Rovno 1/2, Ukraine

Mission Date; 22 Sep.-9 Oct., 2003

Full scope simulator is not just used for training of control room staff training but also for electricians responsible to conduct the manipulation in electrical scheme of NPP. This leads to upgrading of electricians’ skills and better co-operation between control room staff and an electrician on duty.

Krsko, Slovenia

Mission Date; 20 Oct. 6 Nov., 2003

Construction of instructor guides for Field operator practical training

The field operator (non-licensed operator) continuing training is conducted in accordance with annual plan and two-year program. Each year, four training segments / weeks of training are conducted for each operations crew. During one week of training there are some common topics that are attended by field and licensed operators together, and some topics are attended only by field operators.

The basic topics conducted for field operators are practical exercises to perform field operator duties in accordance with system operating procedures. During one week of training up to four practical exercises are performed on different systems from different field operator work positions.

Each practical exercise is conducted in three parts:
- short review about system design and functions (1 h),
- classroom overview of procedure and section that is subject of training (1 h),
- demonstration and practice of system operation activity on field (2 h).

Training is conducted by two field operator instructors in accordance with previously approved lesson plan / practical exercise guide.

The instructor guide consists of instructor-based information that is used during each part of training. The main portion of the instructor guide is developed on the left part of the document to support the training. Rules of procedure use are detailed and content of specific procedure section is covered step by step. To better support instructor needs, the instructor notes are prepared in colours, to mark steps that are performed by field operators (blue) and are the topic of training, and those that are performed by main control room (grey). Important steps to be discussed in detail are coloured red.

On the right side of the guide are objectives, important instructor notes, questions, and remarks that are used during the training delivery and comments about proposed procedure changes if needed. Operating Experience (OE) given by trainees, addressed by SME or by experienced operation workers, or complement to the procedure developed through the international OE are also written to support applicable portions of the course. Through the official process, the instructor guides are prepared by Field operator instructor, validated by other Field operator instructor, verified by Operations superintendent and approved by Training manager. Finally the instructor guide explains the objective and the timing of the
practical evaluation on-site and provide a checking list on last page to perform the evaluation of the work performed.

The goal of Krsko NPP is to continue development of this kind of instructor training guides and to make them available to Shift supervisors for use during the On-the-job training.

Zaporozhe, Ukraine

Mission Date: 6-23 Sep., 2004

Zaporozhye NPP provides comprehensive training facilities, equipment and material for operations, technical support and part of maintenance personnel. The Training Centre operates two plant specific full-scope simulators, representing units 1-2 and units 5-6. A third one is under construction. A part-task simulator, representing control panels of Chemical Water Treatment Station, Special Water Treatment Station and Unit Desalination Station, is used for practical training of chemistry personnel. A similar part-task simulator for electricians’ training is under construction. The Maintenance Training Complex provides several electrical and I&C stands for training on plant switches and maintenance works. Modern multimedia technologies (three-dimensional animations, videos, CBT etc.) are implemented and extensively used for theoretical training. The training Centre provides very good training material.

Philippsburg, Germany

Mission Date: 11-28 Oct., 2004

Combination of training at full scope simulator and glass model

The thermo-hydraulic phenomena and effects which occur in the essential operating and transient conditions in the primary circuit of a PWR reactor can be visualised in the glass model at the simulator centre.

The glass model has been used for this purpose during many years. It had been located in a building of Biblis NPP, so it was less opportunity for the operators of the other plant to be trained on it. Now it is located in the building of the simulator centre of the Society for Simulator Training (GfS) in Essen. In order to help observe the thermo-hydraulic processes, all process parameters are being recorded and displayed on a screen behind the glass model along with schematic diagram.

There was found that it is particularly effective to use of the glass model in context of simulator courses: the combination of theoretical instructions, process control/observation at the simulator and visualisation of phenomena in the glass model is didactically optimal form of training. That is why corresponding glass model presentations are incorporated into the simulator training program, e.g. in context of practical exercises on such incidents as "LOCA", "TMI event", or "Steam Generator Tube Rupture". A special instructor who is an expert in the field of thermo-hydraulic processes is used to show and explain the glass model presentations.
Lovisa, Finland

Mission Date; 3-21 Aug., 2007

National project of Basic professional training course on nuclear safety-Finland.

A project of national training course on nuclear safety - "Basic Professional Training Course on Nuclear Safety - Finland" was issued by common effort of STUK, nuclear utilities Fortum and TVO, technical research center of Finland (VTT), technical universities and Ministry of Trade and Industry.

The aim of the project is response to the needs of the new EPR project and to provide in the long-term a new generation of nuclear experts to replace the present generation which will retire within the next few years.

Although part of the course material is based on the IAEA material, it has been adapted to the Finnish conditions and large part of the material is completely new. The course is intended basically as a lectured post-graduate professional training of new recruits and staff members. Training material (about 3000 pages) and videotaped lectures of previous courses are also available in the distance learning web side of LUT University.

Basic structure of the course covers Principles of Nuclear Safety, Nuclear Safety in Design and Construction, Operational Safety of NPP’s, Operational Limits, Accident Management, Waste Management and Analysis of Nuclear Safety. The lectures are held in Finnish however extended abstracts of the lectures are published in English.

Up till now four 5-week lectured courses took place, the 5th course is planned to start in 2007. Total number of participants in these 5 courses is about 250.

Members of the plant staff actively participated in the project. Representatives of the plant training unit are members of the organizing committee and plant senior managers are involved in the project as lecturers as well as project supervisory body.

Khmelnitzky, Ukraine

Mission Date; 29 Oct.-14 Nov., 2007

System used to track the implementation of modifications required to maintain the fidelity of the full-scope simulator with the reference unit.

Software has been developed and is used to track the implementation of modifications required to maintain the fidelity of the full-scope simulator with the reference unit. All stages of such modification are tracked.

- identification of discrepancies.
  - detected by trainees on simulator;
  - detected when performing the yearly test of the simulator; and
  - identification during the analysis phase of a plant modification that an upgrading of the simulator will be necessary.

- Analysis of the hardware or software modification of the simulator.
- Implementation of the modification for testing purpose.
- Testing period.
- Definitive implementation on full scope simulator.
By the support of this computer database, KhNPP succeeded to eliminating most of the discrepancies between the full-scope simulator and the reference unit. This also owing to the anticipatory system of arising discrepancies identification and subsequent record keeping; assignment of works according to the stages, terms and executors while planning modifications and analyzing progress of works. Reports to the regulatory body on the status of the simulator compliance with the reference unit can be easily prepared.

**Forsmark, Sweden**

Mission Date: 12-28 Feb., 2008

To use the training simulator to describe complex events and to demonstrate the work methods in the control room following a disturbance, to the media and other key groups.

A problem in communications in nuclear power is to be able to describe clearly complex events and the design of the safety systems that manage the events to people outside the nuclear power industry. Furthermore, it is difficult to present a picture of the orderly work methods in the control room during a disturbance by merely describing them.

There is a full scope simulator at Forsmark which is used to conduct training and refresher training for different categories of operations personnel. This simulator is an identical copy of the Forsmark 1 control room. It has been on the site since 2001 and is operated by KSU (Nuclear Training & Safety Center) at the Forsmark site.

After the July 25, 2006 event at Forsmark the media published and broadcast a number of inaccurate descriptions of the situation in the control room during the disturbance and of the impact of the disturbance on various surveillance systems.

The plant invited journalists in to the simulator to witness a simulation of the event, providing them with a much clearer picture of the sequence of events, which surveillance systems were affected and which were intact as well as the orderly work methods of the control room personnel, which were in turn a result of the training and refresher training on the same simulator. Furthermore, it was made clear how the safety systems are designed, with redundant features and so forth. This effort contributed much to presenting a more balanced picture of the July 25th event which had been described in the media as a potential core meltdown.

Other groups have visited the simulator later to see the same run-through. Among others, SKI, the local safety board, the county administrative board’s emergency preparedness organization and many national politicians have seen the simulation. Their perception of the July 25th event has also become much more balanced.

A contributing factor in the success of presenting a more balanced picture is that the personnel who work as instructors in the simulator are good teachers who are able to describe clearly complicated situations and relationships to the layman.

This positive outcome has resulted in Forsmark including the simulator as a communication resource in their emergency equipment.
Balakovo, Russia

Mission Date: 19 May-6 Jun., 2008

The extension of the full scope simulator configuration with the replica emergency control room is based on the necessity to achieve skills and psychological preparedness of the main control room personnel to act under conditions of the design-based and beyond design-based accidents and under extreme situations.

The plant puts into operation a version of the full scope simulator, equipped with the replica of the emergency control room. The simulator operates as a unified complex using the common software load. Such construction is beyond the applied standards. This technical solution provides the simulator with the following advantages:
- It considerably expands the capabilities for the proper simulation of the conditions, close to the software model limits.
- It facilitates the training of operating personnel for design basis and beyond design basis accidents.
- It improves the capabilities for verification and validation of operation documentation, especially emergency procedures.

The feedback from operators, instructors and management is definitely positive. The annual and periodical plant reports indicate the considerable improvement of the training quality. On the basis of these results the operating organization considers the possibility to encourage all the subsidiary plants to implement the innovation.

Arkansas, USA

Mission Date: 15 Jun.-2 Jul., 2008

Comprehensive training facilities for radiation protection combined with different mockups and number of classrooms are used to enhance plant performance. The Training department maintains numerous mock-ups of plant equipment that provide hands-on training opportunities for improving worker knowledge and human performance. The line organizations supply resources to either purchase or develop mockups when needs are identified. In many cases, subject matter experts develop the associated training materials and conduct the training under the oversight of the training organization.

For example:
- In the radiation protection training programme a simulator that mimics the plant’s radiological monitoring system (RADS) is used to train technicians how to monitor dose rates and accumulated dose for individual workers involved in high risk evolutions, as well as area dose rates throughout the plant. Scenarios are developed that require the trainee to perform system operation and monitoring activities such as alarm response; use of human performance tools such as communication skills; procedure use; place-keeping, and exercise knowledge of procedure requirements. Radiation worker practical factors training walks the staff through the entire RP Radiological Controlled Area training aspects, which include RP basics such as dosimetry issue and return, dress out training for contamination controlled areas through to hazards identification of boric acid on plant items, requirements for high dose rate areas, respirator use, use of RADS, hotspots, locked high radiation areas, active leaks, contaminated tools, foreign material exclusion equipment, use of whole body monitors and small article monitors, radiological hazards of working at heights, use of respiratory equipment, scaffolding and filtered ventilation units.
Mockups in the Instrument and Controls group include various electronics cabinetry and instrumentation, such as control drive system and integrated control system. The mockups allow trainee to gain detailed knowledge of these systems, practice human performance techniques and provide a means for performing troubleshooting plant issues without incurring potential plant risk associated with on-line troubleshooting.

The extensive use of mockup training provided to staff members serves to improve worker technical knowledge, develop skills, and reinforce expectations and desired behaviors.

Arkansas, USA

Mission Date; 15 Jun.-2 Jul., 2008

Good staffing and plant knowledge improves the effectiveness of training provided to the plant.

The training organization is staffed with highly experienced and knowledgeable personnel. All operations instructors have obtained training and experience as licensed control room operators, and most have been control room supervisors or shift managers. All instructors have experience at the plant in the disciplines they instruct. Through development of training materials and implementing training, the knowledge and operating experiences of these instructors is captured for future trainees as well as current trainees.

Rotational assignments from the line organizations to the training department are made in each training area (operations, technical and maintenance), which allows high performing job incumbents to participate in training development and delivery. These opportunities allow them to enhance their knowledge of the training process while sharing their current plant experience with trainees. Training department personnel support plant activities such as refueling outages and other plant assignments which in turn keeps their technical knowledge current.

Several members of the training staff have formal degrees in education, including specific training courses in adult learning theory and learning styles for young generation learners now entering the workforce. They provide instruction to the remaining training staff in techniques that improves the effectiveness of the training provided to the plant.

The plant’s Operations Department owns and works directly with Operations Training. An Assistant Operations Manager from each unit is assigned to training and is responsible for the oversight of the Operations Training Process. Currently, in operations training, there are 22 individuals in the training department who hold or have held a Senior Reactor Operator license at ANO, and an additional 4 individuals who hold a Reactor Operators license.
The simulator for welders’ training

A unique simulator for welders’ training was designed and implemented in the Rivne NPP Vocational school with the main objective of reducing the duration and costs of welders’ training whilst assuring required level of training quality.

The purpose of the simulator.

The simulator is dedicated for electric welders’ drill and initial training in manual arc welding practices. The aim of the simulator is to ensure the following skills for the welders:
- Excitation of welding arc and sustainability of its defined length.
- Assurance and maintenance of the specified position of electrode holder (welding torch) in relation to the welding surface of the item.
- Maintenance of thermal conditions of welding pool.

List of tasks conducted on the simulator:
- Simulation of welding with the use of real low-amperage welding arc.
- Set up of initial parameters of the simulated welding process (length of arc space, heat input, slope angle of electrode).
- Recording of information of training session on length of arc space, slope angle of electrode and heat input.
- Generation of acoustic feedback signals in case of violation of boundary values of controlled parameters.
- Change of complexity of training tasks according to all the parameters or specific parameters.
- Statistical manipulation and assessment of training results.
- Documentation of training results in the form of tables and graphics on paper form.

Use of low-amperage current source for simulator operation assures maximum correspondence between simulated welding and the real process that will significantly reduce the adaptation period during work on the real equipment.

This simulator is only a section of the training for welders which is composed of training of welders according to the corresponding programmes (theoretical and practical, on-the-job training, qualification tests of welders and knowledge check). After passing all tests of these different sections, welders are certified by the Rivne NPP welder’s examination committee.

The performance gained is measurable in the interest of the students with advanced technology, reduction of costs and improvement of the general quality of the welder activities.
“Hands on” training

Many methods of providing effective and creative “hands on” training are available to plant personnel. This form of training provides a realistic method for initial and continuing training. Examples noted include the following:

- Plant personnel receive realistic “hands-on” human performance and safety culture training, as well as maintenance fundamentals courses are provided at the shutdown Barseback nuclear power plant.

- Plant utilizes a graphic simulator (G-Sim) as a platform for basic training for operators. The simulator includes graphics that are similar to the plant and is able to simulate neutronics effects seen when control rods are manipulated.

- The control room simulator is also used for field operator advanced basic training (a 1-week course) and engineer on duty training – it is used as a tool to highlight applied theoretical concepts and practical applications.

- Use of the flow-loop simulator capabilities (ETEC facility) provides a unique opportunity to work with actual system measurement and control devices that are very similar to those in use at OKG. In addition, a flow loop facility at the shutdown Barseback plant provides opportunities to conduct training in a very realistic environment.

- Prior to refueling activities at all three plants on-site, a one-tenth scale refueling control system and simulator assist in preparing maintenance workers for the task.

Training materials.

The training provided to plant personnel benefits from the use of objective based, high quality training materials. These materials include such features as detailed graphics (i.e., colour, imbedded plant photos, and flow/logic diagrams). The materials are developed early in the training process, using input from plant personnel and instructors, in order to provide opportunity for quality review of their accuracy. Also incorporated into many sets of training materials are innovative graphic simulations of plant system operation. The training materials are standardized so that whatever plant organization receives training, they each receive the same high quality materials. In addition, the materials are utility system-wide available for use. This results in enhanced understanding of system location, layout, interfaces, and design.
**Ringhals 3/4, Sweden**

Mission Date: 1-18 Mar., 2010

Comprehensive training facilities

There is a comprehensive site commitment to the conduct of realistic training and the necessary supporting training facilities. This is evidenced by the following examples:

- At the nearby Barseback training center (shutdown nuclear power plant), maintenance personnel and field operators train in a uniquely realistic environment. This facility provides the workers with an opportunity to conduct realistic in-plant tasks in a low dose environment.
- At the on-site Testen maintenance training facility, refueling and primary systems (steam generator) maintenance personnel practice tasks that result in significant time and dose savings during outages.
- At the on-site fire training facility, plant personnel can train in challenging fire-fighting techniques along with local fire protection personnel.
- Operations training personnel have created a field operator radiological protection practical training facility so that operators may practice their radiological and observation skills.

**St. Alban, France**

Mission Date: 20 Sep.-7 Oct., 2010

A training facility, reproducing real field conditions, has been created to teach workers the correct actions and behaviour.

The worksite training facility has simple pieces of mechanical plant belonging to both the inside and outside of the controlled area. It represents various work situations with numerous scenarios e.g. contamination, irradiation, use of hazardous materials, working in a confined area, at heights or in a tank, electrical risk, floor level hazard awareness, allowing the plant and contractor personnel to train. All this equipment is controlled from a control room.

It facilitates the application of error prevention techniques during activities such as the installation or removal of devices and the manipulation of plant equipment while in contact with the control room. Errors can be simulated without having real consequences. Work situations having led to deviations can be “replayed” until the correct action and behaviour are achieved.

As a result, maintenance and operating activities can be performed in a calm environment. Workers are then ready to undertake complex actions. Poor working situations are analysed for full understanding in order to avoid repeat defects. Satisfactory partnerships tend to develop with the contractors using the worksite training facility. They also become more committed to improving plant operation.
**Metzamor, Armenia**  
Mission Date: 16 May-2 Jun., 2011

The plant has introduced a plant simulator (mock up) utilizing a panel and components from the shutdown (unit 1) turbine systems. The simulator is located within the turbine hall and fully replicates the plant conditions both operation’s and maintenance staff will be exposed to. The plant simulator is utilized for operator training in the correct use of procedures and communication with other plant areas from a noisy plant area, it allows the operators to practice plant evolutions and the simulator is able to be configured to replicate turbine system operational faults. The simulator is also being used to train electrical technicians in the appreciation and understanding of fault symptoms in the turbine electrical control systems and safe methods of rectifying them.

**Smolensk, Russia**  
Mission Date: 5-22 Sep., 2011

Modern and State-of-the-Art Training Infrastructure and Facilities, such as:

a) Maintenance Training Facility:
   i. Flange Connection Simulator.

The Maintenance Training Centre is equipped with a Flange Connection Simulator, which can be used with 6 different types of flange connections with gaskets. This facility is very important to provide practical training to the maintenance personnel to improve and develop their knowledge and hands-on skill as well as correct behaviour in the areas of tightening force, correct measurement, flange inspection etc.

The facility has also the provision for hydraulic testing to assess leak tightness of the flange connection made.

   ii. Multimedia-based Smart Board for equipment maintenance.

The Smart Board simulator is user-friendly information on the main plant equipment maintenance and intended to conduct training for different maintenance activities. The activities include study of construction and functioning of equipment, provide information on maintenance technologies and evaluate knowledge of trainees.

The simulator includes scenarios for repair of complex plant equipment, such as:
- main circulation pump;
- generator;
- low pressure steam-generator;
- refuelling machine;
- gas compressor;
- switches 6, 20 kV;
- other equipment, total number of scenarios – 24.

The simulator also includes the following mathematical models:
- 3D models of imitated equipment fully identical to actual units.
- 3D graphics of maintenance operations – assembly / disassembly, relocation, measurement, adjustment – on command of a trainee or an instructor.
b) Multimedia Simulator “Refueling Machine”:

Refueling machine simulator imitates refueling process and allows trainees to observe 3D mechanisms which can’t be seen in reality due to constructional features of the refuelling machine as well as due to high radiation fields.

The simulator model reproduces the whole reactor refueling cycle and allows control of refuelling machine simulator from touch-pad monitors identical to actual unit panels.

The refuelling machine simulator consists of a mathematical model, 6 PCs and 12 screens. 7 of the screens reflect refueling machine control panels, and 3 others display refuelling Machine in virtual reality. 2 monitors are used by the instructor to run the simulator. Such a simulator configuration allows conduct of refueling under control of instructor.

The refueling machine simulator is used for initial and continuous training of refuelling operators to achieve a high level of knowledge and skills during practical training.

c) Safety Training Facilities:

   i. Occupational Safety Shop:

Training Ground for training in underground facilities and enclosed compartments.

The plant has constructed a training ground to imitate conduct of works in underground facilities and enclosed compartments (confined space) in close to real conditions. Training on the ground is used to develop and maintain trainees’ skills in conduct of works in high risk production conditions.

The ground is comprised of the following features:

- mock-up of well with fire hydrant;
- mock-up of well with water supply lines;
- mock-up of pumps fitting unit (thermal) compartment;
- mock-up of pipeline trench;
- mock-up of drain shaft;
- training classroom with equipment mock-ups.

The ground is used to achieve the following goals:

- to obtain and train practical skills of conduct of works in the enclosed compartments;
- to use personal protective equipment correctly;
- to ensure individual safety during conduct of works in the enclosed compartments;
- to use error prevention tools;
- to train actions in case of emergency;
- to drill evacuation plan in case of emergencies;
- to provide first aid to the injured.

The training ground is a unique training facility which to issued in training for high risk works in real conditions of underground and enclosed compartments. Such kind of training contributes to further decrease of production risks, increase individual worker safety and develop safety culture.
ii. Radiation Safety Shop:

Electronic Knowledge Assessment equipment (SKZ).

The Training Department has developed and uses a computerized system of knowledge control “SKZ” for “Radiation safety” training courses.

The system comprises: 20 trainees' panels, basic station, software. This system allows rapid testing of personnel during classes. “SKZ” may be used for operating and maintenance personnel during initial and/or continuous training. Test results of each trainee are displayed on the instructor’s screen and can be also demonstrated on a large screen (if required). Reports are stored as HTML files in the system archive.

SKZ is used to:
- conduct routine, entrance and exit assessments;
- conduct objective analysis of training efficiency;
- store, print individual and final assessment reports;
- efficiently generate tests, add and delete questions;
- conduct training in 2 modes i.e. control and self-training;
- create interest of training results to trainees.

iii. Industrial Safety Training:

The Industrial Safety Shop in the training department is well equipped with all the devices and equipment of a very high standard which are necessary meet the NPP working situations. Even during the classroom training many practical hands-on activities are carried-out to give a feel for actual usage of the equipments.

Also a virtual interactive ‘industrial safety training room’ (virtual replica of the real IS training room with videos, training materials) is available on the plant intranet, to support workers’ self-study before regular re-examination on industrial safety.

iv. Fire Safety Shop:

Psychological Fire Simulator.

At Russian nuclear power plants in case of fire and impossibility to de-energize safety significant equipment due to necessity to ensure nuclear safety, it is allowed to extinguish fire at powered high voltage equipment.

To create psychological readiness of the personnel as well as to form the skills of fire extinguishing in electrical installations up to 6.3 kV a psychological simulator was developed and is used at Smolensk NPP. This simulator provides 6 kV power supply to the mock-up of electrical installation.

The simulator is used to train the electrical personnel to be involved in fire extinguishing until the fire brigade arrives.

The simulator comprises:
- electrical installation powered mock-up;
- 6 kV power source connected to the electrical installation mock-up;
- fire extinguishing equipment with the use of sprayed water stream.
Use of psychological simulator allows:
- to develop and maintain psychological readiness to fire extinguishing;
- to develop and maintain psychological stability under stress and emotional pressure.

The training process involves qualified specialists for training of fire response team skills of cooperation between the plant personnel and fire response team in case of fire.

**Hongyanhe, China**

Mission Date; 6-23 Feb., 2012

Implementation and development of the digital control system simulators has resulted in unique capabilities or results.

- To solve the problem of how to monitor operator human performance with a digital control system, the plant developed the use of a “mirror” display of 10 interface panels of control room panels for use by the booth instructors. By using such “mirror” displays, simulator instructors in the booth have the ability to observe the control manipulations being implemented by the operators during transient situations.

- Actual plant digital control system information has been validated using the simulator. As a result, several logic, graphics, and procedure problems have been identified early and provided back to the plant designer.

**Rajasthan, India**

Mission Date; 29 Oct.-15 Nov., 2012

The station developed and utilizes animation based multifunctional simulator for fuel handling training. Fuel handling operation can be easily visualized in this simulator through the animation along with each step of fuelling operation. Fuel handling operation can be run in auto/semauto or auto/manual mode and repetition of similar operation in different modes develops the operator competency in station. The training on the simulator is helping the operator in understanding the following:
- Refuelling operation, each step of the refueling program;
- Abnormal operations and corrective actions to be taken;
- Evaluation of trainee’s performance can be assessed by the simulator.

The Station Fuel Handling Simulator (FHS) uses PC based soft panels. These soft panels are simulations of hard panels of actual plant for manoeuvring controls while all operations can be visualized on large monitors through animations. This FHS is used to impart training to Candidate Control Engineer of fuel handling operation personnel as well as Candidate Assistant Shift Charge Engineer of main station operations. The PC based FHS has models for normal & abnormal fuel handling operations. The simulator has capabilities for refuelling operation having each step of the refuelling program as well as simulating fuel handling system malfunctions. The simulator has proven to be excellent tool for better understanding the intricacies of on-power refuelling operations.
Figure 1. Station Computer based Multifunctional Fuel Handling Simulator

Figure 2. Refuelling sequence on the LCD screen on FHS
Figure 3. Fuel bundle movement on FHS

Figure 4. Fuel bundles pushed by RAM assembly on FHS
Kola, Russia

Mission Date; 11-28 Nov., 2014

The plant has introduced an interactive multi-functional simulator for providing fire-fighting training to all personnel.

The plant has obtained and deployed an interactive computer controlled multi-functional fire-fighting simulator (MFFS) that is used for training all NPP personnel, which provides the means to train and exercise personnel interactively in fire-fighting using fire-extinguishers, and includes the following features:

– Inclusion of a number of different locations for fires.
– Inclusion of different sources of fires.
– Inclusion of alternative types of fire extinguisher.
– Identification of the steps to take in response to discovering a fire.
– Identification of the sequence of steps necessary to fight a fire using a fire-extinguisher.
– Simulation of the sequence of steps necessary to fight a fire by means of a fire-extinguisher using an interactive link between the fire-extinguishers and the fire-simulation displayed on the simulator screen, including detection of the position of the fire-extinguisher.
– Assessment of the correctness of the steps taken to fight a fire.
– Assessment of success in extinguishing a fire.

The benefits of the approach are that it assists management to train and exercise personnel to:

– Respond appropriately on discovery of a fire.
– Follow the correct sequence of steps to fight a fire.
– Recognise the importance of the location of a fire.
– Recognise the importance of the source of a fire.
– Recognise the correct type of extinguisher to use to fight a fire.
– Use a fire extinguisher effectively.
– Recognise when a fire has been successfully extinguished.

The use of the MFFS has helped improve the knowledge and ability of personnel to respond effectively to fires that may occur on the plant and challenge safety.

The provision of the MFFS has benefited fire-safety at the plant.