



Activity Report ***July-September 2001***

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

***Steering and
technical committees
mark completion of
Leningrad Unit 2 ISA
project***

Highlight

Mr. Walter Pasedag, U.S. National Nuclear Security Administration, and Mr. Sam McKay, an International Nuclear Safety Program (INSP) representative from Pacific Northwest National Laboratory (PNNL), participated in the Leningrad Nuclear Power Plant Unit 2 In-depth Safety Assessment (ISA) Project Science and Technology Conference and the Technical Committee meeting in late June and early July.

The Science and Technology Conference, sponsored by the Leningrad plant, was held in St. Petersburg, Russia, on June 28. Participants included representatives from the City of Sosnovy Bor, the Russian Federation-Ministry of Atomic Energy (Minatom), Northwest Region Utility (Russia), DUMA (the Russian Parliament), the International Atomic Energy Agency (IAEA), the European Bank for Reconstruction and Development, and various government and technical representatives from Russia, Sweden, Finland, Great Britain, Germany, and the United States. The primary objective of the conference was to mark the completion of the Leningrad Unit 2 ISA Project. Representatives of the Leningrad plant described the five-year project and summarized the principal results of the ISA, which indicate that substantial improvements in safety were achieved as a result of Western and Russian-sponsored plant improvements. Attending project and government representatives provided comments concerning individual policies and perspectives regarding the ISA process and experience. The conference was open to the local media and included a press conference.

The final Leningrad Unit 2 ISA Project Technical Committee meeting was held in St. Petersburg and Helsinki, Finland, June 27 through July 2, 2001. Participants included government and technical representatives from Russia, Sweden, Finland, Great Britain, and the United States. The primary objectives of the meeting were to assess the completion status of ISA documentation and to discuss critical safety concerns presented within the ISA summary report. The Committee concluded that the ISA report would be presented as complete; however, it will require near-term corrective action to address any deficiencies identified by the Western reviewers.





The Leningrad ISA Project Science and Technology Conference, sponsored by the Leningrad Nuclear Power Plant, marked the completion of the five-year Unit 2 ISA Project. From left: Mr. V. I. Nekrassov, Mayor of Sosnovy Bor; Mr. L. D. Ryabev, First Deputy Minister for Atomic Energy-MINATOM; Mr. V. I. Lebedev, Director of the Leningrad Nuclear Power Plant; Dr. L. G. Larsson, Leningrad ISA Steering Committee Chairman and Director of the Swedish International Program; and Mr. V. S. Opekunov, State DUMA representative.

The initial Steering Committee meeting for the Leningrad Unit 1 ISA Project was held in St. Petersburg on June 29. Participants included government and technical representatives from Russia, Sweden, Finland, Great Britain, and the United States. The key meeting objective was to provide direction concerning the cost, labor requirements, and timing of the Unit 1 project. The Steering Committee directed the Technical Committee to meet at the earliest opportunity and to develop a list of potential Western support organizations and subtask labor for each Unit 1 production area. In response to this direction, the Technical Committee met July 1 and 2 in Helsinki. Participants included technical representatives from Russia, Sweden, Finland, and the United States. A common approach for assessing the labor and cost of each production area was developed based on input from the PNNL representative. A listing of potential production area sponsors was developed and will be discussed at the next Steering Committee meeting. *(Walt Pasedag, NNSA, 301-903-3628; Sam McKay, PNNL, 509-372-4059)*

Normative documentation for Russian simulator training approved

Russia

In late June, Rosenergoatom (REA) approved two normative documents under Order of Concern No. 305. These documents establish the requirements for development, commissioning, and use of nuclear power plant simulators and other devices used for technical training of staff at nuclear plants.

The two documents include RD 0278-01, Requirements of the Technical Means of Training of NPP Operation Personnel, and RD 0279-01, Provisions for Commissioning and Issuing a Permit for the use of the Technical Means of Training for Nuclear Power Plant Personnel Training. Document RD 0278-01 provides a description of the minimum capability requirements that simulators and other devices must have to be acceptable for training. It can be compared to the ANS-3.5 standards used in the United States. Document RD 0279-01 set the requirements and procedure for commissioning and obtaining permission to use the technical training devices in the training organization.

Three workshops were held in Moscow (September 2000, December 2000, and March 2001) to develop these documents. The workshop participants included simulator and training specialists from VNIIAES, the Novovoronezh Training Center, PNNL, and the Balakovo, Kursk, and Novovoronezh nuclear plants. The participants used existing Russian, Ukrainian, and U.S. documents, practices, and technological capabilities to develop a comprehensive set of documents to clarify and standardize the requirements of the simulators and other training devices. All Russian nuclear plants and REA received copies of the draft documents prior to the final workshop, and these comments were incorporated into the final version that was submitted and approved by REA. (*John Yoder, DOE, 301-903-5650; Ken Erickson, PNNL, 509-372-4063*)

VVER and RBMK code validation project reviewed

In early July, a technical specialist from Argonne National Laboratory (ANL) traveled to Moscow to discuss the status of the code validation project for application to VVER and RBMK reactors. The specialist from ANL met with representatives of the Russian International Nuclear Safety Center (RINSC) and the Electrogorsk Research and Engineering Center (EREC) who are participating in the code validation projects. The status of the current activities (i.e., definition and analysis of standard problems) was discussed, and the schedule for deliverables was updated. The discussions concentrated on the proposed statement of work for initiating a testing program at the PSB-VVER (an electrically heated large-scale integral thermo-physical model of a VVER-1000 reactor) facility at EREC. The proposed scope of



work and activities were discussed in detail. The deliverables will be used in the discussions with the Organization for Economic Cooperation and Development (OECD) Nuclear Energy Agency (NEA) with the aim of establishing a joint project for a set of PSB-VVER tests to support the code validation efforts. Under the statement of work, RINSC and EREC agree to develop 1) a list of priority tests and their justification, 2) a test and data quality control guideline, and 3) a detailed status of the facility instrumentation. This information will be prepared in time for discussion at the NEA-led meeting of experts scheduled for mid-October. Under the same statement of work, RINSC and EREC agreed to perform an initial test with PSB-VVER, with the goal of showing that the facility can produce quality data and useful results. It is desirable that the test be conducted before the December 2001 meeting of the Committee for the Safety of Nuclear Installations (CSNI), which will decide on the establishment of the NEA project. *(Walt Pasedag, NNSA, 301-903-3628; Mark Petri, ANL, 630-252-3719)*

Circuit breaker manufacturing license in Russia considered

In mid-July, specialists from Pacific Breakers, Western Services, REA, the U.S. Department of Energy (DOE), Battelle, and PNNL visited the facilities of two Russian firms, Tenzor in Dubna and Plant Progress in Protvino, to discuss the possibility of establishing a license for the manufacture of circuit breakers with a Russian firm. The type of circuit breaker design to be manufactured has not been decided yet. A design requirements document will be developed with Russian contractors, and Western Services will perform a market survey. *(Grigory Trosman, NNSA, 301-903-3581; Richard Denning, Battelle, 614-424-7412)*

Status of Volgodonsk and Kalinin full-scope simulator projects reviewed

In August, specialists from PNNL met in Moscow with representatives of VNIIAES, REA, the Volgodonsk Nuclear Power Plant (formerly known as the Rostov plant), and General Energy Technologies (GET) to discuss the status of the Volgodonsk full-scope simulator project. The Volgodonsk plant has not yet entered into a contract with GET for the software portion of the project although the contract should be in place before the next DOE/Minatom Coordinating Committee Meeting in October.

Management of the Kalinin Nuclear Power Plant reviewed the status of the Kalinin Unit 2 full-scope simulator project with PNNL technical specialists. This project was scheduled to be complete in May 2002, but now the anticipated completion date is December 2001. The simulator room at Kalinin is complete and ready to accept the simulator; however, the simulator will not be moved to the plant until next May or June when the weather improves. *(John Yoder, DOE, 301-903-5650; Joe Cleary, PNNL, 509-372-4094)*





Leningrad Units 1 and 2 ISA project status reviewed

The In-Depth Safety Assessment (ISA) Technical Committees for Leningrad Units 1 and 2 met in Stockholm at the end of September to review project status. Participants included representatives from Russia, Sweden, the United Kingdom, Finland, Russia, and the United States. Key meeting objectives and conclusions are discussed below.

At the request of the Project Steering Committee, Western production representatives reviewed the Leningrad Unit 2 ISA Summary Report. The review addressed the report's completeness and the verifiability of the information and adequacy of the reference materials. The reviewers found the report to be comprehensive, but lacking depth and verifiability in a number of areas. In addition, the reviewers found a number of critical safety issues that need to be addressed in the near future. Recommendations for addressing the critical issues were developed. The review report and proposal to address the safety issues will be presented for consideration and approval at the upcoming Steering Committee meeting, which will be held in October in Washington, D.C.

The Leningrad Unit 1 Technical Committee reviewed a scope of work, labor estimate, and sequence of activities for the Unit 1 ISA project. The scope of work was based, in part, on the experience of the Unit 2 project. Issues concerning the scope, timing, and labor were discussed and documented. The Technical Committee agreed to meet October 16, prior to the next Steering Committee to address these issues and finalize the Unit 1 production plan.

Western Technical Committee members met with the Steering Committee chairman at the Swedish International Project office to discuss the Unit 2 ISA issues and agenda for the October Steering Committee meeting. The Steering Committee chair will coordinate development of a response to the critical safety issues prior to the next meeting. (*Walt Pasedag, NNSA, 301-903-3628; Sam McKay, PNNL, 509-372-4059*)

Ukraine

In early July, technical specialists from ANL traveled to Kyiv to discuss the status of Ukrainian code assessment projects with representatives of Kyiv University, the Bulgarian Institute of Nuclear Research and Nuclear Energy (INRNE), and Pennsylvania State University (Penn State). The status of two thermal-hydraulics standard problem analyses based on a test at the Kozloduy Nuclear Power Plant and a transient at the Rivne

Status of code assessment projects reviewed



***Physical security
projects at
Khmelnyskyy and
Zaporizhzhya
reviewed***

Nuclear Power Plant was discussed. Specialists at Kyiv University and INRNE have made significant progress in the analysis of these two standard problems, and an updated schedule was developed for the completion of the analysis and comparison of the results. The benchmark problem on neutron kinetics-thermal-hydraulics was also discussed at length. The representatives from Penn State and INRNE described the benchmark specification in detail and were able to answer numerous technical questions from the Kyiv University representatives. Specialists from Penn State currently are developing a set of neutron cross sections that Kyiv University will be able to use. The participants agreed on updates to the benchmark specifications, as well as on a schedule for the transfer of the cross section data and the analysis of the benchmark. *(Walt Pasedag, NNSA, 301-903-3628; Mark Petri, ANL, 630-252-3719)*

During the week of July 9, security specialists from Ukraine and Armenia participated in a workshop to demonstrate the accomplishments of the physical security project at Khmelnytskyy Nuclear Plant Unit 1 in 2000, and to share experience in different areas, such as design development arrangements, scope, schedule, and contracts. Several meetings also were held at Kyiv Institute of Nuclear Research, where a similar project was accomplished in 1998 under U.S. Department of Energy leadership, the Kyiv Energoprojekt design institute, and the Transexpo Corporation, which was the general contractor for the Khmelnytskyy plant. During the meetings at Khmelnytskyy, it was agreed to continue further security upgrades by installing detection and alarm systems in the diesel-generator buildings of Unit 1 and in the reactor building limited access area. The Ukrainian project participants will prepare a detailed justification and equipment list for these items.

A site visit to the Zaporizhzhya Nuclear Power Plant was conducted to identify the prioritized areas for future physical security upgrades at that facility. Zaporizhzhya Unit 1 was selected for immediate implementation of upgrades, and the following priority actions were chosen for implementation:

- An automated access control system to limited access and vital areas will be installed. The badging system provided earlier will be modified and upgraded to allow all site personnel access with proximity cards.
- A Central Alarm Station (CAS) will be installed. Unit 1 subsystems will be connected to the CAS. Upon further development of the project, units 2 through 6 will be integrated in the CAS.
- Physical barriers (doors, locks, turnstiles, etc.) in the internal vital and limited access barriers will be upgraded.



The meeting participants agreed that the security system design will represent the host country contribution to the project, and U.S. experts will verify it before implementation. The protocol between U.S. and Ukrainian organizations also was signed.

The PNNL representative revisited Zaporizhzhya in August to survey and photograph the areas that had been identified for upgrades. During this trip, he also met with representatives from the Khmelnytsky Nuclear Power Plant and Energoatom to discuss and agree on the scope of additional upgrades that will be implemented at Khmelnytsky. The meeting participants agreed that access controls and detection and surveillance capabilities for the reactor and diesel-generator buildings were high-priority focus areas. Handheld metal detectors and portable radios for site security forces also were identified as high-level equipment priorities. *(Grigory Trosman, DOE, 301-903-3581; Andrei Glukhov, PNNL, 509-375-3961)*

Training technology transfer continues at Zaporizhzhya and South Ukraine

In July, separate working sessions were held at the Zaporizhzhya (one week) and South Ukraine (two weeks) nuclear plants to continue the transfer of the Control Room Turbine Operator (CRTO) training program to the plants. During the sessions, training and technical specialists from the Engineering Technical Center for the Training of Nuclear Industry Personnel (ETC), the Khmelnytsky Nuclear Power Plant, and Sonalysts Inc. assisted training specialists from the Zaporizhzhya and South Ukraine plants in understanding existing CRTO pilot program materials and in identifying material for modification using the Systematic Approach to Training methodology for application at the sites. *(John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)*

Status of full-scope simulator activities at Zaporizhzhya and Rivne reviewed

In early July, representatives of the Russian Research Institute for Nuclear Power Plant Operations-Lakrom (VNIIAES-Lakrom) and PNNL met in Moscow to discuss the status of the Zaporizhzhya Nuclear Power Plant Unit 1 full-scope simulator project. The main topics of discussion were

- the overall project schedule
- the manufacturing status of the simulator panels
- wiring and assembly activity
- hardware/software integration.

The key issue affecting the project schedule was the completion of the simulator panels, including the wiring and assembly. At the time of the meeting, all the panels had been fabricated by Kharkiv Electromechanical Works Enterprise, about 60% of the





panels had been delivered to the simulator facility, and the shipping process was continuing. Control room panels had been manufactured and were currently awaiting assembly and painting. Instructor station and monitor supports were still being manufactured. Progress on other activities also was reported:

- Annunciator driver procurement was in progress.
- Integration of software models of technological systems was complete, including the instructor station and the plant-processing computer.
- The Ukrainian company KARE was subcontracted to deliver housing supplies from the South Ukraine Nuclear Power Plant to the Zaporizhzhya facility.
- The uninterruptible power source had been installed and was ready for power connection.
- VNIAES-Lakrom also recommended including panel mimic development for the Zaporizhzhya facility fire safety system.

In August, the PNNL representative visited the Zaporizhzhya and Rivne plants to review ongoing full-scope simulator activities. The panels for the Zaporizhzhya Unit 1 simulator had been delivered to the site at the end of July, and wiring and assembly activities were in progress with completion expected by December.

For the Rivne Unit 2 simulator, the PNNL representative met with the Rivne training manager and representatives from ETC and GSE Systems to review the status of the Rivne project. Hardware/software integration activities were under way; however, due to very hot weather, the existing air conditioning system was not sufficient, and several failures of the main computer occurred because of elevated temperatures. Two additional portable air conditioner units will be purchased and installed to correct this deficiency. The simulator building security system is being modified, and an upgraded badging system will be installed in mid-October. The simulator commissioning is scheduled to occur in October 2002. (*John Yoder, DOE, 301-903-5650; Andrei Glukhov, PNNL, 509-375-3961*)

Ukrainian QA, OSI, EARLL, and DDSM activities reviewed

In July, August, and September, a specialist from PNNL traveled to Ukraine for discussions regarding several INSP activities.

In July, the PNNL specialist visited Energodar, Kyiv, and the Crimea Center for Science and Engineering (Crimea Center) for discussions about ongoing safety projects. At Energodar, he met with representatives from Zaporizhzhya Nuclear Power Plant, and in Kyiv, he met with participants of the Ukraine Quality Assurance (QA), Operational Safety Infrastructure (OSI), Event Analysis Reporting and Lessons Learned (EARLL), and Design





Document System Management (DDSM) projects. At the Crimea Center, the PNNL specialist observed root cause analysis training of South Ukraine nuclear plant staff.

In August, the PNNL specialist traveled to Scholkino to attend the annual meeting of the Ukraine EARLL working group and to Kyiv again to meet with participants of the QA, OSI, EARLL, and DDSM projects. During the August trip, the PNNL specialist also traveled to Rez in the Czech Republic for an International Atomic Energy Agency (IAEA) regional project related to VVER-1000 reactor design bases.

In September, the PNNL specialist and a representative of the U.S. firm Brian Grimes Inc. traveled to Ukraine to participate in meetings with members of a U.S. advisory committee and the Ukraine integrating contractor for the DDSM project. The U.S. representatives and members of the advisory committee traveled to Zaporizhzhya Nuclear Power Plant to participate in a meeting of the DDSM management committee. The advisory group offered recommendations for improving planned activities for development of a configuration management system and design basis documents. The management committee decided to designate the Zaporizhzhya plant as the pilot plant for DDSM activities in 2002.

While in Energodar, the U.S. representatives and the advisory group held a workshop for ISA subcontractors and their nuclear power plant counterparts. During the workshop, the importance of design document quality was discussed, and the representative of Brian Grimes Inc. presented a regulatory perspective on engineering document quality. The PNNL representative summarized QA principles and presented new guidelines for review of ISA subcontractor deliverables.

The PNNL representative traveled to Kyiv to meet with Nuclear Power Plant Operational Support Institute staff and representatives of Energoatom to discuss ongoing and planned activities under the EARLL, OSI, and QA projects. ***(Dennis Meyers, NNSA, 301-903-1418; Walt Pasedag, NNSA, 301-903-3628 [for DDSM projects]; Lief Erickson, PNNL, 509-372-4097)***

Implementation of EOIs at Ukrainian plants discussed

In early August, Ukrainian developers of emergency operating instructions (EOIs) met with two representatives of PNNL to discuss a variety of topics aimed at implementation of EOIs at Ukrainian nuclear power plants. Discussions were held on the format and content of technical basis documents, results of verbal translations of Rivne and Zaporizhzhya nuclear plant EOIs, language consistency within the EOI sets, the importance





of writer's guides, verification and validation, and updating the current EOI implementation schedule.

Attendees representing the Ukrainian Nuclear Electricity Generating Company; Rivne, Zaporizhzhya, and South Ukraine nuclear plants; Joint Stock Enterprise Ltd. (EIS); the International Chernobyl Center; ETC; State Scientific and Technical Center for Nuclear and Radiation Safety; and PNNL held productive discussions regarding the problems to be expected during EOI implementation. Among the hurdles to be overcome are scheduling of simulator time for validation, determination of the format and content of the technical basis documents, operator acceptance of symptom-based EOIs, and the expectation of the regulator for EOI approval.

The PNNL representatives committed to work with the regulator by presenting a workshop on symptom-based EOIs once individuals who will be reviewing the regulatory submittal (procedure generation package) are identified. This activity should occur in May/June 2002. Additionally, PNNL has offered support for assisting in the development of the technical basis documents, and for validation and verification. (*John Yoder, DOE, 301-903-5650; Larry Sherfey, PNNL, 509-372-4080*)

Zaporizhzhya Unit 5 safe shutdown analysis reviewed

In mid-August, members of the working group performing the Zaporizhzhya Nuclear Power Plant Unit 5 Safe Shutdown Analysis Project met with representatives from PNNL and Brookhaven National Laboratory to review peer review comments for a deterministic analysis of fire-induced safe shutdown vulnerabilities at the plant. The Ukrainian organization that is performing the analysis is Kyiv Institute Energoprojekt, and the working group includes representatives from Energoprojekt, Zaporizhzhya, Joint Stock Enterprise Ltd., Energoatom Engineering Service, and Scientech. The U.S. peer reviews of the analysis were very complimentary of Energoprojekt's work. The documentation of each room and the system drawings are very detailed and are the best information generated on the unit to date. Minor changes to enhance and clarify the details in the report were discussed with the Energoprojekt representatives. In summary, the analysis shows that vulnerabilities do not exist in most areas of the plant; however, there are a few rooms in which a fire could have a significant impact on the safe shutdown capability of the plant. Energoprojekt will be revising their report based on comments received at this meeting and will issue the report after they have received review comments from Zaporizhzhya plant staff.



In the next phase of this activity, fire and flooding probabilistic risk analyses (PRAs) will be performed. The documentation generated for the deterministic analysis will be used to perform the fire PRA and parts of the flooding PRA. The fire PRA will evaluate the identified vulnerabilities to determine the likelihood of the occurrence of a fire. The quality of the documentation collected for the deterministic analysis will allow the PRAs to be performed in a timely manner. A training session on performance of the fire PRA will be scheduled for later this fall.

The last task on the Zaporizhzhya Safe Shutdown Analysis Project will be to identify the vulnerabilities and to propose the most cost-effective methods to correct the deficiencies. This task was discussed with Energoprojekt and will be performed concurrently with the fire PRA. *(Grigory Trosman, NNSA, 301-903-3581; Andy Minister, PNNL, 509-376-4938)*

Dry spent fuel storage at Zaporizhzhya commences

In mid-August, representatives of the Ukrainian Ministry of Energy and its technical organization, Energoatom, along with representatives from Duke Engineering & Services, and PNNL observed the first loading of a dry spent fuel storage cask at the Zaporizhzhya Nuclear Power Plant. The first cask was loaded successfully on August 18, and several days later, it was installed in its permanent storage position. After the necessary measurements had been recorded, Zaporizhzhya received its regulatory permit to proceed with the loading of two more casks. The radiation levels measured during these operations were about 100 times lower than the design limits established in the Safety Analysis Report. Loading of all three casks was completed by September 6. *(Grigory Trosman, DOE, 301-903-3581; Andrei Glukhov, PNNL, 509-375-3961)*

SPDS training activities for Ukrainian plants planned

On September 4, two PNNL representatives met with Energoatom representatives and technical experts from each of the Ukrainian nuclear power plants to discuss the scope of Safety Parameter Display System (SPDS) training required for operators at the Ukrainian nuclear plants. As a result of this meeting, a clear scope for work was defined, a goal to have a contract in place by November was established, and a project completion date of June 2002 was agreed upon. PNNL staff will develop the necessary statements of work for these activities and will forward them to Ukrainian and U.S. contractors by the end of October. *(John Yoder, DOE, 301-903-5650; Joe Cleary, PNNL, 509-372-4094)*



Ukrainian operator training projects discussed

In early September, INSP representatives from DOE and PNNL met with the new Energoatom Simulator and Training Manager, Mr. Vladimir Ivanytsky, and representatives of the Ukrainian nuclear power plants to review the status of current projects in the training area and plans for future activities. The intent of the status reviews was to ensure that all involved parties had a clear understanding of the current status of these activities and the anticipated scope of new activities. Mr. Ivanytsky clearly stated his positions regarding proposed future activities, and the information he provided will be considered at the Coordinating Committee Meeting in October. A detailed protocol was developed that identifies Energoatom's priorities for simulator and training activities with existing funding, FY 2002 funding, and future funding. (*John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079; Al Ankrum, PNNL, 509-372-4095*)

Slavutych Laboratory activities reviewed

A PNNL representative traveled to Slavutych where he met with the on-site NNSA representative and management of the Slavutych Laboratory for International Research and Technology. The status of ongoing projects relating to nuclear database development, satellite communications system upgrade, financial audit/accounting system upgrade, quality program development, and technical training were reviewed and evaluated. The PNNL representative also attended the International Chernobyl Center (ICC) Council of Members meeting and portions of the Fifth Annual Conference hosted by the ICC. A major topic of discussion at the Council meeting was the proposed project to install a fiber optic cable between Slavutych and Chernigiv, Ukraine, which was endorsed by all council members. ICC management was asked to provide a complete project plan for the activity. (*Riaz Awan, NNSA, 380-44-490-4485; Don Draper, PNNL, 509-372-4079*)

INSC Ukraine web site expansion discussed

A representative of ANL traveled to Ukraine in September for several meetings regarding the International Nuclear Safety Center (INSC) Ukraine web site.

The ANL representative first met with representatives of Kyiv State University (KSU) to discuss expansion of the INSC Ukraine web site to include information on ongoing ISA projects for the Rivne and Zaporizhzhya nuclear power plants. The Ukrainian participants requested assistance with hardware capable of efficiently handling a large volume of information. The ANL representative agreed to address the equipment issue with INSP management.



Then, he attended the Fifth Annual Slavutysh Conference where he and his collaborators from KSU delivered a poster presentation on the INSC Ukraine web site. Several Ukrainian and foreign organizations, such as the ICC, Chornobyl Radiological Center, Nuclear Research Institute of the Ukrainian Academy of Sciences, Framatome, and the Institute of Physics and Power Engineering (IPPE) Obninsk, expressed great interest in the web site. The ICC Deputy Director welcomed the idea of linking ICC and INSC Ukraine web sites. It was agreed that issues surrounding such a linking would be discussed at a technical level within the September/October time frame.

Next, the ANL representative met with representatives of the South Ukraine Nuclear Power Plant to discuss the structure and content of the South Ukraine ISA web site and to determine the level of future participation by the South Ukraine plant in this activity. The South Ukraine ISA web site was developed this past summer jointly by KSU and ANL in consultation with staff at the South Ukraine nuclear plant. Management at the South Ukraine plant values this activity and is ready to assign personnel from the Safety Analysis Laboratory to work with KSU. It was agreed that, in the near future, technical representatives from South Ukraine and KSU would meet to reach final agreement on site accessibility control and organizational issues of mutual cooperation.

Finally, he visited a newly remodeled space at KSU that has been designated the INSC Ukraine office. The office is equipped with a security system and is connected to a local area network. INSC Ukraine computers and servers will be installed in this office. *(Walt Pasedag, NNSA, 301-903-3628; Igor Bodnar, ANL, 630-252-8336)*

Chornobyl heat plant startup reviewed

From September 10-21, a PNNL specialist participated in the Fifth Annual ICC Conference and reviewed the status of the Chornobyl Replacement Heat Plant Project with Chornobyl nuclear plant specialists and managers.

At the ICC Conference, the specialist made a presentation on the completion of the replacement heat plant, its startup, and its turnover to the Chornobyl nuclear plant for operation. During the conference, he also met with the NNSA on-site representative, the Chornobyl Chief Engineer, and the Chornobyl Heat Plant Startup Manager to discuss startup and the need for critical spare parts. Delays in receiving the gas permit, caused by delays in acceptance of the gas distribution station near the town of Chornobyl and resolution of inspector-identified discrepancies, has slowed progress of startup.



Research collaborations promoted

After the conference, the PNNL specialist participated in further startup meetings at the heat plant. These meetings included additional reviews of project status and a tour of the site to assess progress since a previous visit in July. The major topic of discussion was restarting the commissioning process and obtaining the gas permit. A new schedule was developed showing commissioning activities through December. A new restart date of September 25 was planned pending final acceptance of the gas distribution station and resolution of the discrepancies identified during the inspection. Again, the need for spare parts was discussed, and an agreement was reached regarding the most critical near-term needs. (*Riaz Awan, NNSA, 380-44-490-4485; Jim Hartley, PNNL, 509-946-1529*)

Mr. Dan Couch, INSP Manager at PNNL, and Dr. Antone Brooks, Senior Researcher at Washington State University, traveled to Ukraine in mid-September to attend the Fifth Annual ICC Conference and to tour the ICC International Radioecology Laboratory (IRL) in Slavutych, the IRL Field Laboratory in the town of Chernobyl, and the Chernobyl nuclear plant. INSP arranged for Dr. Brooks, who conducts research in areas similar to those carried out by IRL (i.e., effects of contamination and low radiation doses on flora and fauna), to attend the ICC conference to foster collaborations with IRL. Dr. Brooks was impressed by the IRL facility and the research being conducted there. He was optimistic that there could be collaboration between his work and IRL. During the ICC Conference, Mr. Couch represented Dr. James Turner, Director of the NNSA Office of International Nuclear Safety and Cooperation, at the Council of Members meeting. (*Rich Reister, DOE, 301-903-0234; Dan Couch, PNNL, 509-372-6415*)

Armenia safety analysis data collection and model development discussed

Armenia

Representatives from the Slovakian Nuclear Power Plant Research Institute (VUJE), Atomtom, the Armenia Nuclear Power Plant, and ANL met in late July to discuss issues related to data collection in support of thermal-hydraulics calculations for the Armenia plant. The main focus of the project is to carry out design-basis and beyond-design-basis accident analysis calculations with the RELAP5 thermal-hydraulics computer code. During this meeting, the participants addressed the collection of data needed to complete the modeling and concluded that most of the needed data either has been assembled or that reliable sources have been identified to develop the remaining material. Only two data areas were identified for which assistance will be





required: 1) fuel and structural properties and 2) fuel design. Only the fuel supplier or another Russian organization that has access to the information (e.g., the reactor designer) can supply the fuel design data. Fuel and structural properties data could be obtained from the sources identified above or possibly from a VVER database, if one has been compiled. Collection of this data could prove challenging; however, the assessment will continue during the model development.

The ANL representative met with a representative of the Technical Assistance to the Commonwealth of Independent States (TACIS) program, which is supporting the Armenia nuclear plant in developing improved emergency operating instructions (EOIs). TACIS also is supporting the development of a RELAP5 model to be used for the thermal-hydraulics calculations to verify the EOIs. A team at the University of Pisa is managing the model development work, and Gidropress is being contracted to carry out the calculations. Other cooperative efforts in this area are being investigated.

In early August, Armatom, in cooperation with the Armenia plant, provided a data reference assessment report to VUJE, which then completed its own report by mid-August. A rudimentary RELAP5 model was produced several years ago under support from the U.S. Nuclear Regulatory Commission to simulate only the primary loop. This model will be the starting point of the current effort, and the model has been supplied to VUJE. A workshop for specialists from Armatom and the Armenia plant will be held this fall to continue development of the RELAP5 model. To prepare for this workshop, a nodalization scheme will be developed for the secondary loop. The goal is to produce a model validated against plant steady-state data by mid-December. *(Walt Pasedag, NNSA, 301-903-3628; Phil Pizzica, ANL, 630-252-4847)*

Physical protection upgrades at Armenia plant reviewed

A PNNL technical specialist met with representatives of the Armenia Nuclear Power Plant Physical Security Working Group in early August to review and discuss proposed design criteria for installation of short-term and long-term physical security needs and/or upgrades for the protection of identified critical nuclear facilities and activities at the plant. The group also reviewed the overall Physical Protections Upgrades Project and the newly installed Service Water System (SWS) for design compliance with national and international laws, regulations, and requirements, and recommended upgrades to the physical and technical security perimeter as necessary. Discussions included prioritization of upgrades and the possibility of integrating the





Seismic inspection capability and proper safety culture established at Armenia plant

SWS security upgrade project into the Physical Protection Upgrades Project. (*Grigory Trosman, NNSA, 301-903-3581; Denver Greer, PNNL, 509-372-4839*)

In early August, a representative from ANL visited the Armenia Nuclear Power Plant for a seismic safety inspection and to discuss safety assessment projects with Armatom, the Armenian technical support organization for the plant. The seismic inspection reviewed corrective actions taken since the previous inspection performed in September 2000, components that were not part of the September 2000 inspection, and examined components that require additional analysis to assess their safety. All findings from the September 2000 inspection regarding corrective maintenance, assessment of safe-shutdown procedures, and analysis to confirm that further corrective action is not needed have been addressed.

Independent inspections performed in early 2001 resulted in implementation of necessary changes. This level of response indicates that INSP assistance has been influential in building a seismic inspection capability and a proper safety culture at the power plant. A final seismic inspection is planned during the plant outage in 2002. (*Dennis Meyers, NNSA, 301-903-1418; Mark Petri, ANL, 630-252-3719*)

Preliminary Armatom internal web site established

Software recently installed on Armatom computers enabled setup of a preliminary internal web site that will become public once a final Internet connection is established. A specialist from ANL met with representatives of the nuclear research institute Armatom to discuss plans for a new partner web site located in Armenia that will complement an existing network of INSC web sites previously established at ANL, the Moscow INSC, Kyiv University, the Lithuanian Energy Institute, and the National Technology and Science Center in Kazakhstan. Available vendors, equipment, strategies, and services were evaluated to provide a reliable Internet connection to Armatom using either a radio modem connection or a telephone-system based DSL connection. (*Dennis Meyers, NNSA, 301-903-1418; Hubert Ley, ANL, 630-252-8224*)



Armenia plant safety upgrade activities reviewed

In early September, representatives the Armenia Nuclear Power Plant, the U.S. State Department, Burns & Roe, and Battelle met to review the status of current projects and to discuss potential future projects in support of upgrading the safety of the plant. The plant currently is shut down for maintenance and refueling. Negotiations for the supply of fuel have been completed, and the plant is scheduled to return to power in mid-October. The following FY 2002 activities were reviewed.

- Plant computer. Atomenergoproekt-Nizhny Nogoroad has provided the system specifications document to Burns & Roe. This is the highest priority project for FY 2002.
- Auxiliary feedwater system. In progress and will be completed during the current outage. Final testing will occur in the two weeks following plant startup.
- Emergency condenser. In progress and will be completed during the current outage.
- Safety analysis equipment. Will be completed at the end of the current outage.
- Service water system. Burns & Roe authorized the Armenia nuclear plant to initiate work for dust control. The development of specifications for chemistry control by Ural-VTI will be issued in mid-October. Installation of this service water system is planned for the summer outage 2002.
- Turbine generator seals/motor generator sets. Seals are installed in one turbine-generator. The remaining seals and the motor generator sets will be installed in the summer 2002 outage.

In addition, a list of high priority future upgrade projects was developed. Burns & Roe will help determine upgrade costs and safety significance so that priorities can be established. ***(Dennis Meyers, NNSA, 301-903-1418; Richard Denning, Battelle, 614-424-7412)***

U.S. State Department representative visits Armenia plant

Mr. Warren Stern, U.S. State Department, and a representative of Battelle met with representatives of the Armenian Ministry of Energy and the Armenian Nuclear Regulatory Agency to discuss energy supply for the future in Armenia and for a tour of the Armenia Nuclear Power Plant. Deputy Energy Minister, Mr. Areg Galstyan, made a presentation that promoted the continued operation of the Armenia nuclear plant through at least 2008. ***(Dennis Meyers, NNSA, 301-903-1418; Richard Denning, Battelle, 614-424-7412)***





Simulator instructor meeting focuses on improved training materials

In mid-September, a two-week working session that focused on Simulator Instructor Training Skills was held at the Armenia Nuclear Power Plant. During this working period, the plant's simulator instructors received training that will help them improve existing and future simulator training materials. Training specialists from the U.S. firm Sonalysts Inc. and from the Russian Institute for Nuclear Plant Operations led the course. *(John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)*

Emergency preparedness workshop held at Kozloduy

Bulgaria

In mid-July, a one-week Emergency Preparedness Workshop was held for personnel from the Kozloduy Nuclear Power Plant. Kozloduy personnel had identified emergency preparedness as an area in which specific assistance was needed to facilitate the facility's ability to provide effective training. The one-week workshop, which involved training and simulator specialists from the Kozloduy plant and a training and program specialist from Sonalysts Inc., focused on emergency preparedness training and the development of appropriate scenarios and training techniques to foster personnel understanding. *(John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)*

Electrical maintenance training materials under development at Kozloduy

In mid-September, a U.S. training specialist from Sonalysts Inc. conducted a two-week working session that focused on the continued development of a pilot training program in electrical maintenance for the Kozloduy Nuclear Power Plant. During this visit, which is the second of three working sessions that are being held, training material developed for other Soviet-designed reactors was reviewed and modified for use at Kozloduy. The U.S. specialist is working with technical and training specialists from Kozloduy in the development of this program. Plans for the final working visit and implementation of this pilot program were discussed. *(John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)*



Ignalina training team meets with U.S. computer-based- training specialists

Lithuania

A three-person team of training specialists from the Ignalina Nuclear Power Plant traveled to the United States in July to participate in a workshop on computer-based training (CBT). During the trip, the Ignalina personnel met with training and technical specialists at Sonalysts Inc. in Waterford, Connecticut, and with the INSP project manager and training specialists at PNNL in Richland, Washington. The training and technical specialists from Sonalysts and PNNL presented information on existing CBT technologies and capabilities, and the PNNL project manager led discussions regarding plans for expansion of CBT capabilities at the Ignalina facility. Familiarizing Ignalina personnel with U.S. CBT technology used in a variety of applications is expected to further aid Ignalina in this area.

(John Yoder, DOE, 301-903-5650; Don Draper, PNNL, 509-372-4079)

Ignalina SPDS passes factory acceptance tests

In mid-July, a technical specialist from PNNL visited the offices of Western Services Corp. in Visaginas, Lithuania, to observe the factory acceptance tests of the Safety Parameter Display System (SPDS) developed for the Ignalina Nuclear Power Plant. Staff from Western Services Corp. conducted 36 test procedures over 5 days, and personnel from the Ignalina Operations and Nuclear Safety departments witnessed the tests. Representatives from Russia's Kurchatov Institute conducted tests associated with the Reactor Subcriticality Calculation and the 3-D Neutron Physical Calculation.

On August 17, a senior management meeting was held to discuss the results of the factory acceptance tests. There were no challenges to the satisfactory completion of the tests; however, it was observed that the SPDS did add a significant loading on the central processor of the information computer system that drives the SPDS. An additional central processor will be purchased to eliminate that loading. This action was anticipated in the initial funding estimates for this project, so no additional funding will be necessary. *(Grigory Trosman, NNSA, 301-903-3581; Ron Wright, PNNL, 509-372-4076)*

Status of Kazakhstan breeder reactor closure

Kazakhstan

The overall purpose of the Kazakhstan Reactor Closure Project is to ensure irreversible shutdown of the BN-350 (EPR-II) reactor, which was designed to produce weapon's grade plutonium. All of the work performed by the United States on this project is identified in an Implementing Agreement signed by DOE and the Kazakhstan Minister of Energy and Trade in December 1999. Work progress in the main project areas is described below:

Decommissioning Planning - A team of decommissioning specialists from the United States, Kazakhstan, Russia (funded by the ISTC), and the European Union (funded by the TACIS program) attended a decommissioning planning meeting at the EBR-II site in June. Specialists from Kazakhstan and Russia have prepared sections of a draft plan based on a format and content document previously prepared by the international team. The purpose of the meeting was to begin assembling the decommissioning plan and to establish action items required for the completion of the plan.

The purpose of the plan is to document the cost and schedule of activities needed to complete the decommissioning effort. This document would be used as a tool in providing financial and schedule requirements for various areas of placing the reactor in safe storage and final demolition. Various countries have identified a willingness to provide financial support of reactor shutdown, and the plan will identify those needs.

Cesium Trap Design - Following completion of the design for the cesium trap system in the spring, the design team representing Kazakhstan and the United States has been working on ensuring the regulatory code requirements of both countries can be met with the final design. In addition, efforts are under way to establish the contract with Byelkamt, a facility established by the Nunn-Lugar Bill, to meet the regulatory standards of both countries. Because both the ISTC and DOE are providing funding for the fabrication of the cesium trap system, details are being worked out to allow separate contracts for each funding source. Fabrication of the system is expected to begin in October.

Sodium Draining, Processing, and Residual Sodium Deactivation Kazakhstan has submitted the first set of deliverables required by the Non-Proliferation Disarmament Fund (NDF) project. As part of Task Order 1, Kazakhstan provided detailed planning documents to identify the overall scope of work and schedule to perform the activities that are included in the NDF project. These include the draining of the primary sodium coolant, the



engineering effort required for processing the drained sodium into an environmentally acceptable waste form, and for deactivating the residual sodium remaining after draining. Engineers from Argonne National Laboratory-West (ANL-W) in Idaho Falls, Idaho, drafted the statements of work for Task Orders 2 and 4 and submitted them to the U.S. State Department for inclusion in the contract documents. Engineering design teams began on sodium draining and processing, under Task Orders 2 and 4, respectively, in late September.

Fire Protection and Radiation Monitoring Upgrades – Work continued in the coordination of fire protection support being provided by the European Union, through the TACIS program, and the United States. This support includes new fire doors, relocation of fire detection heads based on shutdown activities at the plant (coordinated with the United States), and removal of the hazardous floor coating in the plant. Kazakhstan has requested additional support, and the project is looking for funding sources to support this request. *(Doug Newton, NNSA, 301-903-9504; Pete Wells, ANL-W, 208-533-7152)*



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