

REVIEWS

Meetings

XLVI ETRAN Conference Activities of the Nuclear Engineering and Technology Commission

Fifteen papers were submitted to the Nuclear Engineering and Technology Commission of the XLVI ETRAN Conference held from June 3-6, 2002, in Banja Vrućica, Republic of Srpska, B&H. The Reviewing Commission accepted all of the submitted papers, interpolating them into the program of the Conference. As is customary, the papers covered a wide range of topics classified by the Reviewing Committee into three sessions.

The sitting of the Nuclear Engineering and Technology Section opened with the presentation of works interpolated into the session entitled Current Problems of Nuclear Engineering. All accepted papers (4, all in all) were presented at this session. In a noted paper entitled "Vinča Nuclear Decommissioning Program" by M. Pešić, K. Subotić, O. Šotić, V. Ljubenov, and A. Perić (done on call), a preliminary program of the nuclear decommissioning of the VINČA Institute, initiated at the beginning of this year with the aim of creating a uniform approach to the solution of the inadequate storage of spent fuel in the temporary storage of the RA reactor, objectives of the forthcoming decommissioning of the reactor and the construction of a central, longterm radioactive waste depository in the country was presented. A paper entitled "SAS2H/KENO-V Methodology for 3D Fuel Burnup Analysis" by M. Milošević, E. Greenspan, and J. Vujić gave an outline of a new methodology for referential estimates for fuel burnup in 3D models of nuclear reactors. The said methodology had been previously applied in the analysis of the new Westinghouse LWR reactor. The application proved possible a prolongment of the exchange period of low enriched nuclear fuel to 60 months (as opposed to the present 12 to 18 months period). "Analysis of Neutron Fluctuations in Subcritical Systems with Multiple Emission Sources", a paper signed by Lj. Kostić, gave an analysis of neutron fluctuations in subcritical systems pointing to such systems with a source of manifold emissions as a possible direction of future developments in nuclear technology.

Five papers were presented at the second session entitled Accelerator and reactor systems. A noted work entitled "Designing the Foil Stripping

Extraction System of a Cyclotron" authored by J. Ristić-Djurović and S. Čirković, gave a detailed account of designing a system for conducting an ionic beam out of the VINCI cyclotron by means of a foil. The proposed design represents an optimal solution for the construction of a system for conducting an ionic beam out of a multipurpose cyclotron by means of a foil.

Finally, five out of six accepted works were presented at the third session entitled "Protection Against and Use of Ionizing Radiation". A paper signed by V. Šipka, D. Paligorić, and M. Radenković – entitled "Determination of Uranium and Plutonium Isotopes in the DU Penetrators" – presented the possible applications of the alpha spectrometer at the VINČA Institute for analyzing the impact of missiles used during the NATO campaign in FR Yugoslavia for detecting the presence of actinides resulting from fuel combustion in nuclear reactors.

Despite all difficulties, the overall impression of the reviewers, the Reviewing Committee, those presiding over the various sessions of the Nuclear Engineering and Technology Commission of the XLVI ETRAN Conference and its many participants was that the content and quality of papers submitted and presented at the Conference managed to uphold the high scientific and expert standards traditionally associated with ETRAN.

Miodrag Milošević

VINČA Institute Workshop on the Basics of Decommissioning

One of the main nuclear and radiation safety problems concerning the VINČA Institute is the status of the RA research reactor which has been out of operation since 1984. During the period of extended shutdown, some reactor systems were partially or fully dismantled, planned reconstruction and modernization have never been completed, significant loss of experienced personnel and lack of utilization programs have occurred. Over the years, the problem of inadequate conditions in the water pools used as the temporary storage of spent nuclear fuel in the RA reactor building has arisen. Although not put down on paper, the clearly expressed international consensus about the reduction of fuel enrichment for research and test reactors (RERTR Program) opened the question of the availability of fresh uranium fuel of low enrichment in an amount sufficient for potentially continuing the operation of the RA reactor following its reconstruction.

After World War Two, about 550 research reactors were constructed and have since been in operation all over the world. More than 330 were shutdown due to uneconomical operation, technical obsolescence, conclusion of research programs, safety or regulatory considerations, accidents or due to changes in governmental policy. Around 110 have undergone decommissioning and the remaining ones are in the unenviable position of extended shutdown without a clear resolution as to their future - continuation of operation (restart) or final shutdown and decommissioning.

The decommissioning of a nuclear facility is the last phase in its lifetime. It is a set of administrative and technical steps taken in order to allow the removal of some or all of the regulatory controls from the facility. During the decommissioning, radioactive and hazardous materials, equipment and structures are decontaminated, isolated, sealed, enclosed, or removed so that the facility does not pose a risk to public health or to the environment. After completing the decommissioning process, a portion of the facility site or the whole site can be used for other purposes.

The general state of the RA research reactor and its systems after 18 years of extended shutdown, lack of both interest and support for continuing its operation, loss of operational staff, as well as fresh and spent fuel problems are the basic facts which make the assumption of an imminent decommissioning a most probable option for the permanent solution of the future status of the facility. After the renewal of FR Yugoslavia's membership in the International Atomic Energy Agency (IAEA) in September 2001, VINČA Institute of Nuclear Sciences had proposed a project entitled "Decommissioning of the RA Research Reactor in VINČA Institute" through the IAEA Technical Co-operation Program. At the same time, both the federal and republic governments were urged to reach a decision concerning the final shutdown of the RA reactor. The aim of the said proposal was to instigate preliminary administrative and technical steps necessary for the beginning of the decommissioning process. The RA decommissioning project has been accepted by the IAEA. In July of 2002, the Government of FR Yugoslavia and that of the Republic of Serbia reached the decision to shut down RA and to transport the fresh, highly enriched uranium fuel from the RA and RB reactors in VINČA Institute to their country of origin – Russia. The transport took place in August 2002. Currently (October 2002), the first contract related to the financial support of activities planned for 2003 is being drafted.

As an integral part of the planned IAEA support for the realization of decommissioning project for the VINČA Institute, "Basics of Decommissioning" workshop was held in the Institute (September

2–6, 2002). The Workshop was organized by the IAEA in co-operation with the VINČA Institute. The main goals of the Workshop were the transfer of international experiences and good practices, introduction to the IAEA standards and education of VINČA Institute staff in planning and organizing such a complex process.

IAEA sent two of its leading experts in the field to VINČA Institute: Michaelle Laraia and Dennis Reisenweaver, along with USA experts Lawrence Boing (Argonne National Laboratory), Dennis Ferrigno (Duratec Inc.) and Joseph Adler (TLG Services, Inc.). Twenty six participants, mainly from the Center of Nuclear Technologies and Research and from The Radiation and Environmental Protection Department which are to be engaged in the decommissioning project, attended the Workshop. Officials of the Ministry of Science, Technologies and Development of the Republic of Serbia were present at the opening meeting.

The Workshop's program consisted of 13 lectures that covered the following topics: the decommissioning process (terms, options, strategies), regulatory requirements, decommissioning planning, management of decommissioning projects, preparing decommissioning documents, characterization survey, health and safety issues, waste management, cost estimates and financial requirements as well as radiological monitoring during the decommissioning process and the removal of materials from regulatory control. During the Workshop, several examples of successfully completed projects of the decommissioning of research reactors were presented, including a video presentation of the decommissioning of the 200 kW light water research reactor Janus at the Argonne National Laboratory (USA).

An afternoon session of the Workshop was dedicated to the VINČA Institute Nuclear Decommissioning Program (VINDP), initiated at the beginning of 2002. Three projects supported by the IAEA make up the VINDP. The first concerns the removal of spent nuclear fuel from the RA reactor, the second refers to the decommissioning of the RA reactor and the third deals with the improvement of radioactive waste storage conditions at the VINČA Institute itself. The principal goal of the program is the improvement of nuclear and radiation safety in the Institute through the solution of the three above mentioned problems that have arisen in the previous period.

Participants demonstrated the knowledge acquired during the course of the Workshop through group exercises held during three afternoon sessions. They worked on planning a decommissioning of a small industrial facility making use of radioactive, toxic and chemical hazardous materials in its technological process. Solutions obtained

during group work were subsequently presented at the final day of the Workshop. A commission of five lecturers proposed their own optimal solution for the problem defined, discussed those proposed by different groups and, finally, selected the best one offered.

At the time, a visit to the RA reactor building and facility was also organized and a meeting of foreign experts and officials from the competent federal and republic ministries engaged in the field of nuclear and radiation safety, legislation, regulative and funding of the forthcoming decommissioning set up. The said meeting was to emphasize the importance of the problem and the need for governmental support for its solution. Fruitful discussions concerning future communication and co-operation within the IAEA Technical Co-operation Projects also took place at the Workshop.

Participants were provided with working materials, including the six recent IAEA publications related to the decommissioning.

Foreign experts judged the organization, activities and results of the Workshop as successful. Their overall impression was that the VINČA Institute possesses a staff capable of successfully planning, organizing and completing the decommissioning of a facility such as the RA research reactor.

Vladan Ljubenov

The 4th International Yugoslav Nuclear Society Conference

The 4th International Conference of the Yugoslav Nuclear Society (YUNSC-2002) was held in Belgrade from Monday, September 30, to Friday, October 4, 2002. YUNSC-2002 is the fourth in the established series of conferences to be devoted to the promotion of scientific and technical co-operation of nuclear societies, especially of the countries in the Balkan region, and exchange of information and ideas between professionals in the nuclear field. One of the main goals, besides the good quality of the presented papers and the attendance of well-known experts, was the ambition of the Organising Committee to establish a traditional YUNS conference that would gather nuclear experts from our country, Yugoslav experts currently working abroad and experts from neighboring and regional countries.

The Conference was organized by the Yugoslav Nuclear Society (YUNS) and co-organized by the VINČA Institute of Nuclear Sciences, Belgrade, Yugoslavia. The Conference was supported by many governmental, economic and a number of Yugoslav scientific and educational organizations.

Previous YUNSC-conferences were very successful. At the first YUNSC'96 conference, 121 papers contributed by 280 authors from 19 countries were presented (of which 71 by foreign authors); at the second YUNSC'98 conference, 131 papers submitted by 300 authors from 22 countries were presented (86 papers by foreign authors); and at the third YUNSC-2000 conference, 144 papers by 330 authors from 30 countries were presented (81 foreign authors).

The Conference took place at the Chamber of Commerce of the Republic of Serbia, Belgrade, Yugoslavia. The official language was English.

The keynote speech was given by Dr. Prvoslav Davinić, Yugoslav Ambassador to the Stability Pact for Southeastern Europe. The gathering was addressed by Dr. Vladimir Matić, Serbian Co-Minister of Science, Technologies and Development, as well. Besides scientists, the ceremony was attended by many officials from the government, economy and a number of Yugoslav scientific and educational organisations. As an introduction to the Conference, the future project "Green VINČA – VINČA Institute Nuclear Program" was promoted by Dr. Krunoslav Subotić, director of the VINČA Institute.

At the Conference, out of 117 papers, 30 were presented in 11 oral sessions, while 111 contributions were presented in a number of Poster Sessions. The sessions focused on the topics of current interest given in the announcement. Oral presentations made by invited and selected speakers outlined the general aspects of the Conference. Due to limited time and great interest, other accepted contributions were displayed in the form of posters.

The presented papers were scientific contributions of 270 authors from 29 countries (Belarus, Belgium, Bulgaria, Canada, England, France, Germany, Greece, Hong Kong, Hungary, India, Iran, Italy, Kenya, Libya, Morocco, The Netherlands, Pakistan, Poland, Romania, Russia, Slovenia, Slovakia, Sweden, Switzerland, Syria, Ukraine, USA and Yugoslavia). About 35 foreign and almost 150 Yugoslav scientists took part in YUNSC-2002.

Papers submitted by invitation were presented by selected foreign experts and Yugoslav scientists currently working abroad or in the country. Other oral contributions were selected by the YUNSC-2002 Program Committee according to their quality and contemporary themes, of interest for Yugoslav nuclear science and technology.

The first day of YUNSC-2002 was devoted to: nuclear energy, nuclear power plants and research reactors. Modern computation methods in reactor physics, experimental techniques, contemporary safety principles and regulatory recommendations were presented as well.

During the second day, papers dealing with the possible fields of application of nuclear techniques were presented. Current problems in research reactors and investigations concerning reactor physics were set forth.

During the second day, YUNSC-2002 organized a round table entitled Extended Shutdown, Restart, and Decommissioning of Research Reactors. The aim was to inform the attendees and the public of future decommissioning activities concerning the RA research nuclear reactor in the VINČA Institute of Nuclear Sciences and to discuss similar experiences of other countries.

The beginning of the third day of YUNSC-2002 was devoted to the topic Depleted Uranium which aroused great interest. Two presentations of the experimental results of the analysis of the samples of depleted uranium ammunition used during the NATO bombing of FR Yugoslavia in 1999 were presented.

Further on, the third day of YUNSC-2002 was devoted to the promotion of the monograph Environmental Recovery of Yugoslavia (editors Dragoljub Antić and Jasmina Vujić), based on the improved materials presented at the First International Conference on Environmental Recovery of Yugoslavia (ENRY 2001), Belgrade, September 27-30, 2001. Representatives of the Federal Secretariate of Science, Development and Environment Protection and the General staff of the Yugoslav Army participated in the discussion, presenting information on the environmental effects of the NATO bombing of Yugoslavia and opening a discussion based on the facts of the number of projectiles fired, locations hit, and first results concerning the radiological effect produced.

The afternoon session of the third day of YUNSC-2002 was reserved for an excursion (visit to Sremski Karlovci and Novi Sad) and a conference diner.

The fourth day of YUNSC-2002 was devoted to: ADS and accelerators, nuclear methods in science and technology, radiation medicine, environment, and public relations.

During the fourth day, YUNSC-2002 organized a round table entitled Energy Future of the Balkan States, which aroused great interest among the Conference participants and Yugoslav electricity industry experts. The aim was to inform the attendees and the public of the energy problems in the region (the presentation of Mr. Aleksandar Kovačević, UNDP Belgrade) and the possible role of the nuclear energy sector in future energy strategies (presentation of Prof. Jovan Jovanović, Canada). The participants drew up a declaration on the future of the energy sector in the Balkan Region.

The fifth day of YUNSC-2002 was devoted to nuclear power and sustainable development and a

round table dealing with the topic Technology Transfer and Developing Countries: A Scientific Perspective which proved to be a source of great interest for the Conference participants and attending experts from a number of developing countries.

The Conference Award Committee (professor Predrag Marinković, Faculty of Electrical Engineering, University of Belgrade, Yugoslavia, professor Domiziano Mostacci, University of Bologna, Italy, and Dr. Grazyna Zakrzewska-Trznadel, Institute of Nuclear Chemistry and Technology, Warsaw, Poland) awarded the best scientific paper presented at the Conference, the best paper of a young participant (under 35 years), and the best paper by a student participant. The criteria for the said selection were:

- (a) Participation at YUNSC-2002 as an attendee and author or first co-author of a paper included in the Conference Programme,
- (b) Significant and timely research results, and
- (c) Outstanding performance and promise for future substantial achievement in scientific research, as judged by the Award Committee.

The awarded author of the best scientific paper was Dr. Georghe Ionita, National Institute of Research-Development for Cryogenic and Isotopic Technologies ICSI, Rm. Valcea, Romania, the awarded paper New Improved Counter – Current Multi-Stage Extractor for Solvent Extraction Process, authors G. Ionita, D. Mirica, and C. Croitoru.

The awarded young author was Dr. Kiril Evgenievich Ivanov, Kurchatov Institute, Moscow, Russia, the awarded paper The Structure of X-Ray $O_{4,5}(U)$ -Spectra of Uranium Oxides UO_2 and UO_3 , authors K. E. Ivanov, D. K. Shuh, A. Yu. Teterin, S. M. Butorin, J.-H. Guo, M. Magnuson, and J. Nordgren.

In conclusion of YUNSC-2002, the quality of the presented papers was underlined and the announcement for the next conference – 5th International Yugoslav Nuclear Society Conference (YUNSC-2004), Belgrade, Yugoslavia, October 1-4, 2004 will be mailed to all YUNSC-2002 participants.

The organisation of YUNSC-2002 was financially supported by the Ministry of Science, Technologies and Development of the Republic of Serbia, Secretariat of Development, Science and Ecology of the Federal Republic of Yugoslavia, Ministry of Economy of the Federal Republic of Yugoslavia, Administration for International Scientific, Educational, Cultural, and Technical Cooperation of the Republic of Serbia, Chamber of Commerce of the Federal Republic of Yugoslavia, Chamber of Commerce of the Republic of Serbia and many other governmental and non-governmental entities.

The abstracts of the presented papers were published in the Book of Abstracts distributed to the participants. The Proceedings of the Conference will be edited in the course of 2003 and sent to the authors.

Dragoljub Antić

The 5th International Conference of the Balkan Environmental Association on Transboundary Pollution

The Balkan Environmental Association (B.EN.A.) was established on November 19, 1998 in Thessaloniki, Greece, as a non-governmental and non-profit entity. It has been recognized by the Greek and E.U. law, under the act 22705/30. 08. 1999, by the court of Thessaloniki. The primary aims of B.EN.A. are the following:

(a) To examine and appraise the current problems of environmental protection on a regional, national and international basis. More specifically, B.EN.A. will concentrate upon the problems concerning the protection of people, animals and plants in the Balkan region having to do with the harmful effects of chemicals or climatic changes,

(b) To advise the regulatory bodies of the various Balkan countries on decisions concerning the evaluation of the risk chemicals and physical agents pose on their immediate environment,

(c) To develop international cooperation on reducing transboundary pollution. Also, to engage in activities on transboundary pollution, seeing that this affects public health,

(d) To develop strategies and options for the environmental protection of Balkan rivers, lakes and wetlands,

(e) To develop the environmental quality management systems for the Balkan region,

(f) To develop international programs for the restoration and sustainable improvement of the ecological safety of cross-border regions, and finally,

(g) To plan and organize conferences and other activities on environmental issues.

B.EN.A. organized five successful International Conferences on the environmental issue of "Transboundary Pollution", the first one in Thessaloniki (Greece), in 1998, the second one in Sofia (Bulgaria) in 1999, the third one in Bucharest (Romania) in 2000, the fourth in Edirne (Turkey), while the fifth was held in Belgrade (Yugoslavia) from 7 to 11 of November, 2002.

The Conference topics by sections were: Air pollution and Management – Clean Technologies – Recycling, Water and Soil Pollution – Waste Management – Environmental Radioactivity, Environmental Monitoring and Control – Environmental Education and Ecology – Biology – Risk Assessment, Legislation – Environmental Education – Toxicology. There was a parallel session followed by a Round Table discussion on the "Regional Nuclear Safety B.EN.A. Program". Yugoslav government officials, representatives of the European Union and distinguished officials from Albania, former Yugoslav Republic of Macedonia, Greece, Germany, Italy, U.S.A., Romania, Turkey, and Israel, addressed the Conference as well.

The B.EN.A Regional Nuclear Safety Program is determined to address the said issue in a multidisciplinary manner. Standard techniques for the classification of such nuclear issues as the efficient functioning of NPP, long-term radio toxicological studies, reliable monitoring systems and optimized quality control of environmental systems, are the issues to be studied and solved by the Balkan experts concerned. The mentioned round table was closed by the Chairman of the International Center for Radioactivity Measurements in S.E. Europe and the Advisory Body for Physics, Physical-Chemistry, Biology, Environmental Sciences, Nuclear, Fossil and Renewable Sources, Prof. K. Subotić, Gen. Director of VINČA Institute, who summarized the resulting decision as follows.

An international working group under the name NU-B.EN.A, in order to examine and offer solutions to the existing nuclear safety problems of the region, has established the following priorities:

(a) The assessment of the environmental impact and risk concerning the NPP present in the region (Kozlodui, Chernavoda and Croatia-Slovenia),

(b) Nuclear waste safety storage – legal and illegal,

(c) Depleted uranium,

(d) Safe recycling of all nuclear materials,

(e) Improvement of the mutual trust between neighboring countries in the region, particularly regarding nuclear safety, and

(f) Examination of the growing fears of nuclear pollution concerning the agricultural sector (due to K, U, etc.).

As may be discerned, radioactivity (natural and artificial) seems to have permeated the Balkans. When having to do with soil predestined for agricultural use, special emphasis is to be given to fields in the areas in the vicinity of nuclear power plants.

Nada Miljević