

# INSP Activity Report

## January - March 2002

### Highlight

#### Elimination of Weapons-Grade Plutonium Production project initiated in Russia

In mid-February Dr. James Turner and Jimmie Mulkey of the National Nuclear Security Administration (NNSA), and James Wiborg of the Pacific Northwest National Laboratory (PNNL) traveled to Russia to meet with representatives of the Ministry of Atomic Energy of the Russian Federation (Minatom) to initiate the Elimination of Weapons-Grade Plutonium Production program.



*Jim Wiborg, Jimmie Mulkey, and James Turner at Sosnovoborsk - touring the site of the Mining and Chemical Combine's (MCC) new fossil-fueled heat and power generating facility. District heat distribution piping shown in the background.*

Siberian Chemical Combine (SCC) at the city of Seversk. The MCC and SCC house a total of three plutonium production (ADE) reactors. The three annually generate 1.2 metric tons of weapons-grade plutonium – enough to produce more than 120 nuclear weapons each year. In addition, the design of these reactors precedes the Chernobyl RBMK design and is the least safe type of reactor in operation today.

The program focuses on replacing the ADE reactors with fossil fuel-powered central heat and power generation facilities – referred to by Russians as TETs facilities. This program will also support some reactor safety upgrades until the reactors can be safely shut down. The safety upgrades performed will be limited to those minimizing accident risk while replacement power is being completed. The Department of Energy has mandated that for every upgrade, the duration for design, procurement, installation, and acceptance testing must be less than 24 months. Each upgrade must demonstrably reduce the reactor core damage frequency and reduce the release of radiation in the event of an accident. All upgrades must be consistent with shutting down the reactors at the earliest possible date and will be carefully evaluated to assure they do not extend the life of the reactors. The project is scheduled for completion in 2007. (*James Wiborg, PNNL, 509-375-2692; Jimmie Mulkey, NNSA, 301-903-5481*)

#### Khmelnysky NPP full-scope control room simulator awarded

The Annual Ukraine National Academy of Sciences Award was given to the Khmelnysky Nuclear Power Plant (NPP) full-scope control room simulator. The award is given annually to the

best investment project in Ukraine. There were over 20 projects in the competition. The simulator was built by GSE Systems, Inc. (GES) with its Russian and Ukrainian partners through a contract administered by Brookhaven National Laboratory and funded by DOE. The criteria for the award are quality of the project, impact on safety and the environment, timeliness and scheduling of the project, and beneficial and effective use of the product. The Khmelnytsky NPP full-scope simulator was the first simulator project started and completed in the Soviet-designed Reactor Safety (SDRS) program. Its success contributed to the support received for all subsequent simulator projects managed by the program. (*John Yoder, DOE, 301-903-5650; Peter Kohut, BNL, 631-344-4982*)

## **Czech Republic**

### **Tour of Temelin NPP**

Prior to the 14<sup>th</sup> International European Nuclear Society conference in February 2002, attendees were given a tour of the Temelin NPP in Czech Republic about 160 km Southwest of Prague. A specialist from PNNL, present for the conference, joined the tour of the plant and found it a very modern facility with requisite safety systems and training in place. The group saw the full-scope simulator and the plant's new visitor's center, as well as the turbine hall and the reactor control room. (*Gary Petersen, PNNL, 505-372-6504; Rich Reister, DOE, 301-903-0234*)

## **Cross-Cutting**

### **International European Nuclear Society conference**

A representative from PNNL traveled to Prague, Czech Republic to attend the 14<sup>th</sup> International European Nuclear Society conference on "Nuclear Public Information in Practice". There were a total of 40 presenters during the three-day conference. Subjects ranged from life extension, to building new plants, to obtaining national and international political support for continued operation of nuclear plants. There were also several discussions about terrorist threats to nuclear plants, and how plants are dealing with this in the public light. To great interest, the PNNL specialist gave a presentation on the Soviet-Designed Reactor Safety program and the book "Nuclear Legacy." The general tone of the conference was optimistic about the viability and global support of nuclear power. (*Gary Petersen, PNNL, 505-372-6504; Rich Reister, DOE, 301-903-0234*)

## **Russia**

### **Novovoronezh NPP In-Depth Safety Assessment (ISA) project progresses**

The project coordinator from Argonne National Laboratory (ANL) met with staff members of the Scientific and Engineering Center for Nuclear and Radiation Safety and representatives from Atomenergoprojekt (AEP) to discuss the progress of the peer review of the Novovoronezh NPP Unit 3 probabilistic risk assessment (PRA). Problems concerning the availability of documentation from AEP and the NPP were addressed and resolved. The task order to carry out a limited scope of external events in the extension of the PRA was discussed. The work scope was agreed upon and a detailed discussion of labor efforts for each technical subtask was discussed as well as requirements for translation and travel. Atomenergoprojekt agreed that the work would be completed by December 2002. (*Philip Pizzica, ANL, 630-252-4847; Walt Pasedag, NNSA, 301-903-3628*)

## **Volgodonsk NPP full-scope simulator project work breakdown structure developed**

A DOE representative and two PNNL specialists met with Volgodonsk NPP staff to agree upon a detailed work breakdown structure for the Volgodonsk full-scope simulator project. Contracts for the control panels, input and output system, computers, instrumentation and controls, and wiring are in place. The facility for the simulator will be completed by the end of this year and the entire project is scheduled for completion in December 2003. (*Joe Cleary, PNNL, 509-372-4094; John Yoder, DOE, 301-903-5650*)

## **Kalinin NPP full-scope simulator essentially complete**

The Kalinin NPP full-scope simulator, currently assembled for the development stage at the Russian Research Institute for Nuclear Power Plant Operations (VNIIAES), is essentially complete. It includes an advanced core and thermal hydraulic model that VNIIAES developed. The simulator will be disassembled in April 2002 and shipped to the site at Kalinin NPP to be reassembled and site tested. The simulator is scheduled to be ready for training by August 2002. (*Joe Cleary, PNNL, 509-372-4094 and John Yoder, DOE, 301-903-5650*)

## **Progress made on Leningrad NPP ISA and EOI projects**

A technical specialist from PNNL traveled to Russia and Europe for a series of meetings on the Leningrad NPP ISA and EOI projects. The meetings took place in January and February and covered numerous topics.

The Leningrad ISA meeting participants assessed project production, funding, and planned future activities. At a session in late January, the PNNL specialist participated in planning the disposition of the remaining Unit 2 ISA DSA deliverable issues and in clarifying the scope of analysis for the Unit 1 ISA project deliverables. Also discussed was the disposition of a loss of coolant accident frequency sensitivity analysis related to primary circuit integrity (PCI). Leningrad NPP management realizes the importance of resolving international concerns regarding PCI at the earliest opportunity following review of the sensitivity analysis.

Efforts toward completion of the Leningrad EOI project also were discussed at four separate meetings including participants from Leningrad NPP, PNNL, the Kurchatov Institute (KI), a Lithuanian technical service provider, and the Finnish Center for Radiation and Nuclear Safety (STUK). Meeting objectives included clarifying statements of work for initial EOI activities and PNNL providing KI with a list of EOI production tasks. As a result of meeting discussions, the Leningrad EOI project manager requested assistance of the Lithuanian experts during all phases of the EOI project. (*Sam McKay, PNNL, 509-372-4059; Dennis Meyers, NNSA, 301-903-1418; Walt Pasedag, NNSA, 301-903-3628*)

## **First meeting of the Leningrad Unit 3 & 4 Safety Parameter Display System (SPDS) project team takes place**

A representative from PNNL traveled to Leningrad NPP in early February for the first meeting of the Leningrad Unit 3 & 4 Safety Parameter Display System (SPDS) project team. Project managers from Leningrad NPP have identified a satisfactory area for the assembly of the SPDS. Supplies necessary for the installation were reviewed and Customs paperwork was filed with Rosenergoatom (REA). Factory acceptance tests should be completed in December 2002. Leningrad NPP will begin installation of the Unit 4 SPDS in the fall of 2002. The next outage for

Unit 3 will begin in December 2003 and that SPDS project will be completed in spring of 2004. (Richard Denning, Battelle, 614-424-7412; Rich Reister, DOE, 301-903-0234)

## **Ukraine**

### **Design Document System Management and the Ukraine Reliability Database projects coordinated**

A PNNL specialist attended two project management coordination meetings; the Design Document System Management (DDSM) project, and the Ukraine Reliability Database (URDB) project. Representatives from Energoatom and each of the nuclear power plants (NPPs), along with the lead contractor for each project attended both meetings. Progress on current activities and plans for new activities were reviewed and discussed. Both projects are currently on schedule with no significant issues. (Tye Blackburn, PNNL, 509-372-4092; Walt Pasedag, NNSA, 301-903-3628; Dennis Meyers, NNSA, 301-903-1418)

### **Zaporizhzhya Unit 3 full-scope simulator project begins**

Two PNNL specialists and a DOE representative signed a Memorandum of Understanding for the Zaporizhzhya Unit 3 full-scope simulator project, the 8<sup>th</sup> simulator project in Ukraine. The simulator facility is already completed. Notably, GSE plans to use almost exclusively, hardware and software engineers from the Engineering and Technical Center for the Training of Nuclear Industry Personnel (ETC). This demonstrates that the technology transfer we have invested in has worked and the ETC staff can be relied on by GSE to compete major work products on their own. The ETC also indicated that they are beginning to receive contracts from plants to update and modify simulators we have provided, based on plant changes that have been occurring. (Joe Cleary, PNNL, 509-372-4094 and John Yoder, DOE, 301-903-5650)

### **Zaporizhzhya Unit 1 simulator status evaluated**

The status of the Zaporizhzhya Unit 1 full-scope simulator was evaluated by staff from PNNL. Two PNNL specialists met with staff at Zaporizhzhya NPP in Energodar, Ukraine in mid March 2002. The PNNL representatives found the training facility for both Zaporizhzhya Units 1 and 3 full-scope simulators to be very impressive. A training specialist from DOE traveled to VNIIAES in Moscow to discuss the status of this project and worked with their project manager to keep the project on schedule. (Joe Cleary, PNNL, 509-372-4094 and John Yoder, DOE, 301-903-5650)

### **Rivne Unit 2 simulator progressing on schedule**

PNNL staff traveled to the Rivne NPP site in Kuznetsovsk, Ukraine to check on the status of the Unit 2 full-scope simulator project. The PNNL staff reported that the project appears to be on or ahead of schedule and that there should be no facility issues. (Joe Cleary, PNNL, 509-372-4094 and John Yoder, DOE, 301-903-5650)

### **Ukraine ISA projects reviewed**

The ANL project coordinator for the South Ukraine NPP and the Zaporizhzhya NPP In-Depth Safety Assessment (ISA) projects, participated in a working meeting at the South Ukraine NPP site in March 2002. The working meeting focused on a resolution of comments from the peer review of the South Ukraine Level 1 probabilistic risk assessment (PRA). Using a systematic approach

that was developed and agreed upon prior to the meeting, all major issues raised by the peer review were addressed. The meeting was quite successful in achieving its goals.

The ANL specialist, along with staff from Sciencetech, visited the Kyiv Energoprojekt Institute (KIEP). Some of the current ISA tasks being performed by KIEP were reviewed, including the first phase of the fire PRA for Zaporizhzhya Unit 5 and the task on flooding data collection and analysis from all VVER units in Ukraine. In general, progress on these tasks has been satisfactory. Following the review of project status the completion date was set for May 2002. (*Christian Kot, ANL, 630-252-6151; Walt Pasedag, NNSA, 301-903-3628*)

### **Fifth working meeting on the Ukraine Nuclear Fuel Qualification Project takes place**

Three representatives from PNNL and a specialist from Oak Ridge National Laboratory (ORNL) attended the 5<sup>th</sup> working meeting of the Ukraine Nuclear Fuel Qualification Project (UNFQP) held at the Center for Reactor Core Design (CRCD) in Kharkov, Ukraine. Representatives from all participating organizations were in attendance except the State Nuclear Regulatory Committee of Ukraine. Discussions took place about action items from the 4<sup>th</sup> working meeting. New items discussed include:

- Contracts between NAEK and PNNL for dummy, Lead Test Assemblies (LTAs) and Reload Batch Shipments
- Westinghouse Computer Code Methodology and Verification Document
- Technical Specification for Westinghouse Nuclear Fuel Assemblies
- Concept Technical Decision Document
- Core Monitoring System
- Vendor Quality Assurance Audit Plans
- Status of Enriched Uranium Supply for the Reload Batch
- Oak Ridge National Laboratory Computer Codes
- Procedures for Certification of CRCD Specialists
- UNFQP Activities and Work Implementation Schedule Update
- Proposed future UNFQP meetings
- Procedure for use of International Chornobyl Center Translation Services

The UNFQP 6<sup>th</sup> Working Meeting has been planned for July 2002. (*Richard Robinson, PNNL, 509-372-4097; Jim Cannon, NNSA, 301-903-5016*)

## **Armenia**

### **Semiannual Review of Projects was held at Armenia NPP**

A semiannual review of Armenia NPP projects was held at the plant from March 12 to 14. Participants included representatives from PNNL, Sandia National Laboratory (SNL), Burns and Row Enterprises, Inc. (BREI), Armenia NPP, NNSA, the Nuclear Regulator Commission (NRC), Western Services, and Data Systems & Solutions (DS&S). The PNNL representative reported that the performance of the plant over the past year has been very good. There are no major project issues.

The following are some of the activities that took place during the project review:

- Specifications developed for the plant computer information system were reviewed and many of the required details were obtained from the plant. Commitments were made by the plant to provide additional information by the end of March 2002.
- A number of meetings were held by the representative from SNL, in close cooperation with NRC, to develop a better understanding of the radioactive source control issues in Armenia. A project-planning meeting was planned for June 2002, to be held in Armenia.
- On March 14, 2002 the U.S. Ambassador, his staff, and representatives from the Peace Corps were provided a tour of the nuclear power plant.
- The TACIS Year 2003 program for Armenia was recently approved. Plans for these funds were reviewed with the on-site TACIS representative. Following the completion of these projects, it has been decided that TACIS will only fund projects that are related to plant decommissioning.
- In a closeout session with the Armenian regulator organization, a representative indicated interest in obtaining support related to the implementation of IAEA guidelines for the definition of design basis threats and the performance of vulnerability studies. (*Richard Denning, Battelle, 614-424-7412; Dennis Meyers, NNSA, 301-903-1418*)

### **New partner Web site established to compliment existing INSC network**

An ANL technical specialist met with representatives of the nuclear research institute ARMATOM regarding the establishment of a new partner Web site to be located in Armenia to compliment the existing network of International Nuclear Safety Center (INSC) Web sites.

In early February, ARMATOM received all of the equipment ordered to establish the infrastructure necessary for such a center. The ANL representative provided training and technical assistance to establish a secure and efficient computer network for the center.

Together with an Armenian and Ukrainian specialist, the ANL technician tested, connected, and configured the network equipment. Personnel from ARMATOM were trained in network administration and other technologies related to the creation of the Armenian INSC. (*Herbert Ley, ANL, 630-252-8224; Walt Pasedag, NNSA, 301-903-3628*)

### **Multi-national project progresses on DBA, BDBA, PRA and an SAR for Armenia NPP**

On January 21, a specialist from Argonne National Laboratory (ANL) traveled to Vienna, Austria to attend an International Atomic Energy Association (IAEA) meeting to discuss progress on the collection of data for the thermal-hydraulic safety analysis for Armenia NPP. The IAEA is supporting a project to develop a MELCOR model of the Armenia NPP for confinement analysis. The NNSA project is supporting the development of a RELAP5 model for design basis accident (DBA) and beyond-design basis accident (BDBA) analysis. The goal of this meeting was to summarize all data for both modeling efforts, which were still missing or incomplete, and to find a source for the data. Such a list was completed, sources identified, and dates for the action to obtain the data were agreed upon.

The specialist from ANL also traveled to Armenia NPP in late February. The purpose of the trip was to attend the Armenia Safety Analysis Capability project meeting. Database coordination was again discussed for the development of the NNSA RELAP5 model and a RELAP5 model that the Italian company, SOGIN, is developing concerning the probabilistic risk assessment (PRA) for Armenia NPP. SOGIN will be carrying-out this assessment with funding from TACIS (the European Union Technical Assistance to the Commonwealth of Independent States). This NNSA

project will be producing systems design documents (SDDs). The coordination of NNSA with SOGIN will avoid duplication of efforts and ensure that the resulting databases contain consistent data. During this meeting, specialists also discussed the development of the safety analysis report (SAR) with the help of a production plan provided by NNSA. Armenia NPP staff will take the next steps in this area with consultation available from NNSA specialists. (*Philip Pizzica, ANL, 630-252-4847; Walt Pasedag, NNSA, 301-903-3628*)

### **PNNL contracts reviewed and policies and practices workshop conducted in Armenia**

In the second week of February a technical specialist and a contracts specialist from PNNL conducted a workshop in Yerevan, Armenia on “PNNL Contracts Policies and Practices” as a portion of the Armenian NPP Safety Related Reactor Security project. The workshop was attended by a total of 30 people consisting of representatives from Armenia NPP, and several Armenian design, construction, and vendor organizations. One day was dedicated to the “Contracting Process Workshop” which clearly demonstrated the contracting process, procedures, requirements, and expectations when conducting business with PNNL.

Following the workshop, two specific pending contracts in support of the immediate and long-term security upgrades were discussed. The technical specialist from PNNL finalized the contract details in support of the Service Water System Perimeter Security Upgrades project. The contract was signed with Gydroenergashin – Joint Stock Company. (*Andrei Glukhov, PNNL, 509-375-3961; Greg Trosman, NNSA, 301-903-3581*)

### **Integrated Security Design Development Task subcontractor chosen**

In Yerevan, Armenia, a technical specialist from PNNL met with representatives of the Elbrus design organization and its subcontractor ISTA-Systems to conduct negotiations and finalize the contract details in support of the Integrated Security Design Development (ISDD) task. Although progress was made, further qualifications were identified as being required before the contract could be signed.

The PNNL technical specialist then traveled to St. Petersburg, Russia to meet with the Russian organization JSC “ISTA-Systems”. This organization is considered to be a lead subcontractor for the Armenian NPP ISDD task. The key issues were to evaluate subcontractor capability to perform integrated design tasks and finalize the scope and preliminary schedule of work. Based on the opinion of the Russian Regulatory Authority (GAN) and other acquired information, ISTA can be recommended as a subcontractor for Elbrus design organization for the ISDD task at Armenia NPP. (*Andre Glukov, PNNL, 509-375-3961; Greg Trosman, NNSA, 301-903-3581*)

### **Progress made on Armenia NPP Decommissioning Project**

A representative from PNNL traveled to Yerevan, Armenia in support of the Armenia NPP Decommissioning Project. The major objectives of the trip were to discuss the scope, identify points-of-contact, agree on a basic technical approach, and to coordinate planned and future tasks. The meetings with Armenia NPP, the Ministry of Energy, and the Armenia Nuclear Regulator Authority (ANRA) were held over a three-day period in March 2002. During the meeting it was agreed that three tasks be prioritized with the available funding. The three tasks are the following, 1) development of a waste tracking and inventory control system for radwastes generated during operations and decommissioning, 2) providing technical support to development of Armenia National requirements for deconstruction and decommissioning, and 3) the performance of a

treatability study of Armenia NPP evaporator bottom radioactive wastes. (*Steven Short, PNNL, 509-375-2868; Dennis Meyers, NNSA, 301-903-1418*)

## **Bulgaria**

### **Peer review of Kozloduy NPP emergency operating procedures (EOP)**

A peer review of the Kozloduy NPP emergency operating procedures (EOP) was facilitated by a PNNL technical representative in early February 2002 in Pamporovo, Bulgaria. Three representatives from two U.S. nuclear power plants were also present for the two-week EOP review. Other participants included representatives from Kozloduy NPP, Atomo Consultant Ltd., the Bulgarian Academy of Science (INRNE), and the Bulgarian Nuclear Regulatory Authority (CUAEPP). The main purpose of the meeting was to review and evaluate against industry standards the full scope of the EOP development and implementation process at the request of the Bulgarian Regulator.

Specific topics reviewed and discussed include:

- Writer's Guides and User's Guides reviewed for both VVER-1000 and VVER-440 reactor types.
- Verification and validation procedures and results were discussed.
- Six EOPs were reviewed for each reactor type.
- Validation scenarios were discussed to insure correctness and flow of procedures.
- Methods and results for thermal-hydraulic analysis and validation were explained and evaluated.
- The modernization programs for EP-1 and EP-2 were described and their impacts on the EOP process discussed.
- The regulatory representative presented the regulatory approach for review, approval, and implementation.

Additional topics related to EOP training and validation, funding, and other commitments to IAEA and EU were discussed during the review period. Partial implementation of the EOPs will be completed by June 30, 2002. Complete implementation for EP-1 and EP-2 will take place later in 2002. (*Kent Faris, PNNL, 372-4068; Dennis Meyers, NNSA, 301-903-1418*)

### **Transfer of Electrical Maintenance Training Pilot Program Completed**

The third of three working sessions to transfer the Electrical Maintenance Training Pilot Program to Kozloduy NPP took place January 7 through 18, 2002. A training specialist from Sonalysts, Inc. assisted training and technical specialists from Kozloduy NPP in the development and implementation of the pilot program. The first week of the two-week working session, activities continued on the modification and expansion of the existing materials for the Electrical Maintenance pilot program for specific program implementation at Kozloduy NPP. The second week of the session featured the implementation of the pilot program, by Kozloduy training and technical specialists to a group of job incumbents and trainees for the position. Following delivery of the pilot program, the presenters collected feedback on the program to aid in further program improvement. (*Don Draper, PNNL, 509-372-4079; John Yoder, DOE, 301-903-5650*)