

***Ukraine's seventh
safety parameter
display system passes
site acceptance
testing***

Highlights

System proves its worth prior to formal testing!

The newly installed safety parameter display system (SPDS) for Zaporizhzhya Unit 2 successfully completed site acceptance testing on October 12 and was turned over officially to the management of Zaporizhzhya nuclear power plant (NPP).

Just before site acceptance testing began for the system, the Zaporizhzhya Unit 2 reactor tripped. Ukrainian specialists on hand for the acceptance testing used the recently installed SPDS engineering workstation to review historical data captured by the SPDS. The data displays provided by the SPDS enabled reactor staff to determine the cause of the trip, analyze the effects of the trip on the plant, and prepare the unit for a safe restart. Engineers determined that the trip resulted when two of the four main coolant pumps shut down. Initially plant staff theorized that the pumps shut down because a valve had been opened inadvertently. However, review of the SPDS historical data revealed that all the valves were positioned properly.

Prior to its site acceptance tests, the Zaporizhzhya Unit 2 safety parameter display system demonstrated its worth during an unexpected reactor trip. The engineers on site for the formal testing are shown here reviewing the SPDS data display to pinpoint the cause of the trip. Left to right are V. Veselsky,



Khmelnytsky NPP; A. Artym, Rivne NPP; M. Tregubov, Westron; V. Slezko, Rivne NPP; I. Aleksandrov and G. Shkalenko, Westron; O. Brenman, Westinghouse; T. Shevchenko, Westron; I. Rosenfeld, Burns & Roe; V. Bezsalii, Nuclear Regulatory Administration; S. Kolesov, EnergoAtom; S. Slivka, Zaporizhzhya NPP; V. Borrisenko (seated), Nuclear Power Plant Operational Support Institute; I Ivanisov and V. Rudenko, Zaporizhzhya NPP; V. Goldrin, State Scientific and Technical Center for Nuclear and Radiation Safety; and V. Voronov, Crimea Center.



Following the testing, the system was approved to begin pilot operation. Representatives of EnergoAtom and managers of Zaporizhzhya NPP signed a protocol accepting the SPDS. Other signatories included representatives from Ukraine's Nuclear Power Plant Operational Support Institute and Nuclear Regulatory Administration, as well as nuclear and technical specialists from Westron (the Ukrainian subcontractor), Westinghouse Electric Corporation (the U.S. SPDS supplier), and Burns & Roe Enterprises, Inc. (the U.S. subcontractor).

The SPDS is a computer system that displays a reactor's critical safety functions (reactor power, core cooling, primary coolant system integrity, secondary heat removal, and radiation containment) in the main control room, nearby shift supervisor's room, computer engineer room, and technical support center. The system monitors more than 2000 plant parameters such as temperatures, pressures, flows, water levels, neutron flux, and radiation levels. During any off-normal event, reactor operators and other key plant personnel are able to instantly see the status of the plant's safety functions. The information provided by the visual displays enables plant workers to quickly return the plant to a normal condition. U.S. experience following the Three Mile Island event has demonstrated the SPDS as a cost-effective way to reduce the likelihood that minor incidents will evolve into major accidents.

The system for Zaporizhzhya Unit 2 is the seventh of eleven SPDSs to be installed in Ukraine's nuclear power plants with VVER-1000 reactors. Under a U.S.-Ukrainian cooperative project to enhance the safety of Ukraine's Soviet-designed reactors, SPDSs already are installed in Khmelnytskyi Unit 1, South Ukraine Units 1 and 2, Rivne Unit 3, and Zaporizhzhya Units 3 and 5.

Systems yet to be installed are those for South Ukraine Unit 3 (late 2000) and for Zaporizhzhya Unit 4 (late 2000 or early 2001), Zaporizhzhya Unit 6 (early summer 2001), and Zaporizhzhya Unit 1 (mid-summer 2001). (Rich Reister, DOE, 301-903-0234; Rich Denning, PNNL, 614-424-7412) v

***Fourth annual Chernobyl
Center conference is
largest ever***

The International Chernobyl Center for Nuclear Safety, Radioactive Waste and Radioecology hosted its fourth annual conference in late September. The conference, which focused on "Scientific, Technical, and Social Aspects of Chernobyl NPP Closure," attracted more than 300 participants from 10 countries to the Center's Slavutych Laboratory for International Research and Technology 40 km northeast of Chernobyl NPP. During the three-day event, the attendees participated in plenary and workshop sessions as well as tours of the Chernobyl plant and the Unit 4 Shelter.





The International Chornobyl Center's Slavutych Laboratory was the setting for the Center's recent fourth annual conference on Chornobyl issues. This year's event drew the highest number of participants yet from the international scientific and technical communities.

Three major speakers from the United States gave presentations during the information exchange:

- Dr. James Turner, U.S. Department of Energy, "Current and Future Strategies of the International Nuclear Safety Program"
- Mr. Vincent McClelland, International Emergency Cooperation, "Use of Chornobyl NPP Emergency Management Center for Training on Emergency Preparedness"
- Ms. Anne Zollner, U.S. Department of Labor, "An Innovative Approach to Help Workers and Communities Cope with Enterprise Restructuring and Closures and Promote Economic Growth."

The number of participants in this year's conference was the largest ever, attesting to the high level of international interest in issues related to Chornobyl. Ukraine has agreed to shut down the Chornobyl plant by December 15 this year.

A complete description of the conference activities and outcomes is available on the Internet site for the Slavutych Laboratory at <http://slirt.chornobyl.org/eng/conf/4.html>.

Ukrainian President Leonid Kuchma created the International Chornobyl Center by decree on April 26, 1996, the 10th anniversary of the Chornobyl disaster. The Center was established to enable Ukraine to develop comprehensive, sustainable programs for evaluating and safely managing nuclear activities and facilities. The Center's administrative offices are in Kyiv. The principal technical work is conducted at its laboratory facilities in the city of Slavutych. (Riaz Awan, DOE, 38-050-257-7221; Don Draper, PNNL, 509-372-4079) √



***International Nuclear
Safety Program
Coordinating Committee
meets to discuss future
activities***

***U.S. and Russian
specialists determine
training needs at Rostov***



Russia

Officials from the U.S. Department of Energy and Pacific Northwest National Laboratory representing the International Nuclear Safety Program (INSP) participated in the bi-annual Coordinating Committee meetings in Moscow on October 19 and 20. Representatives from Russian Ministry of Atomic Energy (MinAtom), Rosenergoatom, and other industry organizations were involved in discussions on the scope of INSP activities related to FY 2001 authorized funding. (Rich Reister, DOE, 301-903-0234; Dan Couch, PNNL, 509-372-6415) v

In early October, representatives from Rosenergoatom, the Russian Institute for Nuclear Power Plant Operations (VNIIAES), Rostov and Balakovo NPPs, the U.S. Department of Energy, and Pacific Northwest National Laboratory met to discuss and define future work for a new project supporting development of the training program for operators at Rostov.

The U.S. participants provided a general description of past training activities performed as part of the U.S. Department of Energy's cooperative safety work and answered questions about the possible activities available to Rostov NPP. They also explained training activities conducted at Balakovo NPP in Russia and Khmelnytsky NPP in Ukraine and ongoing activities to transfer those programs to other nuclear power plants. Participants from Rostov described their current training department organization and staffing. Currently, Rostov NPP has 16 training instructors and is authorized to have as many as 32. Individuals from other departments have been chosen to fill some of the open positions but will not be available to transfer from their current positions until after the new plant's start-up. The current training staff received instructor training from the Novovoronezh Training Center.

A tour was arranged to familiarize the U.S. participants with the status of training facilities and equipment currently available to the Rostov training staff. Meeting participants also discussed a request from Rostov representatives for a full-scale control room simulator to assist in operator training and to improve the safety culture at the plant. The representatives from Rostov will coordinate their request for the simulator with the MinAtom and Rosenergoatom for consideration at the next U.S./Russian Coordinating Committee meeting. The U.S. representatives also recommended that Rostov consider a cost-shared approach similar to that followed in the full-scope simulator projects conducted previously at Kola and Kalinin NPPs.

The work proposed for Rostov NPP continues the U.S. effort to develop improved training methods and training expertise within Russia. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079) v

***Manufacture and factory
acceptance tests
completed for prototype
valves***

Chekhov, a Russian valve manufacturing company, has completed the manufacture of a main steam isolation valve and a steam generator relief valve. Prior to manufacture of these two prototype valves, the U.S. company Target Rock reviewed the valve designs and concluded that they would meet the internationally accepted standards of the American Society of Mechanical Engineers. Target Rock also provided recommendations to improve the ease of fabrication and operability of the valves. In November, the valves will be tested at the Russian Kashira facility to qualify the designs for use in future upgrades to Russian nuclear power plants. Burns & Roe Enterprises, Inc., is the principal contractor for this activity to transfer valve manufacturing technology to Russian enterprises. (Grigory Trosman, DOE, 301-903-6899; Rich Denning, PNNL, 614-424-7412) v

***International Nuclear
Safety Program
Coordinating Committee
meets to discuss future
activities***

Ukraine

Officials from the U.S. Department of Energy and Pacific Northwest National Laboratory representing the International Nuclear Safety Program (INSP) participated in the bi-annual Coordinating Committee meetings in Kyiv on October 23 and 24. Representatives from EnergoAtom, the Nuclear Power Plants and other industry organizations were involved in discussions on the scope of INSP activities related to FY 2001 authorized funding. (Rich Reister, DOE, 301-903-0234; Dan Couch, PNNL, 509-372-6415) v

***Rivne safety assessment
progress reviewed***

In late September, the U.S. assistant technical coordinator for the Rivne NPP in-depth safety assessment activity participated in the September 2000 project review held at the Kyiv office of SCIENTECH, the technical assistance contractor for the project. Members of the Ukrainian team that participated included staff from the Rivne project; the Ukrainian technical support organization, Energorisk; and the International Chernobyl Center Safety Analysis Laboratory. The participants reviewed the status of work on project tasks, and progress on all current tasks was found to be satisfactory. Also, the U.S. team began working with Rivne NPP staff to develop the scope of future tasks identified in the work plan for the project. (Walt Pasedag, DOE, 301-903-3628, Igor Bodnar, ANL, 630-252-8336) v

***Inspection equipment
production facility
planned for Ukraine***

Representatives from EnergoAtom, the Ukraine Nondestructive Training and Certification Facility, and Pacific Northwest National Laboratory met October 7 through 13 in Kyiv to discuss development of a fabrication facility for eddy-current probes used to inspect steam generator equipment. In the past, the U.S. Department of Energy has provided steam generator inspection equipment including eddy-current probes to Ukraine. However, the probes wear out over time so they must be replaced. The cost of purchasing new probes in the quantities needed is



higher than Ukraine's nuclear plants can afford. Therefore, the U.S. Department of Energy through its Pacific Northwest National Laboratory and Ukraine agreed to support a cooperative effort to develop a fabrication facility capable of manufacturing eddy-current probes for in-service inspection of VVER steam generators. During the discussions in Kyiv, the Ukrainian and U.S. representatives agreed to cooperatively support this activity.

The United States will

- Support renovation of an existing fabrication facility and provide the basic equipment necessary to fabricate eddy-current probes.
- Assist the design of an eddy-current probe by providing
 - support for developing an initial design for the probes
 - support for laboratory testing for the initial design
 - support for field validation of the initial design.
- Purchase the initial lot of eddy-current probes fabricated at the facility. This initial lot will be used for in-service inspection at Ukraine nuclear power plants.

Ukraine has agree to

- Develop a planning document that describes how the fabrication plant will be started up and how the plant will be operated to ensure a sustained and affordable supply of probes. Ukraine also will develop a schedule for starting the facility. This task will be completed by the end of December 2000.
- Arrange for state-required licensing of the eddy-current probe design and for all state-required approvals for business two months after the completion of the planning document.
- Complete any state requirements for approval of technical requirement documents for eddy-current testing in nuclear power plants.
- Ensure the assistance and cooperation of Ukrainian nuclear power plants in validation testing for the probes.
- Provide assistance in translation of technical documents from English to Russian and Russian to English.

(Grigory Trosman, DOE, 301-903-6899; Tom Taylor, PNNL, 509-375-4331) v



***Zaporizhzhya staff
trained to use Event
Analysis Database***

***Training material for
emergency-operating-
instructions developed
for Ukrainian plants***

***Pilot training program
implemented for Armenia
control room turbine
operators***



Two representatives of Novator-Kyiv and 33 staff members from Zaporizhzhya NPP met October 9 and 10 at Zaporizhzhya for a training session on the use of the Event Analysis Database. The representatives from Novator-Kyiv, the Ukrainian subcontractor that developed the Event Analysis Database, conducted the training for the Zaporizhzhya staff members. This activity is part of the pilot implementation of event analysis and reporting procedures and practices that will enable sharing of information among all Ukrainian nuclear power plants. (Dennis Meyers, DOE, 301-903-1418; Lief Erickson, PNNL, 509-372-4097) v

Representatives from Ukraine's Engineering and Technical Center for the Training of Nuclear Industry Personnel (ETC); Zaporizhzhya, Khmelnytsky, Rivne, and South Ukraine NPPs; and two U.S. companies, Sonalysts, Inc., and Human Performance Analysis Corporation, met in mid-October at ETC headquarters to begin development of training material for instructors at the Ukrainian nuclear plants. The training material will focus on how to implement emergency operating instructions (EOI) and will be used initially to train the instructors responsible for teaching operations personnel at Zaporizhzhya NPP and subsequently at the other Ukrainian nuclear plants on how to implement EOIs.

The representatives from ETC and the Ukrainian nuclear plants provided insights regarding the EOI development process and integration of developed EOIs into training programs. Representatives from the U.S. companies shared their insights regarding the development of effective programs for EOI training. (John Yoder, DOE, 301-903-5650; Al Ankrum, PNNL, 509-372-4095) v

Armenia

During a two-week working session starting in mid-October, a specialist from U.S. contractor Sonalysts, Inc., worked with training and technical staff from Armenia NPP to finalize and implement a pilot training program for control room turbine operators at the plant. In addition, observers from the U.S. firm Human Performance Analysis Corporation and the International Atomic Energy Agency evaluated the implementation activities and provided feedback to the training program developers. This activity focused on assisting in the development of improved training methods and training expertise at Armenia NPP. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

***Main steam isolation
valves installed at
Armenia Unit 2***

Seven main steam isolation valves manufactured by Hopkinson Ltd. and actuators manufactured by the U.S. corporation Enertech have been installed at Armenia Unit 2. Prior to the reactor's return to power in December 2000, the automation equipment for the valves also will be installed and tested. Burns & Roe Enterprises, Inc., is the principal contractor on this project. Safety analyses were prepared by Atomenergoproekt-Nizhny Novgorod, the Russian architect-engineer of the plant, and by Hidropress, the Russian nuclear system designer. Atomservice, an Armenian company, is performing the activities related to start-up and commissioning. Workers from Armenia NPP installed the valves as in-country contribution to the project. (Grigory Trosman, DOE, 301-903-6899; Rich Denning, PNNL, 614-424-7412) v

***Armenia Unit 2 gets new
fire detection and alarm
system***

A new fire detection and alarm system manufactured by the Cerberus Corporation was installed, programmed, and tested at Armenia NPP. The new system is installed in parallel with the old system. Over the next year, portions of the old system will be progressively removed, and the operation of automatic systems (e.g., sprinklers) will be transferred to the new system. The new system is a modern design in which the locations of detectors are programmed into the monitoring system, thus allowing the exact location of a fire to be determined. Burns & Roe Enterprises, Inc., is the principal contractor on this project. (Grigory Trosman, DOE, 301-903-6899; Rich Denning, PNNL, 614-424-7412) v

***New training courses at
Kozloduy aim to improve
management and
supervisory skills and
safety culture***

Bulgaria

During a working session held October 31 through November 5 at Kozloduy NPP, a training specialist from the U.S. firm Human Performance Analysis Corporation presented an expanded version of the previously developed Management and Supervisory Skills course to 15 Kozloduy management staff members. The expanded version included a new module on leadership skills. The U.S. specialist also continued modifications to the previously developed Safety Culture course to incorporate information collected from a survey on the safety culture at Kozloduy NPP. The new training courses are part of the U.S. team's cooperative work to improve training methodology and expertise at the Kozloduy plant. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079) v



***International exchange
forum for VVER and
RBMK reactors held in
Obninsk***

Cross-Cutting Activities

The 2000 Information Exchange Forum, "Safety Analysis for Nuclear Power Plants of VVER and RBMK Types" was held October 14 through 21 at the Institute of Physics and Power Engineering (IPPE) in Obninsk, Russia. The forum is sponsored by the U.S. Department of Energy (DOE), with support from the International Atomic Energy Agency (IAEA), and was hosted by the Russian Institute for Power and Physics Engineering. This annual meeting is conducted to bring plant, utility, regulatory, and research institute personnel together in an open forum to exchange information concerning past, present, and planned safety assessment work at Soviet-designed reactors.

During the five-day forum, 100 papers reported on work sponsored by DOE and by other organizations and countries including the IAEA, Swedish International Projects (SIP), Switzerland, Germany, Czech Republic, Bulgaria, Hungary, Lithuania, Slovakia, Russia, and Ukraine. Approximately 150 representatives attended the forum from host-country plants, utilities, government agencies, research institutes and U.S. national laboratories, and international organizations. Nuclear power plants represented included Paks, Kola, Ignalina, Leningrad, Kalinin, Balakovo, Novovoronezh, Rivne, Khmelnytskyy, Zaporizhzhya, and South Ukraine, and Monticello, a 545 MWe BWR plant located in Montecello, Minnesota. This year, for the first time, training managers from Ignalina, Novovoronezh, and Khmelnytskyy NPPs attended the forum.

In addition, a two-day parallel session of the International RELAP Users Group was held. This session also was sponsored by DOE with support from IAEA, SIP, Nuclear Energy Agency (France), IPPE, RiskAudit (French/German joint venture), and Pacific Northwest National Laboratory, Argonne National Laboratory, and Idaho National Engineering and Environmental Laboratory. (Walt Pasedag, DOE, 301-901-3628; Ty Blackburn, PNNL, 509-372-4092) v

Planned Activities

- ***Indicates the event is new or has changed in some way since the previous report was issued.***

- **November 6-15 - Ignalina NPP, Lithuania**

Training. A training specialist from Human Performance Analysis Corporation will work with training and technical specialists at Ignalina plant to adapt previously developed instructional materials for general employee safety training for implementation specific to Ignalina NPP. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)



- **November 27-December 8 - Kola NPP, Russia**

Training. Representatives from VNIIAES, the Balakovo and Novovoronezh training centers, and participating Russian nuclear power plants will work with a U.S. team member from Pacific Northwest National Laboratory and training specialists from Human Performance Analysis Corporation and Sonalysts, Inc., to begin transferring a simulator instructor training program to Kola NPP. (John Yoder, DOE, 301-903-5650; Al Ankrum, PNNL, 509-372-4095)

- **December 4-8 - Khmelnytsky NPP, Ukraine**

Management and Operations Safety. Staff from Khmelnytsky NPP and EnergoAtom will conduct a comprehensive audit of the quality assurance program at Khmelnytsky. Staff from most departments at Khmelnytsky will support the audit by producing requested documents and participating in interviews. Plant managers will review the audit results and develop improvement plans to deal with any identified weaknesses. (Dennis Meyers, DOE, 301-903-1418; Lief Erickson, PNNL, 509-372-4097)

- **December 4-15 (Rescheduled from September) - Kozloduy NPP, Bulgaria**

Training. Specialists from VNIIAES and Sonalysts, Inc., will work with training and technical specialists from Kozloduy NPP to complete plans and instructional materials for a training program for emergency operating instruction trainers at the plant. During the session, the specialists will implement the course for trainers at Kozloduy Units 3 and 4 (both VVER-440/230 reactors). (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

- **December 6-7 - Kyiv, Ukraine**

Plant Safety Assessment. The Management Committee for Design Document System Management is tentatively scheduled to meet December 6 and 7 in Kyiv to develop a plan for implementing configuration management and design basis documentation at each Ukrainian VVER site. Representatives from the four VVER nuclear power plant sites (Khmelnysky, Rivne, South Ukraine, and Zaporizhzhya), EnergoAtom, the Nuclear Power Plant Operational Support Institute, Kyiv Energoproect, Kharkiv Energoproect, and Pacific Northwest National Laboratory will participate in the meeting. (Walt Pasedag, DOE, 301-903-3628; Lief Erickson, PNNL, 509-372-4097)

- **December 5-6 - Moscow, Russia**

Management and Operational Safety. Representatives from Pacific Northwest National Laboratory, Brookhaven National Laboratory, Bechtel National, and Engineering, Planning, and Management, Incorporated, will meet with members of the working group for the Smolensk safe-shutdown analysis. Participants will discuss project task reports, safe-shutdown vulnerabilities identified by the project, and plans for future application of the analysis process to other nuclear power plants



in Russia. Russian organizations expected at the meetings will be Atomenergoproekt, VNIIAES, Rosenergoatom, Gosatomnadzor, and Smolensk NPP. (Grigory Trosman, DOE, 301-903-6899; Andy Minister, PNNL, 509-376-6663)

• **December 7-8 – Moscow, Russia**

Management and Operational Safety. VNIIAES will host “Fire Safety Analysis Methods at Russian NPPs” at VNIIAES facilities in Moscow. Representatives from each of the Russian nuclear power plants, Rosenergoatom, Gosatomnadzor, and other Russian organizations with an interest in fire protection at the nuclear power plants are expected to attend the workshop. The results of the Smolensk safe-shutdown analysis project will be presented. In addition, representatives from the nuclear power plants will give presentations on the fire safety issues at their plants. (Grigory Trosman, DOE, 301-903-6899; Andy Minister, PNNL, 509-376-6663)

December 11-15 – Moscow, Russia

Management and Operational Safety. VNIIAES will host a second workshop focused on the normative document for simulator standards and training in Russia. Representatives of VNIIAES/General Energy Technologies; Rosenergoatom; Gosatomnadzor; the Novovoronezh Training Center; and Balakovo, Kursk, and Novovoronezh NPPs are expected to participate. A U.S. team member from Pacific Northwest National Laboratory also will attend. Participants plan to finalize a draft of the document during the workshop, then submit it to Gosatomnadzor for consideration. Gosatomnadzor approval is targeted for early 2001. (John Yoder, DOE, 301-903-5650; Ken Erickson, PNNL, 509-372-4063)

• **January 2001 (Rescheduled from September) – Kyiv, Ukraine**

Training. Work will begin on a project to transfer a pilot training program for control room turbine operators to Rivne, South Ukraine, and Zaporizhzhya NPPs. Specialists from the Khmelnytsky plant, the Engineering and Technical Center for the Training of Nuclear Industry Personnel, and Sonalysts, Inc., will provide technical assistance. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

• **February 2001 – Kozloduy NPP, Bulgaria**

Training. Specialists from VNIIAES and Sonalysts, Inc., will work with training and technical specialists from Kozloduy NPP to complete plans and instructional materials for a training program for emergency operating instruction trainers at the plant. During the session, the specialists will implement the course for trainers at Kozloduy Units 1 and 2 (both VVER-440/230 reactors). (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

The Activity Report is prepared for the U.S. Department of Energy Office of International Nuclear Safety and Cooperation by Pacific Northwest National Laboratory under Contract DE-AC06-76RL01830.

