX IV: Related Laws, Regulations and Strategic Documents

Project-Specific Documents

- Decision of the Serbian government to decommission the RA research reactor located at the Vinča Institute and approval of the VIND programme (2002 and 2004)
- Draft of the Serbian new Law on ionising radiation protection and on nuclear safety (2006) and existing Serbian Law on Protection against Ionising Radiation (1996)
- Article 110 of the draft SAA
- Nuclear Safety and Radiation Protection action of the Multi-beneficiary MIPD 2009-2011

International Conventions and Treaties

Serbia is a party to the following instruments under the IAEA's auspices

- Agreement on the Privileges and Immunities of the IAEA
- Vienna Convention on Civil Liability for Nuclear Damage
- Convention on Physical Protection of Nuclear Material
- Convention on Early Notification of a Nuclear Accident
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

Serbia has signed but has not yet ratified the Optional Protocol Concerning the Compulsory Settlement of Disputes to the Vienna Convention on Civil Liability for Nuclear Damage.

As a party to the Treaty on the Non-Proliferation of Nuclear Weapons, Serbia has a Comprehensive Safeguards Agreements with the IAEA for the Application of Safeguards in connection with the Treaty on Non-Proliferation of Nuclear Weapons.

ANNEX V: Details per EC funded contract

This project will be supported through a Contribution agreement with the IAEA to be concluded during Q3 2010.

The Contribution agreement will be concluded with the IAEA in accordance with the terms of the Financial and Administrative Framework Agreement (FAFA) between the European Community and the United Nations, signed on 29 April 2003, to which the IAEA has adhered on 17 September 2004.