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❖ WINS and  
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# International Cooperation in Strengthening Nuclear Security Capacities within Public Company Nuclear Facilities of Serbia

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# About the Company

- Since its establishment in 2009, Public Company Nuclear Facilities of Serbia has continued all nuclear activities previously managed by VINCA Institute of Nuclear Sciences;
- The Strategic Plan of Public Company Nuclear Facilities of Serbia foresees that the operation of the hangar H3, secure storage for high activity sealed sources and RB research reactor, decommission of RA research reactor and old hangars with the radioactive waste will be continued in accordance with the regulatory requirements of the Serbian Radiation Protection and Nuclear Safety Agency, and international standards.



# Main facilities- short description

- Zero-power critical assembly (research reactor RB);
- 6.5 MW heavy water research reactor (research reactor RA);
- LLW and ILW storage (hangar H3);
- Secure storage for high activity sealed sources;
- Waste processing facility;
- Old hangars with radioactive waste (hangar H1 and hangar H2);
- Closed uranium mine Kalna.



# Existing capabilities

- ISO 17025 accredited numerous measurement techniques;
- Implementation of most advanced calculation tools;
- Preparing of experimental benchmarks for critical systems with heavy water for the verification of computer codes for nuclear criticality and radiation shielding calculations;
- Nuclear forensic;
- Hot cells;
- RWM;
- Environmental remediation;
- Education;
- Human decontamination.



# Finished and ongoing projects

- Repatriation of fresh HEU fuel (80% U-235) in 2002;
- Repatriation of spent fuel in 2010;
- IAEA TC Project- SRB 3004 and SRB 9002: Activities related to the characterization and conditioning of the radioactive sources, decommissioning of the hangar H1, characterization and conditioning of the radioactive waste, upgrade of the waste processing facility;
- Building, upgrade and maintenance of the security systems at the Vinca site (cooperation with the US DoE).



# Existing legislative related to the nuclear security

- Law on radiation protection and nuclear safety;
- Regulation on determining the programme of nuclear safety and security;
- Regulation on the security measures of nuclear facilities and nuclear material.



# Reporting and Review

- Reporting system of PC NFS is defined via ISO9001 standards and national legal system on public companies, and they include regular and *ad hoc* reports, both verbal and written
- National licensing system also regulates regular reporting to the Serbian Radiation Protection and Nuclear Safety Agency
- Reporting is twofold: to the Regulatory Body, and to the Government, via ministries responsible for radiation protection and nuclear safety.





# Upgrade the PPS on the Vinca site

- Since 2003, The United States Department of Energy's (DOE) has endeavoured to provide technical and financial assistance to Vinca Institute of Nuclear Sciences to improve protection of nuclear and radiological material. After the PC NFS was founded, all the cooperation in the field of nuclear security was continued through PC NFS. The last building, upgrade and maintenance of PPS at the Vinca site (site which uses PC NFS and INS Vinca) together which has covered facilities of interest both in PC NFS and INS Vinca was successfully finished at the beginning of 2016.





# Upgrade the PPS on the Vinca site-cont

- Eight facilities of interest was the part of the last upgrade (six belongs to the PC NFS and two which operates with cat. 1 sources belongs to the Vinca Institute of Nuclear Sciences);
- PC NFS has signed the Contract with the US DoE in 2014 and all the works was accepted in the January 2016;
- After the final acceptance of works, new Contract related to the maintenance of the complete system and extended warranty was put into force;
- New proposals was provided;



# Cooperation with WINS in order to enhance internal capabilities

- Director of the PC NFS, leading experts in the field of radiation safety and radiation and nuclear security and the engineer from the Department for Nuclear Security have successfully finished WINS Academy with different specialization;
- Participation in various workshops organized by the WINS;
- Presentation of the results of the enhancement of nuclear security culture within PC NFS.



# Cooperation with US DoE in order to enhance internal capabilities

- In March 2016 we have established cooperation with US DoE which has resulted with four workshops and training courses that took place in PC NFS: Workshop on Mitigating the Insider Threat Using Behavioural Science, Insider Threat Identification and Mitigation, Site Security Plan, International Response Training Course;
- Representatives from all relevant stakeholders took participation: Serbian Regulatory Body, Clinical Centre of Serbia, Ministry of Interior, Ministry of Defence, etc.



# Cooperation with IAEA in order to enhance nuclear security culture

- In autumn 2015, PC NFS has signed research agreement with IAEA under CRP on Development of Nuclear Security Culture Enhancement Solutions(NSCES);
- Three year duration of the project;
- Nuclear security culture was recognized from the management of the PC NFS as the foundation of nuclear security regime and became the part of the strategic plan.



# Description on research objectives and anticipated outcomes

- Adoption on nuclear security objectives;
- Defining the key actions that contributes to the strong nuclear security culture;
- Presenting the responsibilities and roles of state, regulatory body, management and individuals in strengthening the nuclear security culture to our employees;
- Establishing system with clear roles, objectives and responsibilities;
- Communicate across organizational boundaries.



# Scientific scope of the project

- Development, application and upgrade of self-assessment methodologies and tools;
- Development of training programmes due to enhance nuclear security culture;



# Current status (1<sup>st</sup> year progress)

- Revision of the procedures related to the nuclear security by in house experts (not only the staff with main responsibilities in nuclear security);
- Establishing the monitoring system for the compliance of the procedures (both safety and security);
- Main reason why any strategy (including NSC) fails is because the staff doesn't support it;
- Engagement of staff in the process: preparation, inclusion, communication, clarification;





# Current status (cont'd)

- Psychologist from our Company joined the team and will be accountable for interviews with employees-training needed;
- Realizing the importance of the nuclear security culture;



# Current status (cont'd)

- Clarifying accountabilities between departments and looking for the accountabilities of all departments with nuclear security;
- Director of PC NFS have formed the expert team for monitoring the implementation of nuclear security culture (in charge for the development and application of self-assessment methodologies);
- Team is made from the Committee for radiation and nuclear safety and security+ psychologist, Head of the Department for Radiation Safety, Head of Department for Development and Application of Nuclear Technologies-eight people together;



# Current status (cont'd)

- Defined self-assessment survey(app.20 questions, from strongly disagree- strongly agree, 7 points scale) ;
- Questions about nuclear security in a broader, already established survey that includes safety and other employment issues;
- Establishment the survey's objective.



# Current status (cont'd)

- Key consideration: message given to employees, assurance of anonymity, how the results will be used, survey methods and timelines;
- Zero-point status: evaluation of knowledge, beliefs and attitudes towards nuclear security;
- Before the first self assessment survey we have provided two question task for all the employees: How would you describe nuclear security system in PC NFS and How would you describe nuclear security culture in PC NFS



# Current status (cont'd)

- The expert team has provided about 100 questioners and received 75 feedbacks. All the staff was grouped by age (<40, 41-53, 54-65), education (high school, BSc and higher) and work position (security and non-security). Detailed analysis was provided and we were ready to take the first self-assessment



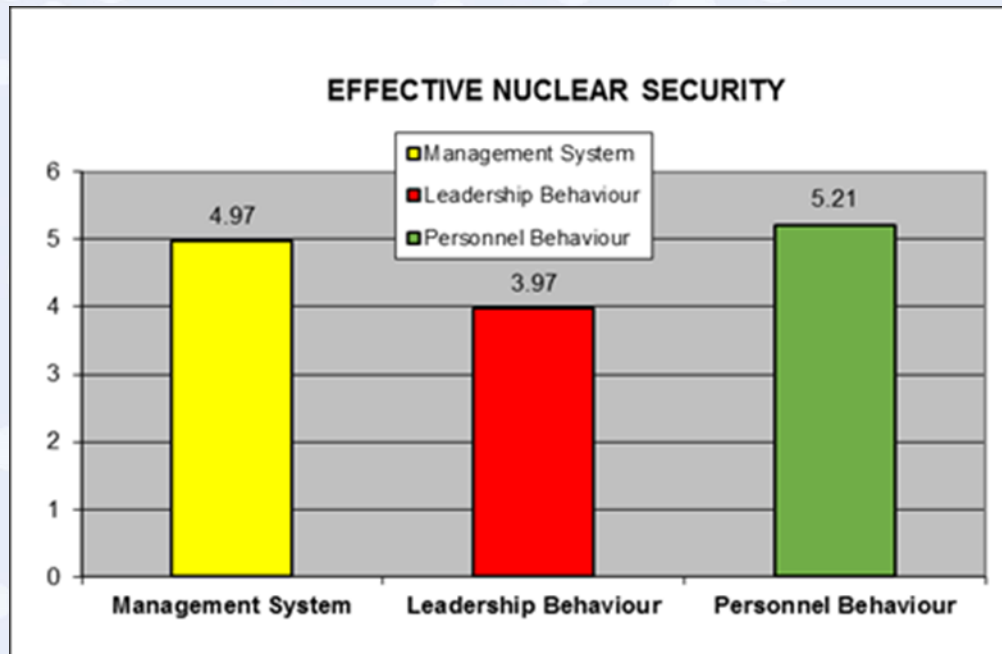
## Current status (cont'd)

- After detailed analysis of the answers and the results which were expected we have provided lectures for our employees in the field of nuclear security and nuclear security culture;
- First self-assessment survey was provided to all the employees with required age, education and position;
- 17 statements in total (management system-6, leadership behavior-8, personnel behavior-3).
- The expert team has provided around 100 questioners and received 93 feedbacks. All feedbacks were taken into account for the analysis. The sample structure was the same as it was for the pre-survey



# Current status (cont'd)

- Results and discussion:





# Current status (cont'd)

- All the statements with the average values under 4 were analyzed in much more details. Staff on the positions related to the security was much more critical (value 7 was very rare). Non-security staff didn't provide low values (1,2 and 3) on most of the statements.



## Current status (cont'd)

- It is a very positive sign that the average value of the statements related to the management system is 4.97 (close to the border between yellow-green) and we need to point out that the best average results were on the statements related to this. This means that we need minor adjustments, and we will continue with intensive efforts in this field. In the field of leadership behavior, motivation is part of the framework where we should do much more. Also, we need to improve communication between staff and management by involving the staff in all aspects of preparing, organizing and carrying out operations.



# Current status (cont'd)

- For staff who work in the field of nuclear security we have seen more critical assessment of the provided questions. This trend was expected because the survey content was much more appropriate to their field of work and the bigger experience that requires critical review.



# Planned activities for the second year

- Precisely defined main issues that we are facing with, completion of interview process;
- Continuous training for the PC NFS staff;
- Realizing the importance of the nuclear security culture;
- Significant improvement that can be clearly seen on the new tests;
- Presentation of the developed methodologies that might be helpful for the colleagues from the other countries.



# Planned activities for the second year-Interview

- 25 technicians which are working with radioactive and nuclear material and physical protection;
- 8 questions prepared by the self-assessment team, half-standardized, 30 minutes, individually or in smaller groups;
- Psychologist was responsible to take the interview;
- Results for the first survey and the interview were very similar- communication is the biggest issue;
- Complete analysis of the survey and interview will be provided to the IAEA in the form of report by the end of 2017.



# Planned activities for the third year

- PC NFS staff has accepted nuclear security culture principles and understood the point of the project;
- Providing the know-how to the other colleagues;
- Detailed presentation of all results collected during the three years of project;
- Opening of the new possible cooperation.



# Expected outcomes

- Self-assessment methodologies and tools developed;
- Nuclear security culture enhancement programs that meet the requirements for each position/responsibility in the form of reports and technical documents;
- Good base for future cooperation with colleagues from other countries and IAEA experts.

