OSART Good Practices
OPERATIONS
Fire Prevention and Protection Programme

Pickering, Canada

Mission Date; 9-26 Feb., 2004

The organization of training for fire and rescue incident command and control is above current standards in the industry. The station has built a plant mock-up, including the vicinity of a populated area. An instructor's facility will simulate various incidents like fire, railway accidents and building collapse while from the adjacent room the Incident Commander will coordinate the incident response and resource management. Video cameras are used to create realistic images of the scene as well as to tape and record the event and the response.
There are about eight scenarios developed so far. After the scenario, team-debrief, post critique, feedback and evaluation process are used to improve performance.
This team is also trained and qualified to respond in case of confined space rescue, high angle rescue, first aid and hazardous material.

Zaporozhe, Ukraine

Mission Date; 6-23 Sept, 2004

All the firemen and operations staff are adequately instructed and trained to a very high standard at the plant's dedicated training facility. This facility includes plant specific mock-ups such as:
- connection corridor,
- tower and stairs,
- cable corridor,
- rooms with electrical panels,
- various ladders/walkway configurations (including platforms at off-normal angles to simulate damage),

in which fires and smoke hazards can be provided for realistic fire training. Many different scenarios can be prepared.

Penly, France

Mission Date; 29 Nov.-16 Dec., 2004

In the plant fire zone boundaries are exactly denoted to provide effective means of quickly identifying the various functional components at fire zone boundaries and ensuring that they are intact.
Workers are always able to identify the fire zone in which they are working thanks to a colour code system (red for train A nuclear safety-related fire zones, green for train B nuclear safety-related fire zones, and yellow for industrial safety-related fire zones) which matches up with that used on fire detection panels. Other means of identification include the numbering of fire zones, fire zone drawings available in the control-room and fire response procedures.
This information is indispensable for performing the requisite fire risk assessments prior to starting work and for carrying out the appropriate actions in the event of fire in these areas.

Identification of functional components at fire zone boundaries is facilitated by fire zone sign, even for workers whose knowledge of fire zones is limited.
Fire risk assessments performed on the plant (e.g. hot work permits) are facilitated by sign indicating fire zone boundaries.
As temporary storage of materials is prohibited in industrial safety-related fire zones, these zones are marked in yellow to facilitate their identification.
Initial actions intended to ensure personnel safety and plant safety must be taken within no more than 20 minutes of the alarm. Visual identification of fire zone boundaries contributes significantly to achieving this objective, because:

-It clarifies and facilitates initial actions taken by the first-line responder to contain the fire
-It facilitates evacuation of staff through safe access paths in the event of fire breaking out in plant rooms
-Access points to fire locations are clearly identified, particularly for off-site emergency response teams.

Improvements made to fire zoning through the use of fire risk assessments have been effective in improving fire risk prevention and have significantly helped to improve nuclear safety, industrial safety, environmental protection and plant safety.

Penly, France

Mission Date; 29 Nov.-16 Dec., 2004

Fire scenarios of the response organization for specially recorded sites

Nine fire fighting scenarios are designed and included in the emergency response organization of the NPP (PIER). They focus on premises where the risk is seen as being significant (safety, fire load, impact on the environment, propagation).
They have been designed by the NPP, presented to the fire brigade (about 60 members) during their visits of these installations, and then validated by the firemen after a detailed and thorough assessment, including the SDIS planners.
In each scenario, we find the critical elements to prepare for fighting a significant fire: building's structure, special risks, retention means for fire extinction water, equipment and actions to be performed, information transfer, fire fighting strategy, equipment location.
These scenarios are available in the command centre and the external rescue vehicles.
PCD2, chief of relief operations, is the contact person with the chief officer of the fire brigade and he can share accurate, structured and detailed information in order to best manage the response in case of a fire.
The scenarios are used to prepare the joint drills with the firemen.
While they specify the necessary rescue actions, these scenarios enable to limit the fire propagation and allow for the response optimisation in terms of safety, industrial safety, radiation protection, environment and of damages to equipment.
These scenarios lead to improve both the organization and the response in case of a fire in the NPP and thus allow for a direct improvement of safety in the units in case of a fire as far as safety equipment is concerned.

Cernavoda, Romania

Mission Date; 22 Jan.-10 Feb, 2005

Portable fire extinguishers on wheels have a unique device to make them seismically safe when not in use. The seismic lock is also very easy to unlock when needed.

Borssele, Netherland

Mission Date; 8 Nov.-7 Dec., 2005

The plant has upgraded the fire suppression systems to the latest technologies including an Innergen gas system for electrical areas and a water fog system for oil fire hazards.

The plant has replaced all automatic and manual Halon gas fire suppression systems with Innergen gas systems. This modification was made in anticipation of the prohibition of the use of Halon for environmental reasons. Innergen is a mixture of inert environmentally friendly gases, which reduce the oxygen in air to extinguish a fire.

The manual Halon extinguishers were exchanged for CO-2 extinguishers.

Additionally the turbine generator control oil, fire suppression system was upgraded to a water fog system which provides superior suppression of oil fires. It includes a sophisticated 2/3 logic with multiple fire detector technologies. It has the ability to activate as often as needed to suppress the fire or any re-flash fire, and it is extremely effective minimizing the water used. Minimizing the water used, provides the environmental benefit of not requiring the disposal of large volumes of water, oil and fire debris, if the system were activated.

This good practice proactively implements technologies that are the best available and environmentally friendly.

South Ukraine3, Ukraine

Mission Date; 9-25 Oct., 2006

Organization of fire fighting.

The organization for fire fighting is above current standards in the industry. The fire brigade, with all equipment which could be vital, is on shift and always ready to operate. The premises of the fire brigade are very close to the plant. The firemen and operations staff are adequately instructed and trained. The facilities used to train firemen are numerous and adapted to the needs of a nuclear power plant.

-The fire brigade is located 500 m from the plant.
-There are 10 fire cars, well equipped and kept in very good condition.
-An officer will manage the operations in the field from a command-car.
-Alarms come directly from the field or from the main control room.
-There is a realistic smoke simulation underground were many scenarios are carried out
-The organization can easily find the premises in a fire. They have clear and exact keeping of documentation.
-The training schedule is adequate.
-In case of a fire in the control area, the personnel have group and individual dosimeters.
-The brigade will be quickly supported by two other fire brigades, located within 5 km of the plant.

St. Laurent, France

Mission Date; 27 Nov. - 14 Dec., 2006

A "Fire Committee" including representatives of various plant departments analyses and implements rules and carries out inspections in the field.

The plant has set up a Fire Committee ("Commission Incendie") composed of representatives of various departments and projects of the NPP's organization (risk prevention, operations, site protection, mechanical and electrical, dismantling of Saint Laurent A, emergency planning and preparedness, fire action plan). This committee is headed up by the senior manager in charge of safety and quality department. Its secretary and animator is the fire officer, fire safety coordinator.

This committee is in charge of analysing and implementing new regulations and EDF corporate policies and operational experience related to fire prevention and protection.

The activities of this committee are:
-to conduct multidisciplinary activities,
-determine the priority of actions to be taken,
-define an action plan with relevant people in order make it easier to take into account prescriptions related to fire protection and improve "fire culture",
-to carry out controls of activities related to prevention, training and fire fighting.

For these purposes, its members carry out systematic walk-downs in the installations at least twice a month. The deviations observed are documented and tracked.

The team considers that this committee is a powerful mean of disseminating in a practical way the fire protection concern in all departments of the NPP. Furthermore, the periodic walk-downs performed by a team of people having various backgrounds increase efficiency of these inspections.

Yongwang, Korea

Mission Date; 17 Apr. - 4 May, 2007

Fire-rated penetration labels and containment penetration labels are placed on the walls for easy identification of such points in the field.

Currently, thanks to more than 10,000 identification labels on fire-rated penetrations and containment penetrations, the visual inspection, leakage test and post maintenance activities are implemented more efficiently.

An identification label is attached to the wall at eye level. Arrows and serial numbers, indicating the location of the penetration, are affixed so that the relevant fire-rated or containment penetration among others is easily identified in the field.

A visual inspection of the fire-rated penetrations and leakage test of the containment penetrations is implemented every 18 months. Therefore, besides regular inspection when staff identify a deficiency of a penetration on a field tour, they can inform the responsible person of the exact deficiency location. Follow-up measures can then be taken simply by giving the serial number on the label.

Tihange, Belgium

Mission Date; 5-23 May, 2007

The plant has developed an ambitious programme for reducing fire hazards and improving fire fighting capability. This programme is driven by plant management and has produced improvements in staff behaviour, training, fire fighting equipment and facilities:

- The plant has developed a specific fire fighting training programme on simulator.

As part of the plant's ongoing initiative to minimize the impact of an event, such as smoke release, self-ignition or an incipient fire, on plant safety, the plant has developed a specific fire fighting training programme on simulator. This training includes various stages starting with theory and ending with practical fire fighting exercises.

The plant uses a simulator at its training centre to improve staff preparation for practical exercises. This simple, mobile, flexible system provides training in proper work practices and the use of appropriate equipment in a broad range of situations simulated on a wide screen.

The simulator is managed by a specific computer programme made up of a screen displaying the situation, a touch-sensitive pad on which the trainee stands and a bank of extinguishers equipped with sensors. The simulator accurately reproduces the development or control of the fire on the basis of the trainees' actions, for instance selection and use of a type of extinguisher, distance from flames, etc.

This simulator has improved the efficiency of this training, thanks to:
・Numerous scenarios and quick development: more content in less time.
・Simulates near-real conditions without the related disadvantages: no need to create a fire and therefore no pollution, less stress for the trainees, who are more receptive to information as a result.
・Easy to implement: centralizes training resources at the plant, significantly reduces cost and effort of traveling (time wasted, fatigue, transport risks, pollution).

-The plant has published a leaflet:"Management of movable fire loads".

The leaflet provides information and tips in a handy format which is accessible to all workers, setting out the basic moveable fire load management principles, with a few chosen illustrations.

It defines the products concerned and the rules for storage outside warehouses, the use of a fire-proof cabinet and temporary storage. One section shows the "moveable fire load sheet".

This sheet is crucial in ensuring in-depth defense of equipment items and developing a questioning attitude. It details storage areas and their capacity (nature of the products and maximum quantities authorized) which have been determined according to the detection and protection capacity of the rooms, the distance from any ignition source and the absence of safety-related equipment.

This leaflet is a simple, inexpensive method which attracts people's attention and gives them additional reminders. It is sent to each member of staff individually by post and is also available in racks located in areas where people pass through. It is also publicized on the public address terminal (PAT) television screens installed in over twenty areas on the site. It will likewise be included in the new version of the welcome package (in the same

way as other information leaflets), to be given to all new employees from 1 July 2007.

The "moveable fire load sheet" is supported and promoted by a manager of the site, thus ensuring that the initiative receives customized attention.

Forsmark, Sweden

Mission Date; 12-28 Feb., 2008

Effective management of fire cells

Fire cells monitoring - Fire cells divide the unit into separate compartments in order to prevent the spread of fire and fumes. In order to monitor the integrity of the fire cells, each door in the fire cell is monitored and an alarm is tripped if a door is open too long. This feature ensures a high standard for fire cells integrity, even during outage. Anyone who is in the plant and discovers an open fire cell door must close it. If this is not possible, the Shift Supervisor must be informed immediately.

Fire cells service openings - During work, service openings are used whenever possible. When in use these are sealed by seal bags specially designed for this purpose. This feature ensures that the fire cells are closed even during work in plant

Adaptive Fire Alarm Detectors - The fire alarm detectors system can be adapted (with increased or reduced sensitivity) to the actual work situation in specific plant rooms. Changes can be accomplished via a PC software application, e.g.: when hot work is performed or a transportation vehicle enters into the plant. The fire alarm detectors are always ready to monitor fire status; there is no need to switch them off completely. The sensitivity of the fire alarm monitoring system is specified by the fire protection foreman when issuing the directive for fire protection measures as part of work authorisation process.

Cruas, France

Mission Date; 24 Nov -11 Dec., 2008

Presence of a professional fire-fighter seconded to the plant.

The plant has engaged a professional fire-fighter in order to provide assistance concerning all questions in this area and to maintain contact with the municipal fire brigades. Agreement with the local fire response centre (SDIS), aimed at strengthening the relationship, ensures that all conditions are in place to improve fire prevention and the effectiveness of fire fighting. The provision of a professional firefighter falls within the scope of this agreement.

The professional firefighter provides the plant with his expertise in prevention and prediction, training and organisation of emergency response operations. He is involved in risk assessments, training of EDF and SDIS staff and developing fire scenarios. He also participates in the improvement and consolidation of the partnership between EDF and SDIS. The ETARE plans ("listed facility plans"), which provide off-site emergency services with all relevant information about the plant facilities, were developed with his assistance.

A further benefit is the observation during exercises of operations staff by a professional firefighter with the aim of improving their approach to firefighting, their organisation and the command effectiveness of emergency response supervisors. In addition, the professional firefighter, as a first aid monitor, applies his skills at the earliest stage while awaiting the response of medical services in the event of an accident on site.

Improving the skills of members of response teams in respect of incipient fires helps control fires at the initial stage before they have consequences for nuclear safety, personnel or the plant.

Mihama 3, Japan

Mission Date; 15 Jan.- 5 Feb., 2009

A surveillance camera network that operates simultaneously with the fire alarm was established in order to secure the safety of operators, etc, during the initial response in the case of a fire incident.

Surveillance cameras (approximately 230 in MIHAMA unit 3; approximately 700 in the entire site) were established near the fire alarms of the turbine building, reactor auxiliary building, reactor building, and radioactive waste building.

The surveillance cameras operate simultaneously with the fire alarm when it goes off. A sign signaling a fire and images near the fire alarm are displayed on the surveillance monitor, and the system notifies all concerned parties of the fire in the central control room and countermeasure headquarters, etc, by switching on the Patlite lights and sounding a buzzer.

As the installation of the system allows for advance verification of the field when necessary during an accident such as a fire or steam leakage through the cameras from within the central control room, it has been very useful in allowing for the equipping of optimal protective equipment and verifying the field in advance, and securing the safety of operators, etc, that conduct the initial response.