INSP
International
Nuclear Safety
Program

Activity Report
May 2000

Office of International Nuclear Safety and Cooperation - Dr. James Turner, Director
Improving the Safety of Soviet-Designed Nuclear Power Plants

Highlight

New program director conducts first review of project sites in Ukraine

Dr. Jim Turner traveled to Ukraine during May for the first time in his new role as director of the U.S. Department of Energy Office of International Nuclear Safety and Cooperation. As part of the trip, Dr. Turner held discussions in Kyiv with high-level Ukrainian officials on U.S.-supported projects including the dry cask spent fuel storage system at Zaporizhzhya nuclear power plant (NPP), the replacement heat plant at Chornobyl NPP, and the Ukraine nuclear fuel qualification effort.

In Slavutych, Dr. Turner and his party toured the Slavutych Laboratory for International Research and Technology. He also met with directors of the International Chornobyl Center, who provided briefings on the center's operations.

Dr. Jim Turner and other U.S. team members pause in front of the Chornobyl Shelter while touring the Chornobyl site. From left to right are Sally Kornfeld, U.S. Department of Energy attaché to the U.S. Embassy in Kyiv; Dr. Jim Turner, director, Office of International Nuclear Safety and Cooperation, U.S. Department of Energy; Dan Couch, program manager; Andrei Glukhov, project manager; and Alex Sich, manager, Kyiv Adjunct Office, all of the International Nuclear Safety Program, Pacific Northwest National Laboratory.

Dr. Turner and his group then toured the Chornobyl site, including the exclusion zone, the heat plant, and Chornobyl Unit 3. They also visited the closed city of Prypyat.

Sally Kornfeld, Dr. Jim Turner, and Dan Couch at entrance to Chornobyl NPP.

Dr. Jim Turner (left), Sally Kornfeld, and Dan Couch view one of the heavy equipment "graveyards" within the Chornobyl 30-kilometer exclusion zone. The equipment—1,621 vehicles and 30 military helicopters—was used in mitigating the consequences of the 1986 Chornobyl accident and remains highly contaminated with radioactivity.

The group then traveled to Zaporizhzhya NPP, the site of several U.S.-supported nuclear safety projects including configuration management, simulators, training, and the dry cask storage system for spent nuclear fuel, for introductions and discussions with Zaporizhzhya management. There, the U.S. delegation received a tour of several plant areas to view the dry cask storage system and cask transporter and the Unit 5 control

room with its U.S.-provided full-scope simulator and safety parameter display system.

Dr. Turner was accompanied on his Ukraine visit by the U.S. Department of Energy attaché to the U.S. Embassy in Kyiv as well as several members of the U.S. team from the Department of Energy and Pacific Northwest National Laboratory. (Richard Reister, DOE, 301-903-0234; Dan Couch, PNNL, 509-372-6415) V

Russia

Contract awarded for Novovoronezh safety parameter display system

During May, Burns & Roe Enterprises, Inc., awarded a contract to Data Systems & Solutions to install a safety parameter display system in Novovoronezh Unit 5. Data Systems & Solutions will subcontract with the Russian firms ConSyst and Western Services to perform most of the in-country work. Installation in the VVER-1000 reactor is planned for completion in summer 2001. Safety parameter display systems were installed in Novovoronezh Units 3 and 4 in 1998 and 1999, respectively. Those units are VVER-440/230 reactors. (Richard Reister, DOE, 301-903-0234; Rich Denning, PNNL, 614-424-7412; Frank Panisko, PNNL, 509-372-4472) V

Simulator instructor training program being transferred to Russia

At a late-May workshop, the U.S. team began the transfer to Russia of a training program for simulator instructors. The workshop, conducted at the Moscow facilities of the All-Russian Research Institute for Nuclear Power Plant Operations (VNIIAES), was the first of three planned to transfer the simulator instructor training technology. Initially developed with U.S. support for nuclear facilities in Ukraine, the program is part of a cooperative effort to improve training for staff at Soviet-designed nuclear power plants.

Representatives from VNIIAES, the Novovoronezh and Smolensk training centers, and Kola NPP participated. U.S. team members from Sonalysts, Inc., Human Performance Analysis Corporation, and Pacific Northwest National Laboratory also attended.

The group established six key objectives for the weeklong workshop:

- Define the content of the training program.
- Identify available reference materials to be used in developing the program.
- Develop a plan for implementing the program.
- Develop a schedule for program development and implementation.
- Identify and assign responsibilities for modifying existing, or developing new, instructional materials.
- Identify technical and logistical support requirements for the training program.

By the end of the workshop, participants had achieved all six objectives. They will meet again in September 2000 to continue program development activities. Pilot implementation of the program is scheduled for November 2000 at Kola NPP; the specific date will be determined by availability of Kola's full-scope simulator. (John Yoder, DOE, 301-903-5650; Al Ankrum, PNNL, 509-372-4095) V

Ukraine

U.S. nuclear power plants host workshop for Ukrainian specialists

Ukrainian specialists representing the Engineering and Quality directorates at Energoatom and the Nuclear Power Plant Operational Support Institute (NPP OSI) participated in a U.S.-supported workshop May 15 through 19. The workshop, conducted onsite at two separate American nuclear plant sites, introduced the specialists to different approaches to collecting design basis data for operating nuclear power plants.

Ukrainian nuclear specialists and their interpreter at Palo Verde NPP near Phoenix, Arizona, for the second half of their workshop on design basis documentation. Standing (left to right) are Evgeny Bogdantsev, Nuclear Power Plant Operational Support Institute; Larysa Veselska, interpreter; Iryna Mitichkina, Energoatom; Viktor Klochko, Energoatom; and Viktor Alekseyev, Nuclear Power Plant Operational Support Institute.

Personnel from the two plants—Millstone in Connecticut and Palo Verde in Arizona—presented their approaches to design basis reconstitution and documentation. They also answered questions and provided examples of procedures and documents.

Using this information, the NPP OSI specialists will develop a plan for handling design basis documents at Ukraine's four

VVER nuclear power plants. After Energoatom approves the plan, documents will be developed for each plant in Ukraine. When completed, the design basis documents will provide easily accessible information on critical plant structures and systems. Such information will facilitate accurate operating procedures, efficient maintenance, and effective design improvements for Ukraine's nuclear power plants. (Walter Pasedag, DOE, 301-903-3628; Lief Erickson, PNNL, 509-372-4079) V

Second safety parameter display system up and running at Zaporizhzhya

Ukrainian and U.S. specialists successfully completed the installation and site acceptance testing for Zaporizhzhya NPP's newest safety parameter display system on May 30. Representatives of the Ukrainian organizations Energoatom, Westron, and the Nuclear Power Plant Operational Support Institute worked with U.S. contractors Burns & Roe Enterprises and Westinghouse Electric Corporation to complete the effort on May 30.

The new system—installed in Zaporizhzhya Unit 3—is the second of six ultimately planned for Zaporizhzhya NPP, one for each of the plant's VVER-1000 reactors. Unit 5 was the first to receive a safety parameter display system, in October 1999 (see ***Activity Report***, October 1999). Unit 2 likely will receive its system this summer; site acceptance testing is scheduled for completion in October 2000. Unit 4 is scheduled to receive its system near the end of 2000. The U.S. team plans to install systems in Units 1 and 6 in spring 2001. (Richard Reister, DOE, 301-903-0234; Rich Denning, PNNL, 614-424-7412; Frank Panisko, PNNL, 509-372-4472) V

South Ukraine's second safety parameter display system passes site acceptance tests

On June 1, the U.S.-provided safety parameter display system for South Ukraine Unit 2 successfully completed site acceptance tests at the plant. The system is the second of three to be installed at the operating VVER-1000 reactor units at South Ukraine NPP.

In July 1999, Ukrainian and U.S. specialists completed final installation work and acceptance testing for the Unit 1 system. The project team expects to complete installing the third system—this one for South Ukraine Unit 3—late this year following the scheduled fall outage. Key members of this team include Energoatom, the Nuclear Power Plant Operational Support Institute, and Westron of Ukraine, as well as U.S. contractors Burns & Roe Enterprises and Westinghouse Electric Corporation. (Richard Reister, DOE, 301-903-0234; Rich Denning, PNNL, 614-424-7412; Frank Panisko, PNNL, 509-372-4472) V

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Rivne implements new training program

Training and technical specialists from Ukraine's Khmelnytskyy and Rivne NPPs, the Engineering and Technical Center for the Training of Nuclear Industry Personnel, and Sonalysts, Inc., implemented a pilot training program for control room reactor operators at Rivne NPP during the week of May 21. Trainees in the new class were incumbent control room reactor operators and supervisors. Implementation of the program at Rivne NPP supports the U.S. team's efforts to improve training methods at Ukraine's nuclear power plants with Soviet-designed reactors. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079) V

Zaporizhzhya staff receive root cause analysis training

At a nuclear power plant site, the capability to effectively determine the root cause of events and report on lessons learned is important to prevent the escalation of minor problems into serious accidents. In support of the pilot implementation of event analysis procedures at Zaporizhzhya NPP, specialists from Ukraine's Crimea Scientific and Engineering Center conducted a training seminar for Zaporizhzhya staff during the last week of May.

Technical specialists from the Crimea Center and Pacific Northwest National Laboratory introduced the topics and summarized U.S. experience following the accident at Three Mile Island NPP. The seminar, held in Scholkino, focused on how to apply procedures for nuclear power plant event analysis and reporting to Energoatom. The trainees were 14 Zaporizhzhya staff members who represented the plant's reliability laboratory, dispatchers, operations instrumentation shop, technical department, radiation safety, turbine shop, and maintenance engineering. Three personnel from Energoatom's surveillance and operating experience departments also attended the seminar. (Dennis Meyers, DOE, 301-903-1418; Lief Erickson, PNNL, 509-372-4079) V

Seminar introduces Energoatom quality assurance program to Khmelnytskyy managers

To encourage awareness and acceptance of Energoatom's new quality assurance program, the U.S. team supported a seminar for Khmelnytskyy managers on May 30 and 31 at the plant site. Representatives of Energoatom and the Nuclear Power Plant Operational Support Institute (NPP OSI), members of the Ukraine Quality Assurance Working Group, and an executive consultant from British Energy participated in the seminar.

Quality assurance personnel from Energoatom described the basis for the Energoatom quality assurance program and the normative document standard developed by the working group. They also reviewed the development of International Atomic Energy Agency safety codes on which the Energoatom program is based; the quality assurance safety code also was discussed. The NPP OSI representative described Energoatom's implementation plan and summarized principles of safety culture. Working

group members described how quality assurance is implemented at the nuclear power plant sites in Ukraine, and the British Energy representative described how quality assurance contributed to making the British nuclear power plants cost-effective and profitable.

The seminar was an important step in expanding involvement of key personnel in implementing the new Energoatom quality assurance program. Consistent implementation of the program at all of Ukraine's nuclear power plants will improve plant safety by improving the quality of work and reducing errors. (Dennis Meyers, DOE, 301-903-1418; Lief Erickson, PNNL, 509-372-4097) V

Plans discussed for safety analysis code repository

Near-term plans for the safety-analysis code repository center at the Slavutych Laboratory for International Research and Technology (SLIRT) were discussed in a mid-May meeting at SLIRT. The SLIRT director, deputy director, and system administrator participated in the discussions with a technical specialist from Argonne National Laboratory.

Technical specifications for a Hewlett-Packard workstation have been finalized. A suite of modern safety analysis codes used in in-depth safety assessment work in Ukraine will be installed and maintained on computers at SLIRT. The next step would be a series of code maintenance workshops in Ukraine to train SLIRT experts on how to maintain and use the codes.

SLIRT specialists will participate in an upcoming workshop on the CONTAIN and MELCOR codes tentatively scheduled for July-August 2000. They also likely will be involved in a July-August workshop on RELAP5, to be presented by specialists from the Idaho National Engineering and Environmental Laboratory. Establishment of the code repository and the subsequent training will help SLIRT analysts to develop marketable expertise in nuclear power plant safety assessment work within Ukraine. (Walter Pasedag, DOE, 301-903-3628; Igor Bodnar, ANL, 630-252-8336) V

Armenia

System installation and testing completed

The U.S.-provided safety parameter display system for Armenia Unit 2 underwent site acceptance testing at the plant in early May, after workers finished all installation work. Plant technical staff and representatives of U.S. contractors Science Applications International Corporation, Data Systems & Solutions, and Burns & Roe Enterprises, Inc., participated in the testing. Armenia Unit 2 is a VVER-440/230 reactor. (Richard Reister, DOE, 301-903-0234; Rich Denning, PNNL, 614-424-7412; Frank Panisko, PNNL, 509-372-4472) V

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Lithuania

Ignalina nuclear safety projects reviewed

At meetings in Lithuania held April 25 through 30, U.S. team members from the U.S. Department of Energy and Argonne National Laboratory met with counterparts from the U.S. Agency for International Development, Lithuanian Ministry of Economy, Lithuanian Energy Institute, Lithuanian nuclear regulatory agency VATESI, and Ignalina NPP to discuss ongoing and future projects in support of the Safety Analysis Report for Ignalina Unit 2. Participants identified new needs for safety analysis capability. Joint projects to address those needs are under current consideration. (Dennis Meyers, DOE, 301-903-1418; Mark Petri, ANL, 630-252-3719) V

Lithuanian nuclear expert participates in technical exchange

With U.S. support, a technical expert from the Lithuanian Energy Institute attended PHYSOR 2000, the American Nuclear Society international topical meeting, ***Advances in Reactor Physics and Mathematics and Computation into the Next Millennium***. Following the early-May society meeting in Philadelphia, he joined U.S. team members from Argonne National Laboratory to plan pipeline-whipping analyses for Ignalina NPP. The Argonne meetings included a technical exchange with experts from the Idaho National Engineering and Environmental Laboratory on thermohydraulics and neutronics modeling of the Ignalina RBMK reactor. (Dennis Meyers, DOE, 301-903-1418; Mark Petri, ANL, 630-252-3719) V

Cross-Cutting Activities

International working group meets

The International Atomic Energy Agency held a meeting of the Working Group on Accident Analysis of and Training Program for the RBMK-1000 Kursk NPP at its facilities in Vienna, Austria. Participants from Austria, Germany, Russia, Switzerland, and the United States, including a member of the U.S. team, attended the mid-May meeting. Group members have met periodically over the past few years, working toward a detailed technical report on their topic.

During the May meeting, the group decided that one of the calculations to be shown in the final report (the loss of feedwater transient) should be performed as a benchmark, providing a comparison of the various computer programs being used elsewhere in the analyses (e.g., RELAP5/MOD3.2, RELAP5-3D, ATHLET, and STEPAN/KOBRA). Group members also concluded that additional discussions and work will be needed for the accident analysis simulation and training system for Kursk NPP.

The working group will meet again in October to finalize the technical report. At a final meeting in mid-January 2001, the group will discuss peer review of the technical report. (Walter Pasedag, DOE, 301-903-3628; Jordi Roglans, ANL, 630-252-3283) V

Computer code validation effort reviewed

Work to validate computer codes for transient analysis of RBMK and VVER reactors underwent review in late May in Moscow. The project is a joint effort of the U.S. and Russian international nuclear safety centers. Detailed technical discussions centered on the analyses performed for RBMK standard problem R5 by specialists at the Electrogorsk Research Center for Nuclear Power Plants Safety and at Argonne National Laboratory. Discussions provided an opportunity for each analytical team to raise questions regarding the work in the other side's analysis report. Participants compiled a list of modeling differences and discussed the topics to cover in the joint comparative analysis report. The group agreed that each team will continue work toward completing its final reports and then begin work on the comparative report. (Walter Pasedag, DOE, 301-903-3628; Jordi Roglans, ANL, 630-252-3283) V

Planned Activities

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

• May 29-June 9 — Kozloduy NPP, Bulgaria
Training. A representative of Sonalysts, Inc., and a specialist from VNIIAES will work with training and technical specialists from Kozloduy NPP on the development of an instructional program for emergency operating instruction (EOI) trainers. Kozloduy technical personnel are providing expertise on the EOIs, while the U.S. and Russian specialists are helping develop a training program on EOIs. During the second week of this working visit, participants will implement the EOI training program for a pilot group of trainers at Kozloduy Unit 1. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

• May 29-June 9 — Zaporizhzhya NPP, Ukraine
Training. A U.S. training expert from Sonalysts, Inc., and training and technical specialists from Ukraine's Khmelnytskyy NPP the Engineering and Technical Center for the Training of Nuclear Industry Personnel will implement a pilot training program for control room reactor operators at Zaporizhzhya NPP. The program will be piloted to a group of incumbent control room reactor operators and supervisors who also will be asked to provide feedback on the training. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

• **May 30-June 2 — Bilibino NPP, Russia**
Simulators/Training. The U.S.-provided analytical simulator for Bilibino NPP will be turned over officially to the plant. Participants will include several representatives of the plant, Gosatomnadzor, Rosenergoatom, LAKROM, VNIIAES, GSE Power Systems, and Pacific Northwest National Laboratory. Following the turnover ceremony, participants will review the status of the plant's training program and instructional materials for operators. (John Yoder, DOE, 301-903-5650; Joe Cleary, PNNL, 509-372-4094)

• **June 7-9 — South Ukraine NPP, Ukraine**
Simulators/Training. The U.S. team will officially turn over the full-scope simulator for Unit 3 to South Ukraine NPP. Organizations participating in the turnover will include South Ukraine NPP, the Main State Inspectorate, Energoatom, LAKROM, GSE Power Systems, Inc., the U.S. Department of Energy, and Pacific Northwest National Laboratory. (John Yoder, DOE, 301-903-5650; Joe Cleary, PNNL, 509-372-4094)

• ***June 12-18* (rescheduled from May 22-27) — *Kyiv and South Ukraine NPP, Ukraine***
Management and Operational Safety. U.S. specialists will work with Ukrainian team members to prepare a plan for auditing radiation monitoring of the environment at South Ukraine NPP. Representatives of South Ukraine NPP, Energoatom, the Nuclear Power Plant Operational Support Institute, SCIENTECH, Inc., and Pacific Northwest National Laboratory will participate. The South Ukraine audit plan and resulting audit (scheduled to begin June 24) will provide a framework and field data from which a functional area performance guide can be developed for use at all nuclear power plants in Ukraine. (Dennis Meyers, DOE, 301-903-1418; Lief Erickson, PNNL, 509-372-4097)

• **June 13-14 – Moscow, Russia**
Plant Safety Assessment. Participants in the in-depth safety assessment projects under way at Soviet-designed nuclear power plants in Russia will review progress and status on those projects. Meeting attendees are expected to include representatives of Minatom, Rosensergoatom, the European Bank for Reconstruction and Development, and Kola, Leningrad, and Novovoronezh NPPs. U.S. team members from the U.S. Department of Energy and Argonne National Laboratory also will participate. (Walt Pasedag, DOE, 301-903-3628; Phil Pizzica, ANL, 630-252-4847)

• **June 19-30 – Moscow, Russia**
Management and Operational Safety. U.S. specialists from Data Systems & Solutions will hold a workshop on the development of sub-tier analytical scenarios for emergency operating instructions for nuclear power plants with VVER reactors. Gidropress, Rosensegoatom, VNIIAES, Atomenergoproekt, and Balakovo, Kola, Novovoronezh, and Rostov NPPs will send representatives to the workshop. (Dennis Meyers, DOE, 301-903-1418; Larry Sherfey, PNNL, 509-372-4080)

• **June 19-30 — South Ukraine NPP, Ukraine**
Training. A U.S. training expert from Sonalysts, Inc., and training and technical specialists from Ukraine's Khmelnytskyy NPP the Engineering and Technical Center for the Training of Nuclear Industry Personnel will implement a pilot training program for control room reactor operators at South Ukraine NPP. The program will be piloted to a group of incumbent control room reactor operators and supervisors who also will be asked to provide feedback on the training. (John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

• **June 27-29 – Stockholm, Sweden**
Plant Safety Assessment. The coordinating committee for the Kola Unit 2 probabilistic risk assessment will meet to review project progress, plans, and schedules. Committee members include representatives of Kola NPP, Swedish International Project, and Argonne National Laboratory. (Walter Pasedag, DOE, 301-903-3628; Phil Pizzica, ANL, 630-252-4847)

• **July 17-20 – Boston, Massachusetts, USA**
Engineering and Technology. Specialists from Engineering Planning and Management Inc. (EPM) will host a progress meeting on the safe-shutdown analysis under way at Smolensk NPP. Participants will include a group of analysts from VNIIAES, Atomenergoproect, and Rosenergoatom, as well as technical specialists from EPM and Brookhaven and Pacific Northwest national laboratories. Participants will review comments on reports covering the probabilistic portion of the analysis and the recommendations for fire safety upgrades to correct identified deficiencies. They also will discuss completion of the project and implementation of corrective actions at the plant. (Grigory Trosman, DOE, 301-903-3581; Andrew Minister, PNNL, 509-376-4938)

• **September 27-29 — Slavutych, Ukraine**
Chornobyl Initiatives. The International Chornobyl Center will convene its fourth annual conference to facilitate the exchange of information on international scientific and technical activities at Chornobyl. The conference program will include plenary and workshop sessions and technical tours of Chornobyl NPP and the Unit 4 Shelter. Conference organizers are seeking speakers to give presentations at the conference. (Riaz Awan, DOE, 38-050-257-7221; Don Draper, PNNL, 509-372-4079)

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