

Simulator instructor training completed at Kola

Russia

In early December, a two-week workshop was held at Kola nuclear plant to complete the transfer of the Simulator Instructor Training Course to trainers at that facility. U.S. trainers from Sonalysts Inc. and Human Performance Analysis Corp. facilitated the workshop, which focused on pilot implementation of the course. Participants from the Russian Institute for Nuclear Power Plant Operations (VNIIAES) and Kola and Novovoronezh nuclear plants led the pilot program presentation and various topical presentations, and the project manager from Pacific Northwest National Laboratory provided feedback based on his observations of the activities. Six students, all instructors from the multifunction simulator-training group at Kola, received the training.

The Simulator Instructor Training Course, originally developed for use in Ukraine, is being transferred to the Russian organizations to further facilitate the use and understanding of simulators for training-related activities. (*John Yoder, DOE, 301-903-5650; Al Ankrum, PNNL, 509-372-4095*)

Smolensk safe shut- down analysis report reviewed

Specialists from Brookhaven National Laboratory and Pacific Northwest National Laboratory met in early December in Moscow with the Russian working group that is performing the Smolensk Unit 3 Safe Shutdown Analysis Project. The Russian working group performing the analysis consists of specialists from Russian subcontractor General Energy Technologies (GET). The primary purpose of the meeting was to review and discuss the Russian task report "Development of the Probabilistic Model for the Analysis of the Fire Impact upon the Safe Shutdown of Unit 3." The report describes the probability of reactor core damage due to a fire in rooms identified by deterministic analysis to have vulnerabilities and identifies several rooms where fire could cause damage to electrical cables and/or equipment, thus increasing the probability of core damage. The U.S. specialists reviewed the report and provided comments. The final report will be submitted in March 2001. (*Grigory Trosman, NNSA, 301-903-3581; Andy Minister, PNNL, 509-376-4938*)



Fire protection workshop well attended

A workshop on “Methods of Fire Hazards Analysis of Russian Nuclear Power Plants” was held at VNIIAES in early December. Sixty-seven participants from 5 countries and representing 24 nuclear power plants attended the workshop. The participants represented technical specialists, regulators, nuclear power plant fire protection staff, design institutes, and the Russian State Fire Protection Department.

Nineteen presentations were made at the workshop including the results of the Smolensk Safe Shutdown Analysis and the status of the Zaporizhzhya Safe Shutdown Analysis. Following are brief summaries of some of the presentations.

- The head of the State Fire Protection Department presented his organization’s perspective on fire protection and suppression at nuclear power plants. There were 26 fires between 1995 and 1999, and there had been 2 fires in 2000 up to the time of the workshop.
- The Leningrad nuclear plant has used the U.S. National Nuclear Security Administration Core Protection Evaluation Methodology (RCPEM) to develop a safe shutdown analysis for fire-caused events at Unit 3. The methodology has not been applied in its entirety.
- A probabilistic analysis of fire events has been completed at Ignalina nuclear plant, and fire protection upgrades have been made to fire barriers and to the structural steel in the turbine hall. Ignalina plans to use RCPEM to perform a safe shutdown analysis. Swiss companies will be supporting that activity.
- A specialist from the All-Russian Institute of Fire Protection (VNIIPO) made a presentation on the best approach to performing fire hazards analyses. VNIIPO agrees with the U.S. approach of using a combined deterministic and probabilistic analysis approach to the studies. They believe the methodology needs to be modified to include requirements from several Russian normative documents.
- Kola nuclear plant used the International Atomic Energy Agency (IAEA) methodology for fire hazards analysis of VVER reactors for an analysis of Kola Unit 4. They developed a database to analyze the interaction between rooms. They also have developed a cable database and are in the process of entering the cables into the database. In the past 2 years, they have spent approximately 50 million rubles installing fire protection upgrades at all of the units, and they plan to spend about the same amount in the next 3 years on additional fire protection upgrades.

***Normative documents
workshop held
in Moscow***

- At Balakova, a limited scope fire hazards analysis has been performed, and at Novovoronezh, a fire probabilistic safety assessment is being performed on Unit 5. At Kalinin Unit 2, a deterministic and probabilistic fire analysis is planned for 2001.

(Grigory Trosman, NNSA, 301-903-3581; Andy Minister, PNNL, 509-376-4938)

Representatives of VNIIAES; the Novovoronezh Training Center; Balakovo, Kursk, and Novovoronezh nuclear power plants; and Pacific Northwest National Laboratory met in Moscow in December to participate in the second Normative Document Workshop. These organizations were the major participants in the first workshop, which was held in September 2000. The purpose of the second workshop was to review the draft documents created as a result of the first workshop. The documents describe the Russian simulator standards and the use of training aids in training programs. Participants presented their views on the content and purpose of the documents and made suggestions for revisions.

The documents were revised by mid-January 2001, and a short 2-day review session with VNIIAES and the training organizations was conducted to make additional revision suggestions prior to submitting the documents to the regulator, Pacific Northwest National Laboratory, and remaining training organizations. A final workshop in March 2001 will incorporate the recommended changes and result in the final version of the documents, with the intent of getting regulator approval.

(John Yoder, DOE, 301-903-5650; Ken Erickson, PNNL, 509-372-4063)

***Full-scope
simulator project
initiated at Rostov***

In mid-December, representatives from Rosenergoatom, VNIIAES, GET, Rostov nuclear power plant, the U.S. National Nuclear Security Administration, and Pacific Northwest National Laboratory met to discuss the new Rostov simulator project.

The purpose of the meeting was to initiate implementation of the joint project. A memorandum of understanding detailing initial roles and responsibilities as well as a Joint Project Work Plan (JPWP) were developed and signed by the participants. Minatom and the National Nuclear Security Administration approved the JPWP on January 31, 2001. The outcome of this project will be a full-scope simulator for the newly commissioned Rostov nuclear plant. ***(John Yoder, DOE, 301-903-5650; Jeff Ace, PNNL, 509-375-2640)***

**Quality assurance
audit conducted
at Khmelnytskyy**

**Design document
system management
project for VVER-1000
reactors approved**

**Acceptance testing
completed for eighth
Ukrainian VVER-1000
safety parameter
display system**



Ukraine

In early December 2000, specialists from the Khmelnytskyy nuclear power plant, Energoatom, and Nuclear Power Plant Operational Support Institute (NPP-OSI) conducted a comprehensive quality assurance audit at Khmelnytskyy. The purpose of the audit was to identify gaps that might exist between the Ukrainian requirements and guidance for managing plant operations and actual practices at Khmelnytskyy and to recommend improvements in any areas identified as being deficient. *(Dennis Meyers, NNSA, 301-903-1418; Lief Erickson, PNNL, 509-372-4097)*

A specialist from Pacific Northwest National Laboratory attended the second meeting of the Management Committee for Design Document System Management (DDSM) for nuclear plants with VVER-1000 reactors (also referred to as the Safety Analysis Documentation or Design Basis Document Project). At this meeting, held in Kyiv on December 11, 2000, the Committee commented on and approved a project plan and a draft memorandum of understanding for the project. All Ukrainian VVER sites, except South Ukraine, were represented, as were Energoatom, Kharkiv Energoprojekt, and NPP-OSI. The meeting protocol was signed on December 12, confirming acceptance of the project plan and the draft memorandum of understanding.

In a subsequent meeting held in late January, representatives of Pacific Northwest National Laboratory, Energoatom, and NPP-OSI met to discuss processes for selecting the Ukrainian subcontractors that will be involved in the DDSM project. A tentative schedule was discussed that would call for proposals to be due in time for a bid evaluation meeting at Pacific Northwest National Laboratory in early April. *(Walt Pasedag, NNSA, 301-903-3628; Lief Erickson, PNNL, 509-372-4097)*

Site acceptance testing for the South Ukraine Unit 3 safety parameter display system (SPDS) was completed successfully on December 20, 2000. This system was the eighth to be turned over to Ukraine. Previously, SPDSs were turned over to reactor operators at Khmelnytskyy Unit 1; Zaporizhzhya Units 2, 3, and 5; Rivne Unit 3, and South Ukraine Units 1 and 2. The ninth SPDS was installed at Zaporizhzhya Unit 4 in late December and will undergo site acceptance testing following the unit restart in February. The remaining 2 systems will be installed at Zaporizhzhya Units 1 and 6 this summer. The hardware has been shipped to Ukraine where the systems will be assembled and tested by Westron Company prior to installation.

**Control room turbine
operator training
material modified for
extended use**

**Ukraine INSC web
site now on-line**



Each SPDS monitors the critical safety functions at the nuclear plant and displays the key safety parameters used in off-normal events. The systems include workstation-type, person-machine interfaces and computer-driven displays of key plant parameters. System functions include centralized and real-time presentations in the reactor control room and other key locations at the reactor site of critical safety functions such as subcriticality, core cooling, and integrity of primary coolant circuit including the reactor vessel, secondary heat removal, and containment building integrity. Westinghouse Electric Company, under the direction of Burns & Roe, is the supplier of all 11 systems. **(Rich Reister, NNSA, 301-903-0224; Rich Denning, PNNL, 614-424-7412)**

For 2 weeks in late January, training specialists from the Engineering Technical Center (ETC), Khmelnytsky nuclear plant, Sonalysts Inc. and Pacific Northwest National Laboratory met in Kyiv with training and technical specialists from Rivne, South Ukraine, and Zaporizhzhya nuclear plants. This working meeting was convened to review and modify previously developed Control Room Turbine Operator (CRTO) training material for implementation at Rivne, South Ukraine, and Zaporizhzhya.

The specialists from ETC, Khmelnytsky, and Sonalysts Inc. worked with the technical and training specialists from Rivne, South Ukraine, and Zaporizhzhya to help them understand the existing CRTO training material and assisted in identifying material that needed to be modified using the Systematic Approach to Training methodology. The specialist from Pacific Northwest National Laboratory facilitated discussions related to ongoing training technology transfer activities. **(John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)**

In late January, specialists from Argonne National Laboratory met with representatives of Kyiv State University (KSU) to help establish a Ukrainian International Nuclear Safety Center (INSC) web site. This partner web site complements the existing network of INSC web sites established at Argonne (1995); the Russian INSC in Moscow (1996); the Lithuanian Energy Institute in Kaunas, Lithuania (1998); and at the National Technology and Science Center in Almaty, Kazakhstan (2000). Personnel from the university's Nuclear Technology and Cybernetics departments worked on the prototype web site, and to improve performance of the web site, KSU relocated computers to a building in downtown Kyiv next to the main Internet exchange node at Ukrtelcom. The specialists from Argonne provided guidance concerning the prototype web site development, hardware acquisition priorities, and networking alternatives to improve network speed and reliability. The web site, which is publicly available at

***ISA activities at
Ukrainian nuclear
plants reviewed***

<http://www.insc.gov.ua>, provides information on nuclear safety issues for Ukraine and technical information on Ukrainian nuclear plants. (*Walt Pasedag, NNSA, 301-903-3628; Igor Bodnar, ANL, 630-252-8336*)

In early February, specialists from the U.S. National Nuclear Security Administration, Argonne National Laboratory, and Pacific Northwest National Laboratory traveled to Kyiv to meet with representatives of Energoatom, Ukrainian nuclear power plants, technical support organizations, and the regulator to discuss the status of emergency operating instruction (EOI) development and the tasks remaining to implement the EOIs and to participate in a meeting of the In-Depth Safety Analysis (ISA) Steering Committee.

During the EOI meeting, one of the specialists from Pacific Northwest National Laboratory made a presentation describing the tasks needed to develop and implement symptom-based EOIs. A specialist from Sciencetech gave a presentation describing how the analysis required to technically validate the EOIs will be conducted as an integral part of the ISA activities.

Representatives from Zaporizhzhya and Rivne, the nuclear plants piloting this activity, provided brief status reports of their EOI development activities. In summary, both plants have drafted a complete set of EOIs and are now ready to support the EOI analysis activities.

During the ISA Steering Committee Meeting, representatives from each of the participating nuclear plants provided brief overviews of the status of their activities. Much of the discussion focused on the schedule for completing the activities and reviews required in order to obtain long-term operating licenses for the plants. The U.S. participant from the National Nuclear Security Administration acknowledged the need to expedite the schedule as much as possible while not compromising the required quality of the activities. Means for expediting the schedule by streamlining the peer and regulatory reviews and improving the timeliness of contracting processes were discussed and will be addressed further at the next meeting, which is tentatively scheduled for mid-March. (*Walt Pasedag, NNSA, 301-903-3628; Mark Petri, ANL, 630-252-3719*)

***Ukrainian nuclear
personnel trained
in audit procedures***



In February, specialists from Pacific Northwest National Laboratory; Southern California Edison; TXU Electric; Portland General Electric; R. Babione Enterprises, LLC; and the Slovenian Krsko plant traveled to Yuzhnoukrainsk, Ukraine, to conduct a workshop on auditing suppliers of safety-related equipment and services to nuclear power plants. The specialists are all active participants in the Nuclear Utility Procurement Issues Committee that coordinates vendor audits and evaluations for their

**Major upgrades
completed at
Armenia Unit 2**

members. The workshop was attended by 35 staff members from South Ukraine nuclear plant, 4 from Zaporizhzhya, 2 from Rivne, 1 from Khmelnytsky, 3 from Energoatom, and 1 each from NPP-OSI and the Ukraine State Center for Quality. A representative from British Energy attended the workshop and made a short presentation supporting the principles conveyed by the other experts. *(Walt Pasedag, NNSA, 301-903-3628; Lief Erickson, PNNL, 509-372-4097)*

Armenia

During the outage ending in early December 2000, major projects involving the nuclear service water system, the main steam isolation valves, and the fire detection and alarm system were completed at Armenia Unit 2.

- The largest of the projects was design, construction, and start-up of a new nuclear service water system, which relies on two spray ponds to reject heat from safety-related equipment. Previously, all cooling water was provided through four cooling towers, which would have been vulnerable to failure in a seismic event. The new system consists of two independent cooling trains, each of which are qualified to withstand a design basis earthquake. Burns & Roe provided management support for this project. Much of the contracted effort was performed by local Armenian organizations.
- Seven fast-acting main steam isolation valves also were installed in the plant. These valves provide protection against steam line breaks that could potentially result in thermal shock to the reactor pressure vessel. The previously installed valves responded very slowly and were unreliable. The new valves are controlled automatically so the response time is much faster. Burns & Roe provided management support for this project. Hopkinson Ltd. in England supplied the valves, and the U.S. firm, Enertech, supplied the valve actuators.
- Finally, installation of a new fire detection and alarm system was completed, the detectors were programmed, and the system was tested. The old and the new systems will work in parallel while plant operators become familiar with the new system. Over the next year, automatic actuation of equipment will be transferred section by section from the old system to the new system. Cerberus, a Swiss firm, supplied the detection equipment, and Burns & Roe provided management support.

(Dennis Meyers, NNSA, 301-903-1418; Rich Denning, PNNL, 614-424-7412)

**Development of Water
Chemistry training at
Armenia continues**

**Nuclear Safety
Council discusses
safety and reliability
issues at Armenia
plant**

**Major milestone
achieved at Kozloduy**



A training specialist from Sonalysts Inc. worked with trainers and technical specialists at Armenia nuclear plant for 2 weeks in late November and early December to continue development of a pilot training program in Water Chemistry. This visit was the second of three working visits being conducted to develop this training program for the facility.

During this visit, task analysis for the Chemistry Department Shift Supervisor pilot training program was completed, and development of program material commenced. Material previously developed for pilot implementations of Water Chemistry training programs that have been transferred to other Soviet-designed reactors is being modified as appropriate for application to the Armenia plant. Plans for the final working visit also were discussed. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

In early January, the Armenian Nuclear Safety Council met in Tsakhadzorto to discuss issues related to safe and reliable operation of the Armenia nuclear power plant. The President of Armenia, who sponsors the Nuclear Safety Council meetings, attended most of the January meeting and was supported by representatives of the Armenian Ministry of Energy, and Armenian regulator, utility, and technical-support organizations. Council members from Germany, the United Kingdom, France, and Russia and a U.S. specialist from Future Resources Associates also participated in the meeting. (*Dennis Meyers, NNSA, 301-903-1418; Lief Erickson, PNNL, 509-372-4097*)

Bulgaria

In December, staff at Kozloduy nuclear plant verified its complete set of 48 EOIs for Units 5 and 6 (both VVER-1000 reactors). This action represented completion of Milestone 4 in the process that was established for implementing EOIs for these units. Work toward meeting Milestones 5 and 6, Operational Validation on the Full-Scope Simulator and Operator Training, currently is being performed. Milestone 7, Regulatory Approval, and Milestone 8, Implementation, which are the final 2 milestones, will be met in 2001.

Kozloduy also has completed RELAP5 technical validation for 12 of the 13 bounding modes needed to thermal-hydraulically validate the mitigating strategies for the 32 VVER-440/230 EOIs for Units 3 and 4. Work on the remaining bounding mode is in progress and is scheduled for completion by the end of March 2001. EOIs for the VVER-440/230 units are scheduled for Regulatory Approval and Implementation prior to 2002. (*Dennis Meyers, NNSA, 301-903-1418; Kent Faris, PNNL, 509-372-4068*)

***EOI training
implemented
at Kozloduy***

A 2-week working session was held at the Kozloduy nuclear plant in December to continue development of a training program on the use of EOIs. The purpose of this visit was to continue development of training materials and programs that will be given to plant staff before EOIs are implemented.

During the working session, a U.S. specialist from Sonalysts Inc. worked with Kozloduy training specialists on the design of the training materials for the group of EOIs that will be used in this pilot training program. Training specialists from Kozloduy worked with plant technical specialists to develop facility-specific training material. The focus of this working session was on the training material and program for Units 5 and 6 (both VVER-1000 reactors).

In February, training specialists from VNIIAES, Trnava Training Center in Slovakia, and the U.S. firm, Sonalysts Inc., visited Kozloduy to help training and technical specialists implement the EOI training program described above. The Kozloduy training and technical specialists conducted the training for simulator instructors at the plant. The U.S. and Russian participants observed the activity and provided feedback, and the specialist from Trnava Training Center provided insight gained from EOI training in Slovakia and obtained information for future use in Slovakian training efforts. During the third week, a training specialist from the Department of Energy observed the implementation activities and held discussions with Kozloduy management about future training activities. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

***Kozloduy training
courses revised and
implemented***

In late January, a U.S. training specialist from Human Performance Analysis, Corp., visited the Kozloduy nuclear power plant in Bulgaria to observe pilot program implementation of a revised Safety Culture course and to present a second implementation of the revised Management and Supervisory Skills course. Staff at Kozloduy had previously received the Management and Supervisory Skills and the Safety Culture courses, but training and management personnel at the plant requested assistance in revising both of these programs. Specifically, they requested that a Leadership module be added to the Management and Supervisory Skills course and that more detailed, site-specific information be included in the Safety Culture course. The Management and Supervisory Skills program was revised and implemented by the U.S. training specialist. Staff from Kozloduy revised the Safety Culture training with input and oversight by the U.S. specialist. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

***EOI information
exchange held
at Ignalina***

***Simulator upgrade
project reviewed***

Lithuania

In early February, training specialists from the Chernobyl and Smolensk nuclear power plants and the U.S. firm Sonalysts Inc. traveled to Ignalina nuclear plant to participate in EOI training activities. Training specialists from Ignalina conducted simulator-training sessions for EOIs developed specifically for the plant. The Ukrainian, Russian, and U.S. participants observed the training and made technical presentations on EOI training activities within their respective countries and facilities. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

Slovakia

Representatives from the Slovakian Nuclear Power Plant Research Institute (VUJE), the U.S. National Nuclear Security Administration, Pacific Northwest National Laboratory, Data Systems & Solutions (DS&S), and CORYS Training and Engineering Support System met at the VUJE Training Center in December to review the status of the V-2 simulator upgrade project. The representatives from VUJE also described the status and provided a tour of the V-1 simulator being built by VUJE and their V-1 multifunction simulator provided by the European Community. DS&S, CORYS, and VUJE reviewed the training requirements and pending RELAP5 integration tasks, and mutually developed a draft schedule for completing the integration by October 2001. It was agreed that the statement of work for the RELAP5 integration activity would be revised and updated. (*John Yoder, DOE, 301-903-5650; Ken Erickson, PNNL, 509-372-4063*)

Planned Activities

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

- **March 12-17, Ignalina Nuclear Power Plant, Lithuania Training.** A U.S. training expert from Human Performance Analysis Corp. will travel to the Ignalina facility to review materials developed to support the General Employee Safety Training Program. This will be the third and final visit as part of this project aimed at transferring General Employee Safety Training Program materials from other Soviet-designed nuclear power plants to Ignalina. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

• **March 19–23, VNIIAES, Moscow, Russia**

Training. A U.S. technical specialist from Pacific Northwest National Laboratory will participate in a one-week workshop to discuss the development of normative documents for simulators in Russia. This is the third workshop to be held on this topic (the first two occurred in September and December of 2000). Discussions will continue at this workshop on the development and format of a normative document for simulators, topics to be covered in normative simulator documents, and issues related to normative documents for full-scope and multifunctional simulators. The workshop will be run by VNIIAES and will include participants from VNIIAES, Novovoronezh Training Center, and Balakovo, Kursk, and Novovoronezh nuclear plants. (*John Yoder, DOE, 301-903-5650; Al Ankrum, PNNL, 509-372-4095*)

• **March 19–30, Kyiv, Ukraine**

Training. A U.S. training specialist from Sonalysts Inc. will travel to Kyiv to facilitate a workshop organized to help transfer the training program for Control Room Turbine Operators to Rivne, South Ukraine, and Zaporizhzhya nuclear plants. This is the second workshop being held in support of this effort. The workshop will be held at ETC Headquarters and will include participants from the ETC and the Khmelnytsky nuclear plants. This is the second of four workshops to be held with each site to transfer the program. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

• **March 12–23, Armenia Nuclear Power Plant**

Training. A U.S. training expert from Sonalysts Inc. will travel to the Armenia nuclear plant to assist in final preparations for the pilot implementation of the Chemistry Department Shift Supervisor Training Program. Implementation of the pilot program will occur during the second week. The program will be implemented by training and technical personnel from the Armenia nuclear plant and will be observed by personnel from Sonalysts Inc. and the National Nuclear Security Administration. Discussions will take place with training center management regarding plans for future work in the training area. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079*)

• **March 26–30, Rez, Czech Republic, and Temelin Nuclear Power Plant**

Plant Safety Assessment. A kick-off meeting for an IAEA design basis document project for the Temelin plant in the Czech Republic will be held during the final week of March. Due to the similarity in objectives with the Ukraine Design Document project, eight members of the Ukrainian project team will attend along with a representative from Pacific Northwest National Laboratory. (*Walt Pasedag, NNSA, 301-903-3628; Lief Erickson, PNNL, 509-372-4097*)



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