OSART Good Practices
EMERGENCY PREPAREDNESS AND RESPONSE
Emergency preparedness

Mochovce, Slovakia

Mission Date; 4-20 Sep., 2006

Capability and Use of the Computer Information Network for Emergency Response.

The NPP Computer Information Network displays the worksheets for the various ERO positions and allows personnel to complete the worksheets electronically. Worksheets that are completed to recommend actions, such as protective action recommendations, can be completed and forwarded electronically to the appropriate personnel for review and approval. The distribution of worksheets is predetermined and automatically occurs within the system. The Computer Information network also includes a screen that provides a one page summary of important information related to emergency response. This information includes event classification, unit status, meteorological conditions, the location of plant personnel, the status of offsite notifications, the status of warnings to personnel, protective action recommendations for shift, onsite, and offsite personnel. Information from this system is also archived. The electronic worksheets are printed out periodically to provide a backup record, and paper worksheets are available in the event that the system fails. Use of these electronic worksheets improve the efficiency of the emergency response organization and the accuracy of the information that is exchanged among the various positions.

Mochovce, Slovakia

Mission Date; 4-20 Sep., 2006

In order to address the requirements of different regulatory bodies, and to enhance their response to emergencies, the plant developed emergency plans for each building onsite. These procedures provide response actions for non-radiological emergencies such as fires, bomb threats, explosions, and hazardous material releases. The procedures identify responsibilities, such as who is in charge of event response for various types of emergencies, and providing information on the types of hazards in each building including the types, locations and amounts of chemical and hazardous material. The procedures provide information on the appropriate types and locations of equipment used to combat the emergency, such as chemical events. To exercise the procedures and train personnel, the plant conducts and conducts an emergency drill in a selected building approximately monthly.

South Ukraine3, Ukraine

Mission Date; 9-25 Oct., 2006

Video conference tool uses for Emergency Planning and Preparedness communication.

The plant uses effective and efficient video conference connection as well as plant operation data collection in ERO between utility and other NPPs.

The video conference connection has been installed in the internal crises centre. This system allows visual communication (video conference connection) with utility and all Ukrainian NPPs.

The main role of this equipment during the video conference:
- To be more effective when communicating with off-site;
- To aid the decision procedure between utility and NPP;
- To exchange practical skills and knowledge among NPPs in emergency tasks;
- To request support dealing with all NPPs and utility; and
- To efficiently report the unit status.

In this crisis centre there is equipment which provides on-line plant data, processing, documenting, storage display and transfer of data. The system maintains on-line transfer of SUNPP unit status parameters to the crisis centres of the operating organization and NRC of Ukraine.

Tihange, Belgium

Mission Date; 7-23 May, 2007

Reception of personnel and families at the "Reception and fall-back center" in the event of an accident

The plant has set up an organization for the reception of personnel and families and managing a long accident period, which could last several days. This organization is based in the "reception and fall-back center" in Les Awirs (Centre d'accueil et de repli des Awirs - CARA), which is supplied by power from Awirs power plant.

In the event of an emergency, CARA will fulfill the following functions:

- It can function as an off-site fall-back crisis center in situations where the normal site crisis center (COS) is inaccessible. Contact with the affected unit is maintained using the following means: telephone, fax, computer networks and videoconference.
- It can be used as a point to assemble people. It has a refectory for 100 persons that can also serve as a briefing room for the emergency staff just before they go to the plant. It has a big changing room with 24 showers for decontamination of staff coming off the plant. It also has a conference room with a capacity for 50 members of injured persons' families.
- Personnel can be given personal protective equipment. The teams are transported in a bus which is available 24 hours a day. The drivers have dosimeters and are used to working with the site and know what to do in the event of radioactive contamination.
- There is an infrastructure (meeting rooms, cafeteria, medical room, etc.) for the reception of the families of injured personnel in a calm atmosphere (no pressure from the media, at a distance from the site).

Chinon, France

Mission Date; 27 Nov.-14 Dec., 2007

Medical facilities, equipment and procedures for the treatment and transportation of contaminated casualties in emergencies.

The plant's Medical Service has set up a robust organization for taking charge of contaminated casualties on site until their decontamination in the decontamination facility of the medical service or to transfer them to hospital.

The strong commitment of the medical and nursing staff as well as the strong relationships maintained with hospitals, the good involvement of medical service staff in exercises and training courses, the involvement of doctors at national level, and the well-organized duty roster for continuous medical cover contribute to the continual strength of this organization.

Furthermore, care of casualties is enhanced by locally developed innovative techniques, including:

- Facilities for decontamination of multiple casualties, regardless of their ambulatory conditions.
- Equipment and procedures to survey potentially contaminated wounds.

The medical personnel as well as the plant volunteers receive regular practical training and exercise, which ensures the effective deployment of the medical arrangements.

Arkansas, USA

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

The Emergency Planning Procedure/Print Document Disaster Recovery System enhances the plant's emergency preparedness.

The plant maintains all procedures and documents necessary for use by Emergency Response Organization (ERO) personnel on the Entergy Web. Should this system be lost for any reason, emergency planning has a disaster recovery system established that ensures access to these documents is retrievable by all ERO personnel. Designated computers, in each primary and alternate emergency facility, receive a daily download from document control. The most current revision of all procedures and drawings required for sustained ERO operations is loaded to the hard drive of these computers. If a failure of the intranet occurs, all required documents can be retrieved and used from local computer hard drives with no loss of information experienced while responding to an emergency event. This process reduces work burden and cost on document control by allowing electronic update of procedures and prints in ERO facilities without having to maintain hard copy backup. It also reduces the need to audit prints and procedures for current revisions which saves even more time.

Mihama 3, Japan

Mission Date; 20 Jan.-5 Feb., 2009

Comprehensive off-site emergency drills, including resident evacuation have been conducted every year with Mihama station participating every four years. Fukui Prefecture conducts yearly off-site emergency drills with participation of a few hundred local residents, which are quite comprehensive, covering the items listed below (*: drills where the licensee lends its cooperation):

- Emergency communication drill (*)
- Emergency taskforce operation/management drill (*)
- Off-site center operation/management drill (*)
- Self-Defense Force dispatch drill
- Emergency monitoring drill (*)
- Emergency exposure medical treatment drill (*)
- Resident evacuation drill (*)
- Evacuation center operation/management drill (*)
- Public relations drill (*)
- Traffic control drill
- Nuclear operator on-site fire brigade firefighting drill (*)
- Training for relevant authorities to deal with the region evacuated
- Support team mobilization training, based on the Fukui Prefecture Wide Area Mutual Firefighting Support Agreement

Off-site centers have been established in the Fukui Prefecture municipalities with nuclear power stations (Mihama Town, Takahama Town, Ohi Town, and Tsuruga City). The four municipalities have taken turns conducting these comprehensive drills where municipalities and power stations have participated.

The yearly off-site comprehensive drill significantly improves the public awareness and sufficiently supports the preparedness of off-site and on-site emergency response organizations.

Ringhals 3/4, Sweden

Mission Date; 1-18 Mar., 2010

Cooperation With Local Authorities.

The plant has made a commitment to close coordination with local police that has resulted in a better overall understanding of how off site and on site organizations will respond to events involving radiological concerns as well as fire, rescue, and potential hostile actions. In many cases, events involving hostile actions can change the way an emergency response organization responds to a radiological event. Actions taken by the plant in this area have helped to improve plant safety through a defense in depth concept provided by the emergency responders.

Together with police officers and group leaders for the local security company, the staff assigned as Engineer on Duty has undergone training, including Table Top exercises directed at criminal attack. During the training, it was repeatedly emphasized that the primary objective for the responders is to maintain reactor safety and that apprehension of the criminals is secondary. In 2008, a functional exercise in physical protection was carried out with 21 police officers, 23 engineers on duty (all) and 9 group leaders from the plant's security force. The evaluation of this training and exercise showed this type of exercise to be very valuable and has given all participants more in-depth knowledge of their own roles and knowledge and understanding of the roles of other responders The commitment to cooperation included on site familiarity training of 160 police officers in 2007 through 2009, and 110 police officers undergoing refresher training at the site in during the same period.

Doel, Belgium

Mission Date; 8-25 Mar., 2010

The plant has a comprehensive database of all equipment intended to be used for emergencies.

All equipment, instruments and logistics needs for all emergency management functions and facilities are inventoried in a centralized database (under SAP management system). The database contains a detailed description of the items, the frequency at which they need to be tested, the calibration requirements (for detection equipment) and the department responsible for their maintenance. A sample check of the instruments indicates that the detection instrument calibration is up to date.

This comprehensive equipment management system ensures that the equipment is fit for duty and provides a demonstrable, effective and reliable way to ensure that all the equipment required to manage emergency response is available for emergencies.

Doel, Belgium

Mission Date; 8-25 Mar., 2010

The plant has a customized training program for each person in key emergency response positions.

The plant has a well-documented statement of required capabilities and knowledge for each of the positions identified in the emergency plan. For each “person”, based on their knowledge and experience, the plant designs an individualized training program to allow the individual to achieve the required level of performance. This includes self-studies, courses (with designated instructors), on-job training and drills. Following completion of the program and sign off, the individual is tested orally. If the results are not satisfactory, the individual is prescribed additional training. If successful, the individual receives a certification with a clear validity period. The performance of each individual is tracked, including the need for recertification. This is included in the personnel training database system of SCALDIS.

This system ensures optimal performance of the emergency response teams against clearly defined standards.

Bohunice 3/4, Slovakia

Mission Date; 1-18 Nov., 2010

For fulfillment of working tasks of OHO management unit (EBO Emergency Committee) in emergency conditions it is necessary to equip the Emergency Committee members with such knowledge and skills which will facilitate them to achieve optimal working performance under stressful conditions, they learn how to handle the information more effectively, to remove errors in processing of information within OHO team, etc.

The training courses are performed in form of an experience /adventure/game, with a certain level of physical and psychical load, by applying method of active participation and experience training in the field.

The training courses, focused on psychological preparation of EBO Emergency Committee (EC) members, have been attended by EBO EC members since 2005, with the following topics:

- 2005: 'Reacting in crisis situations' (pilot project which was attended just by one shift of EBO Emergency Committee
- 2006: 'Reacting in crisis situations' (Since 2006 the courses are attended by the whole EBO EC)
- 2007: 'Development of team cooperation and communication'
- 2008: 'Self-knowledge and team cooperation'
- 2009: 'Accident management'
- 2010: 'Solving of crisis situations'

The purpose of psychological preparation is that EC members, after passing the courses, are able to:

- Objectively obtain and evaluate information about the reality,
- Distinguish projective and tunnel seeing (and to be able to eliminate it) and to distinguish it from objective (unbiased) perception and evaluation of the situation,
- Identify own role in the team, its strengths and weaknesses from the point of view of team cooperation,
- Get to know positive and negative aspects of oneself and of the team under pressure and when situation or strategy change,
- Master the principles of effective two-way and multi-way (three-way) communication during emergency situation and to apply these rules during a simulated situation of NPP accident, the rescue of persons and material values /assets/, evacuations, etc.
- Development of communication and team cooperation,
- Select appropriate communication and management strategy and to be able to apply it during a simulated situation of NP accident, rescue of people and material values /assets/.
- Deal with crisis situations under time stress, change of strategy procedure
- Correctly provide first aid to the affected persons, correctly use the protective suit - tyvek

On the basis of the results and analysis of the given (running) course there are formulated objectives and goals for the next courses which are under preparation for the future period and there is not affected the continuity of psychological preparation of EBO EC members. Individual courses are mutually interlinked, they are focused mainly on problem areas and they are at a very high professional standard.

Seabrook, USA

Mission Date; 6-23 Jun., 2011

Radiological field monitoring & communication system.

The plant's emergency response organization (ERO) offsite monitoring teams (OMTs) utilize a web-based program known as WebEOC to record field monitoring data and to transmit the data to dose assessment personnel in the Emergency Operations Facility (EOF). ERO OMTs are deployed into the field in dedicated vehicles to conduct radiological surveys and environmental sampling. The OMT uses the WebEOC application to enter its team identification number, its location, and the survey results information using the data entry screen. When the data entry is saved, the information is immediately transmitted to the EOF where it is displayed on a large screen for viewing by EOF dose assessment staff which allows prompt recommendation and intervention. The redundancy of measurement is also assured. New Hampshire and Massachusetts state field monitoring personnel are equipped with laptop computers with the same WebEOC field data communication capability.

This method:

- Eliminates the need to verbally communicate information over cellular telephones or via radio transmission.
- Minimizes opportunities for human performance errors resulting from repeated manual transcription and communication of data.
- Provides for prompt information to decision makers.

Cattenom, France

Mission Date; 14 Nov.-1 Dec., 2011

Efficient follow-up by the Radiological Assessment Group (PCC) of the off-site radiological situation using real-time ambient dose rate data.

The Radiation Monitoring vehicles, to be deployed during an emergency, are equipped with a gamma dose rate system connected with a GPS system allowing the PCC staff to track their location continuously on a map. The ambient dose rates measured, every 10 seconds, by this system are displayed on the dashboard and transmitted by TETRA radio to the PCC. A colour code is applied to the transmitted data allowing a quick assessment of the radiological situation (green if dose rate is lower than 0.35 Sv/h, yellow for values between 0.35 Sv/h and 1 mSv/h and red for ambient dose rates 1 mSv/h). This automatic transmission allows the accumulation of the environmental measurement data while avoiding misunderstanding or errors, improving the accuracy of the available environmental data.

Associated with online real-time ambient dose rate values from 29 off site gamma-tracer stations (Genitron) and with the colour coding used, this system may give a comprehensive overview of the environmental radiation situation.

The online display of the ambient dose rates on the dash board also participates a better protection of the team members of the vehicles (driver and technician).

The system has been in place at Cattenom NPP since 2010.

Mühleberg, Switzerland

Mission Date; 8-25 Oct., 2012

External Emergency Storage Facility in Reitnau

Following the severe reactor accident in Fukushima, Japan, the operators of NPPs in Switzerland were requested by ENSI ordinance to make urgently available an external storage facility for severe accident scenarios. The storage facility was to be earthquake and flood proof and to contain additional means and equipment for deployment.

The operators decided to set up a joint central external storage facility (in the following referred to as "External Storage") and to store therein additional equipment for event scenarios. The equipment stored exceeds the international standards.

The External Storage constitutes a supplementary pillar for Emergency Management of CH-NPPs and has been integrated as such in the Emergency Organisation of the respective plants. The equipment stored is permanently ready for deployment. For this purpose, the systems and equipment stored are regularly maintained and used for training. In the event of an accident the emergency response unit will be set up at an early stage, i.e. predefined staff will travel from the non-affected plants to the external storage facility and start preparing material and equipment for transportation.

The External Storage accommodates emergency generators, fire brigade equipment such as pumps, hoses and other fire fighting material, radiation protection material, tools, fuels, oils & lubricants, and other auxiliary materials. There are several sets for many of the aforementioned items.

The storage facility was designed and established in cooperation with the fire brigades, army and air force. All items are packed and prepared in such a way, that they can immediately be transported by land or air (helicopter) with the help of these response forces.

Kozloduy, Bulgaria

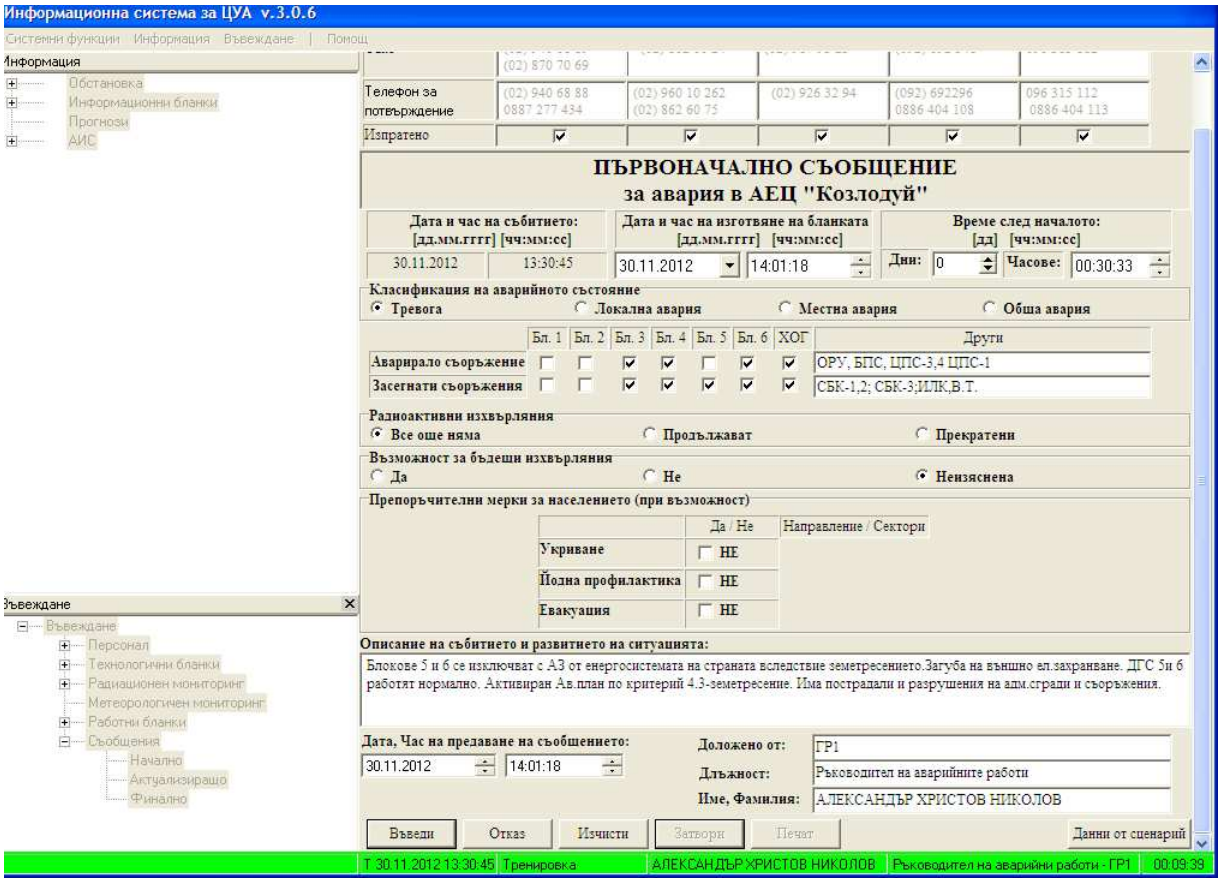
Mission Date; 26 Nov.-13 Dec., 2012

Emergency Response Centre Information System (ERCIS)

The plant has identified the need to transmit information concerning the status of units 5-6 and the consequences for the public and the environment to several off-site organizations. There are several pre-arranged forms used for this purpose.

The plant has developed an Emergency Response Centre Information System (ERCIS) to automatically acquire the necessary information and fill-in the forms. The forms can then be faxed, printed or emailed with the touch of a button.

The ERCIS is used by emergency team on duty at the ERC during drills or emergencies to prepare messages to state institutions. The ERCIS is tailored to the work of each person on duty at the Emergency Response Centre. Each work station is authorized to acquire specific information from a server and transmit it to the off-site authorities. Every form sent to the off-site authorities is logged and time-stamped automatically.



The server has access to the following information:

- meteorological data from three weather stations;
- radiation monitoring data from the industrial (on-site) gamma monitors;
- radiation monitoring data the ring of detector surrounding the plant in the EPZ;
- radiation monitoring data from the fixed network in the UPZ;
- nuclear units 5 and 6 process parameters;
- safety parameters display system (SPDS);
- post accident monitoring system (PAMS);

- spent fuel storage facility (SFSF) parameters.

ERCIS has three modes of operation:

1. Monitoring mode during normal operation to get access to real data from the site, the weather stations and the radiation monitors.
2. Scenario mode during exercises to get simulated data. In this case, the simulated data is prepared using EPA-Dose, JRODOS and main control room simulator.
3. Emergency mode to obtain real data regarding the emergency and transmit forms to the off-site authorities.

The benefits of this system are that it improves the accuracy and timeliness of the information transmitted to the off-site authorities. It also simplifies the management of the information and allows the Emergency Action Manager to track the information that was sent. Finally, it allows the same system to be used during drills or exercises, improving the training of emergency team.

Borssele, Netherlands

Mission Date; 1-18 Sep., 2014

The plant organizes six site-wide integrated exercises each year to ensure that all personnel with assigned duties during an emergency participate in an exercise each year.

Each exercise includes the participation of one of the shift crews at the simulator, a complete roster of personnel at the Alarm Coordination Centre, the security organisation, the maintenance organisation, the deployment of emergency mitigation equipment (diesel generators or pumps) which may involve the assistance of off-site contractors or the Army. In addition, the exercises are coordinated and conducted in collaboration with the external Emergency Response Organisations, which include: the Regional Centre of the Safety Region of Zeeland (VRZ), the nuclear regulatory body (KFD), the National Institute for Public Health and the Environment (RIVM), the National Nuclear Assessment Team (EPAn), and the crisis centre of the plant designer (Krisenstag Areva). These organisations appreciate the opportunity for all their personnel to participate to an exercise.

Once every five years, a national large scale exercise includes the participation of all ministries involved in the response to a large scale emergency, in addition to the participants to the annual exercises.

Borssele, Netherlands

Mission Date; 1-18 Sep., 2014

The plant organizes annual exercises with the 13 Armoured Brigade of the Netherlands Armed Forces. The tests involve support by the Army for the deployment of beyond design basis emergency mitigation equipment, security, and decontamination.
After the Fukushima accident, the plant made arrangements with the 13 Armoured Brigade to provide support in crisis situations. The 13 Armoured Brigade possesses a wide range of mobile equipment and means of transport to deliver resources anywhere. Its personnel is equipped and trained to operate under harsh conditions such as those encountered during a nuclear emergency.

The agreement between the plant and the 13 Armoured Brigade includes participation in a yearly exercise where these arrangements are tested in the field. In 2012, the exercise involved the delivery of diesel fuel, a large mobile diesel generator, and operating crews during a simulated flood. During the 2013 exercise, the 13 Armoured Brigade performed monitoring and decontamination for 60 employees. It also arranged an emergency communication network. In November 2014, a third exercise is planned, which will involve radiation protection support on-site, and the off-site decontamination of vehicles that evacuated from the plant. The annual exercises also integrate a security component. These arrangements increase the robustness of the mitigation measures that were put in place by the plant as part of the Complementary Safety-margin Assessment – the European Union stress-test.

Flamanville, France

Mission Date; 6-23 Oct., 2014

Effective documentation management system for ready access to updated EPP documents wherever they are needed.

In EPP some 400 binders are used in approx. 40 rooms/facilities requiring the presence of EPP documentation. A system was set up in 2012 to manage this bank of documentation. At his/her action point, each emergency team member has 2 binders. The red binders are sealed in transparent vinyle to ensure that their content has not been modified since issue by the documentation department. The red binders are used by the EP members in case of an actual emergency, whereas the yellow binders are used during exercises only.

Each binder has a summary of contents describing it as a unique/autonomous document. The binder is referenced with a package code. Some binders can be used by all command post members. If 2 binders have the same content, they are identified by the same package code (e.g. SDD01).

The package code enables the documentation department and the contractor in charge of updating the binders (renewal of binder after a drill, revision of current document, etc.) to locate the binder. In the example mentioned above, SDD01 stands for S (BDS or bunker) as the EP member's first action point, D for (PCD), D for (decision making room for PCD) and 01 as a chronological number of the binder located in the room.

All documents referenced in the document management system are recorded with their package number indicating where there are located in the distribution list.

The documentation department has an EPP reference cabinet and also a backup of the content of each binder. In an emergency, the update of the binder can be done promptly. Following drills or actual emergency situations, the documentation department has the full content of the binder replaced promptly and recovers the container used for document recycling of the binder that has not been hand amended by an EPP member.

Advantages and benefits

- Prompt update of EPP binders that are part of the documentation management system.
- Autonomous and efficient management of EPP documents (if the EPP officer is away from the station, the update can be done promptly and as soon as necessary).
- Documents that are 100% guaranteed updated are a fundamental to emergency management. With this system, the EPP members know that the documents they need are always up-to-date.
- In case of actual emergency during a drill, each EPP member has a complete binder for use during the real emergency situation.

Station results demonstrating that the potential good practice meets expectations:

- Before this new organization, EPP members reported deviations on missing, non updated or incomplete document.
- The organization has been in place for 2 years and all EPP members have expressed satisfaction on the documentation system. They now have full trust in the documentation provided.
- Various verifications at all levels (documentation department, contractors, command post managers, EP officer) have shown that documents are indeed up to date.

Flamanville, France

Mission Date; 6-23 Oct., 2014

Training for evacuation of disabled personnel from buildings

The plant deliberately employs disabled persons. In order to assist them in emergencies a specific evacuation plan was established for each disabled member of personnel. It is signed by the disabled person and their line manager.

An evacuation chair is provided for persons with reduced mobility.

This evacuation chair is located in a stairwell which offers fire/smoke resistance of one hour. The chair can be deployed by one person, and enables a person with reduced mobility to be evacuated safely.

The person with reduced mobility and his/her colleagues have been trained in the use of the chair within the scope of the specific evacuation plan.

Kashiwazaki 6/7, Japan

Mission Date; 29 Jun.-13 Jul., 2015

Intensive Emergency Response Organization exercise programme

The station has implemented a detailed programme of monthly exercises for the full Emergency Response Organization.

The exercise scenarios systematically cover a wide range of severe conditions and complex challenges. Exercises are conducted to simulate, to the extent practicable, realistic conditions. This includes exercises conducted in low light level conditions (to simulate loss of normal lighting during SBO conditions and events during the hours of darkness) and using protective equipment that would be used during extreme weather conditions such as very high rainfall (to practice performing activities that could be hindered by the additional protective equipment

The results of the detailed programme of exercises and the high degree of realism gives greater confidence that the station ERO will be able to discharge its responsibilities in all credible accident conditions.

Sizewell B, UK

Mission Date; 5-22 Oct., 2015

The range of emergency exercise constraints that are tracked is very comprehensive

In conformity with IAEA standards, the station implemented an exercise programme that covers all response functions required during an emergency, and tests the associated exercise objectives and the emergency personnel regularly.

In addition, the station created a comprehensive list of exercise constraints that must be tested over a five year period:

- Normal working hours; outside working hours
- Normal operation; outage
- Mustering with automatic system; mustering with manual system
- Alerting with automatic system; alerting with cascade of telephone calls
- With main communication network available; without main communication network available
- With public address system available; without public address system available
- With Main Control Room available; without Main Control Room available
- With Emergency Control Centre available; without Emergency Control Centre available
- With Access Control Point available; without Access Control Point available
- With Shift Manager; without Shift Manager
- With Emergency Controller; without Emergency Controller
- With external services (police liaison) at Emergency Control Centre; without external services
- Fire with off-site fire service support; without off-site fire service support
- Security event with off-site police service support; without off-site police service support
- Release monitoring with off-site survey available; without off-site survey available
- With electrical grid available; without electrical grid available
- Slow reactor depressurization; Fast reactor depressurization
- With contained accident; with release to the environment
- With high radiation environment for emergency response teams; without high radiation environment

Tracking such a comprehensive list of constraints ensures that the emergency plan is tested under the full range of conditions that could arise during an emergency.

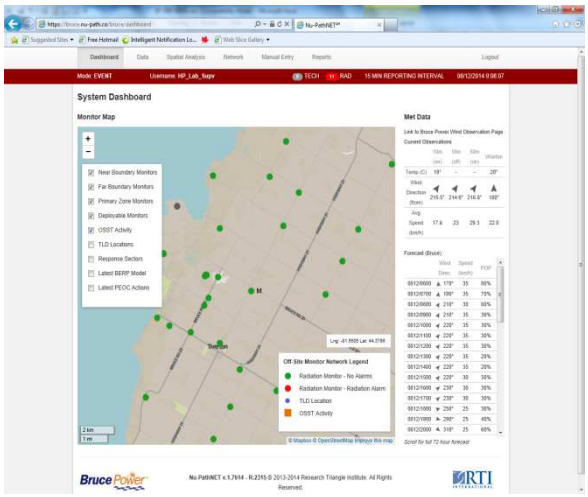
Result: By implementing this process, the station identified corrective actions to cover gaps in the emergency arrangements that would not have been detected otherwise.

Bruce B, Canada

Mission Date; 30 Nov.-17 Dec., 2015

Self-Sufficient Off-Site Remote Monitoring

Offsite remote monitoring of the plant comprises of a series of 44 static monitors that transmit gamma dose-rate data to a software application called NuPathNET. Each monitor operates independently. Each monitor transmits its data in near-real-time through the cellular network and would automatically switch to satellite phone back-up if required. Each monitor is powered by batteries, with solar panels recharging the batteries. NuPathNET provides a user-friendly interface and also permits the data to be shared over the internet with anyone who is given access rights. Currently, the Bruce Power remote monitoring system provides its data to the province of Ontario, the regulator and health services. The monitors also provide basic weather data to assist with plume modelling. The system is in continuous use but also has a “training mode” where scenario data can be used to drive exercises and drills. In addition to the 44 static units, there are 8 mobile monitors that can be used to enhance coverage, compensate for any defective monitors, or used for unforeseen circumstances. The 44 monitors provide excellent coverage on site and within the entire primary zone. Finally, the monitors provide not only dose-rate data but also detailed information on up to 18 different nuclides, as determined by the user.The next enhancement to the system will see 8 air samplers that will provide real time data on air particulate and iodine. The system is extremely rugged with no failures in 18 months despite the harsh climatic conditions that exist around the plant.



Cernavoda, Romania

Mission Date; 7-24 Nov., 2016

Gamma dose rate simulation software incorporated into the On-site/Off-site on-line Gamma Monitoring System.

The On-site/Off-site on-line Gamma Monitoring System contains fifteen on-site and off-site gamma monitoring stations that provide accurate, real-time data to the main control rooms and emergency response centres computers. Data are transmitted to these facilities through

radio system or by Satellite system as back-up.

This on-line monitoring system has a software capability to simulate gamma radiation fields at all gamma stations. The simulation software has a feature to simulate gamma dose rate evolution over unlimited time periods. The operators and emergency response personnel use these inputs to quickly determine emergency classifications (Emergency Action Levels), to assist in dose assessment and to develop protective action recommendations. Consequently this software is a very good tool that can be used during emergency exercises to make the scenarios more realistic.

By using this software during emergency exercises, improvements were noted in the timely recognition and classification of radiological events (achieving the performance criteria of 15 minutes for classification). This also contributes to a significant reduction of field monitoring teams' simulated exposure, and to improving accuracy and timeliness of dosimetry data transmission to emergency response personnel. This software also helps train the On-site Emergency Response Organization to inform and make recommendations to the Public Authorities in a timely and user-friendly manner.