OSART Good Practices

OPERATIONAL EXPERIENCE FEEDBACK

Utilization and dissemination of operating experience

St. Laurent, France

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

Operational experience during outages

The integration of local and corporate operating experience obtained in a participatory manner with all field staff has enabled the plant to improve outage performance and has led to a positive trend in plant results.

- After the first outage of the year, the outage structure 'right at the end of its first outage' goes over the strengths and difficulties encountered. Improvements which are easy to implement are selected by both plant and department managers, and project participants in order for these benefits to be applied to the forthcoming second outage.
- After the plant's second outage (the last for the current year), useful items of operating experience is collated within the crafts and classified according to topics. These topics are discussed collectively and a coordinator is designated to address those selected.
- Conference calls between all plants are organized by a corporate entity to inform the whole EDF fleet of experience having occurred on some plants as well as the associated preventive measures.
- The schedule is a common tool shared by all crafts involved in the outage, as data is updated twice a day, thereby providing accurate status of progress being made.
- Good technical or organizational practices are formally written up.
- Collate all items of operational experience by involving all field staff in order to use good practices quickly during outage preparation and performance phases, and in order to rapidly identify courses of action to deal with unplanned situations.
- Prompt rectification of discrepancies identified during previous outages.
- Prior to commencing work, staff are briefed on safety or availability related events having occurred during previous outages, using an OE data base.
- The corporate entity relays events occurring at each plant to the other plants by means of conference calls and documents.
- It also organizes annual forums attended by outage managers in order for them to share their experience.
- The results achieved were, 2001- 5 events, 2002 - 3 events, 2003—3 events, 2004-1 event, 2005-0 event and 2006-1 event.

By incorporating operating experience into the schedule and by briefing those involved in the outage on the risks associated with their activities, worker attentiveness is enhanced and favourable conditions are created for performing activities.

Yonggwang, Korea, Rep. of

Mission Date; 16 Apr.-3 May, 2007

Establishment of the network of expert working groups to disseminate Operating Experience information at a site with six units

The whole technical staff on the YGN site is divided into 10 expert working groups and 40 expert subgroups. In monthly subgroup meetings, the representatives from all YGN units meet each other and share their OE information. Also the group spirit is enhanced by having a joint lunch after the meetings.

The goal is to improve the quality of maintenance and operations with six operating units. Another goal is to prevent the recurrence of events at the YGN site. The groups meet every quarter and there is an annual joint general conference. These groups and subgroups are also useful where there may be a sudden need to resolve pending items on plant operation.

An example of a group is Plant operations (divided to 3 subgroups; Operations Control, Training and Surveillance tests) or I&C (divided to 4 subgroups; Reactor I&C, Turbine I&C, Computer Systems Control, I&C Control Engineering).

Forsmark, Sweden

Mission Date; 12-28 Feb., 2008

Structured cooperation with the original equipment manufacturer (OEM) for OE dissemination for improvement of safety.

It is advisable to integrate the knowledge from the OEM in the OE process for two reasons. Firstly, the expertise of personnel at the OEM can be used for the evaluation of the reports. Then the reports can be used as a basis for initiating bilateral technical projects.

In cooperation with the original equipment manufacturer (OEM) Westinghouse Electric Sweden (former ASEA-ATOM) the plant has together with the other operators established a programme for screening external events. This programme is called ERFATOM and has been operational since 1994.

The input comes from sources commonly used in the industry, e.g. WANO, IRS, and NRC. In addition Finnish and Swedish reports (Licensee Event Reports) to the regulatory bodies are used as input.

Each utility has the opportunity to report events of interest even if the event is not reportable to the regulatory body.

Each event is screened for applicability for the BWR-plants in Sweden and Finland. The programme has a designated engineer at each site for the evaluation of the reported events. A common database is used for the processing of the reported events. At the OEM the knowledge from safety experts and component/system engineers are used for the evaluation. The events that pass the first screening are classified according their relevance to safety.

A telephone conference is held every fortnight with representatives from FKA, OKG, RAB, TVO and OEM Westinghouse in cooperation with ERFATOM. At the conference, the events are to be evaluated (international events and international and Swedish LERs) are selected. These events are then evaluated and prioritized before they are presented to the operators. This approach ensures that disciplined contact with the manufacturer (OEM) concerning events that have occurred in the nuclear-branch is maintained.

The output is a report issued every second week where additional relevant comments are noted. The plants have this report and may use it for additional work in a separate database.

In this way the utilities use the OEM expertise evaluations of events for improving safety.

Vandellos 2, Spain

Mission Date; 21 Sep.-8 Oct., 2009

The plant has established an operating experience communication programme that utilizes various mechanisms to disseminate operating experience information to a wide range of groups. The mechanisms provide updates and notices on the daily, weekly, monthly, quarterly and yearly meetings to all internal departments and sections of the organization. In addition, this information is distributed to all appropriate national and international bodies and agencies.

Examples include:

- At all times: Summary on the corporate intranet of events which happened on the same day in the past with the lessons learned and related documentation.
- At all times: Operating Experience general information is available and updated on the corporate intranet. SCOPE: ALL PERSONNEL
- At all times: Operating Experience indicators are displayed.
- At all times: Access to the websites of WANO, INPO, TECNATOM, IAEA (IRS).
- Daily: National and international Operating Experience news is discussed in the daily production meeting. SCOPE: UNIT MANAGERS and mailing.
- Weekly: Internal meeting, OPERATING EXPERIENCE HOUR. SCOPE: Persons responsible for operating experience and guests.
- Monthly: Notices to and presentations for members of plant safety committees and event analysis committees.
- Quarterly: Meeting with operating experience managers from Spanish plants.
- Yearly: Participation in international missions.
- Yearly: Yearly reports, specific training.

These communication activities improve the ability to access operating experience from any point in the organization and puts within reach of all personnel, the lessons learned from the most significant events.

St. Alban, France

Mission Date; 20 Sep.-6 Oct., 2010

A tool for motivating plant staff as to the benefits of operating experience and achievement of management recognition in this area.

The plant OE Manager screens about 1000 event reports from other NPPs of EDF and selects some of the events based on their advantage for potential improvements when implemented at the plant (100 selected in 2009). A project is then opened and allocated to the relevant specialisation for analysis and incorporation of the corrective action. Once the corrective action has been implemented it is then reported back to the OE Manager.Twice a year, based on an analysis tool, an evaluation regarding the benefits of these corrective actions is carried out and presented to the Nuclear Safety Committee. It is also disseminated to the plant staff for motivation and bringing out the advantages of such OE. The tool involves assigning a weight age factor of effectiveness considering the robustness of the corrective action. These weight age factors are:

A) 100% for corrective actions that are robust and sustainable:
Example: Significant safety event at Golfech on 23/07/2009.
Late detection of unavailability of train A reactor protections as details were missing from the alarm response sheet. As the issue was also identified on site the alarm response sheet was modified (document in the electronic document management system).

B) 50% for corrective actions that are robust but not sustainable:
Example: Near miss at Paluel on 08/10/2007.
Near miss of falling during radiological mapping at the bottom of the reactor pool.
As the risk was also identified on site, the risk assessment was amended (document not in the site electronic document management system).

C) 10% for corrective actions that are not robust:
Example: Significant safety event at Cattenom on 31/03/2009.
Leak from the control rod drive mechanism on the Reactor Coolant System.
Awareness raising for the shift crews concerning the impact of the Cattenom event and on the importance of drafting periodic reports on reactor coolant system leak.

After analysis of a significant safety event occurring on another site, if robustness of the corrective action is assessed at 100%, the benefit is 1.0 significant safety event prevented.

Valuation of 100 events selected in 2009 for implementation at the plant is:

NUMBER OF EVENTS POTENTIALLY PREVENTED IN 2009				
Scrams	**Significant safety events**	**Significant environment events**	**Significant RP/chemistry events**	**Capability saved (in days)**
10.6	**46.6**	**4**	**22.8**	**34.3**

This tool quantifies the benefits of factoring in of external OE on the plant. This tool has motivated the members of the OE coordination network and has also resulted in better recognition of the importance of OE and the role of the OE coordinators by the senior management.

Smolensk, Russia

Mission Date; 5-22 Sep., 2011

Human engineering (ergonomic) assessment of working places in the Main Control Room (MCR) and identification of working environment factors that may influence the functional state of MCR operators.

MCR staff have made an expert assessment of their own working places. In the course of the assessment the staff identified inconveniences in the man-machine interface and the working environment factors that may affect their functional state.

The assessment was initiated by the plant's OE (operational experience) group. Following this initiative, human performance laboratory staff developed questionnaires that were to be filled in by the MCR staff of each category (i.e. reactor operator, turbine operator, unit operator, unit shift supervisor and plant shift supervisor). Next, the human performance laboratory and the safety assurance monitoring department study the answers in the questionnaires which contain not only yes/no answers but also comments (explanations, suggestions and requests) of the experts (i.e. MCR staff).

Each group of experts made a fairly long list of suggestions on improving the MCR ergonomics.

Some of the suggestions:

1. Instruments measure the same parameter but have different measurement scales.
2. All MCR staff: put digital indicators of electric and thermal power under the unit clock.
3. All reactor operators, turbine operators, unit operators: install desks to work with documentation because it is not convenient to fill in the checklists, there is too little space currently.
4. Put control desks for TG 5 and 6 control and protection systems farther apart.
5. Put another monitor for control and protection system so that information on TG-5 and TG-6 will be on different monitors.
6. Turbine operator, unit operator work places: take away "Backup" controls for the equipment that is not used.
7. Reactor operator work place: put additional work place PC with an output to unit shift supervisor printer.
8. Turbine operator, unit operator work places: mark functional groups in different colors.
9. Provide radio communication (mobile) with operators in reactor, turbine and instrumentation shops.

Ergonomic questionnaire is a good practice to prevent events.

Smolensk, Russia

Mission Date; 5-22 Sep., 2011

The station has developed a set of handbooks for self study with an overview of events at plants in Russia and other countries.

A set of A5-volume handbooks was prepared on the basis of event investigation reports of Smolensk NPP and information about the most significant events at Russian and other plants, received from IAEA, WANO data bases and other sources.

The handbooks include:

- An overview of human performance events which occurred at Russian and other plants.
- description of major accidents (Three Mile Island, Chernobyl, Fukushima-Daiichi);
- the most significant events at Russian and other plants caused by equipment failures and external impacts.

The handbook is easy to read and can be used both for self-training and training by instructors at Smolensk Training Centre.

The electronic version of source materials which is used to write the handbook is available at the SNPP file server.

Mühleberg, Switzerland

Mission Date; 8-25 Oct., 2012

Fast and thorough response to recent significant external OE events, including important plant modifications and communication.

- The plant organises itself in a flexible, yet effective way, to cope with important external events, outside of the normal OE process. Necessary resources (in terms of staff and budget) are made available in a short time to organize this.

The response of the plant includes discussions with the regulator, immediate corrective actions, plant modifications and internal communication.

Events that receive international or national press attention, are followed by a special group, communication of this group happens on a regular basis in order to inform the staff on on-going incidents.

The group that is set up during an important event, screens the available information from different sources and tries to understand what happened in the last 24h. They provide technical insight and explanation on different relevant topics. In one case they discussed such topics as reactor building venting / different reactor types / some calculations on dispersion of radioactivity, a technical comparison (reactor type, containment) to KKM, what is written in the press, what other countries and utilities are doing, what actions can be / are envisaged by the KKM plant, …
At a later stage, topics might move on to what the impact of the event is on the KKM plant and its staff, including the long term.

In recent history, the plant has shown this during two of such events:

1. Fukushima Daiichi

The response of the plant to the Fukushima Daiichi accident, that took place in March 2011, included the following items:

Immediate corrective actions: 800 kVA emergency power aggregates that could be transported to site by helicopter, were rented, as well as mobile pumps. Measures were taken to assure fuel supply to the site. Additional tools were bought for maintenance and connections for the external emergency equipment were made. Different storage locations for this equipment were evaluated and arranged.

Later corrective actions included important modifications to the main heat sink, the spent fuel pool cooling and the upgrading of the SUSAN intake. All realisations were performed within a very short period of time. Further actions are in the process of being implemented.

In this case, a special team was set up to collect all the available information (e.g. WANO, regulators, press). They prepared a presentation for the plant manager to be given at additional PinF meetings. The frequency of the presentation depends on the amount of available information and the need to communicate urgently, but was typically several times a week. Meetings to inform plant staff, were held on 14 March 2011, 16 March, two on 17 March, 22 March, two on 25 March.

It was the plant manager who presented the information / messages to the plant personnel. In some occasions, he was assisted by his manager, the BKW Energy Switzerland manager.

2. Doel reactor vessel inspections

After anomalies had been detected in the Doel 3 PWR reactor vessel in July 2012, the plant, although the outage had already started, adapted its outage plan to include a detailed ultrasonic inspection of a representative sector of its reactor vessel and the subject was discussed during the outage meeting with plant staff, for the total duration of the outage.

Benefit:

The plant's prompt and thorough response results in fast modifications, that avoid a similar event occuring at this site. The entire plant staff is informed, they can give answers to family and friends. The staff can understand what they read in the papers or watch on TV, get a better idea of the risks / threats. The plant staff know what measures will be taken in the KKM plant and might even suggest items.

Rajasthan, India

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

Easy accessibility of OE detailed information to plant personnel and effective use.

The station has developed an operating experience webpage named "OPEX" in which all the analyses reports of internal operating experience as well as external operating experience are available to facilitate access and use of operating experience feedback. This operating experience page is accessible to all station staff. It contains a wide range of operating experience information. Examples include plant low level events analyses, events causing unit outage analyses, significant event analyses, external OE review reports, detailed information about corrective actions and presentations on selected events.

A tracking process for approved corrective actions is accessible to all and it also provides a historical information base of lessons learned since 2002. This has helped the station in maintaining a low backlog of corrective actions. Station sections are utilizing it for information sharing and timely completion of corrective actions.

Moreover, the station has developed a system for systematic verification of the use of operating experience during pre-job briefings. Management and line managers have to carry out regularly field observations including pre-job briefings. During these field observations, an observation sheet is to be filled by line managers for checking whether Just in time (JIT) prepared as a result of operating experience feedback is being used during pre-job briefings. Findings are discussed in the daily meeting with senior management. "Not referring JIT" is identified as an indicator of the use of operating experience. A trend of indicator is available to the respective sections for initiating appropriate corrective actions. The value of this indicator is presented in quarterly LLE analyses report as subcategory of error likely situations.

This system of tracking has proved to be useful for assessment of use of operating experience during execution of job. This was implemented in 2010 and since then yearly the trend of indicator "Not referring JIT" shows a continuous improving trend.

Dampierre, France

Mission Date; 31 Aug.-17 Sep., 2015

Software used to better capture lessons learned from post-job debriefings, and quickly and easily integrate them into pre-job briefs.

The Plant has developed a user-friendly tool to improve the quality of maintenance activities via the effective and timely capture of lessons learned.

The software is designed to be used by maintenance workers to quickly and easily access recent OE data needed to prepare their work. With just two clicks, they can include relevant OE in their pre-job brief and perform their work more safely.

During each post-job debriefing, maintenance workers report their lessons learned in this common application. They are therefore fully involved in this process. This application does not add to the long list of existing tools but is truly integrated, in that it extracts data from the Terrain database. It includes both station and fleetwide OE.

It has been tested by workers, who find it useful to build up their own OE. It has helped them realise the usefulness of post-job debriefings and of the integration of OE in PJBs. The capture of lessons learned has tangibly increased, as well as their direct integration into future work via PJBs.

Since June 2014, 292 post-job review findings have been raised, and this is a considerable improvement. A tangible decrease in the number of sub-standard maintenance tasks has also been observed in the department since implementing this tool.

Sizewell B, UK

Mission Date; 5-22 Oct., 2015

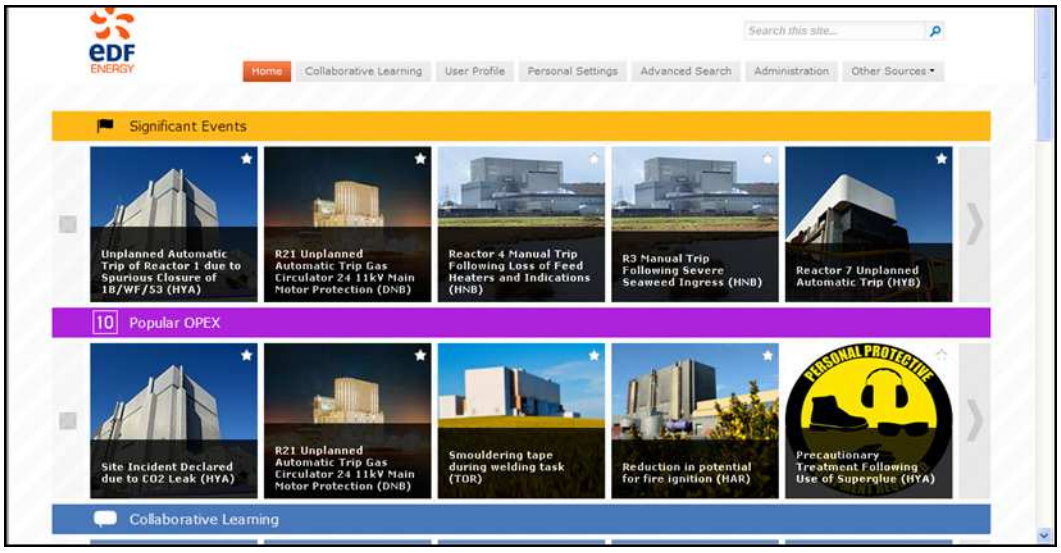
Organizational Learning Portal

The Organisational Learning Portal has been developed to enable all internal and external operating experience to be available in one system which can be reviewed by all personnel on-site.

The system enables rapid entry of events such as reactor trips which can then be commented on by all stations in the nuclear fleet.

Individuals can set up favourite categories so that relevant events are sent directly to them by e-mail daily, weekly or monthly basis with hyperlinks to the OPEX report. They can also change their home page so that events are listed in the order of significance appropriate to each person.

The Organisational Learning Portal is a cross fleet operational experience database. Any one on site with computer access can access the database to view fleet, international and industry operating experience.



Results: During May 2015 the station saw more than 500 unique individuals accessing the database to review the Operating Experience.