

# OSART Good Practices

## OPERATIONAL EXPERIENCE FEEDBACK

### Use of operating experience

#### Blayais, France

Mission Date; 2-19 May, 2005

INDEX is a user-friendly and efficient computer network application that links together the various engineering crafts within the whole fleet of nuclear power plants at EDF. It is based on the internal intranet system. The network structure linking the 19 nuclear power plants (58 reactor units) is an effective means of disseminating operating experience and of meeting two specific goals forming part of the strategy developed by the corporate nuclear operations division:

- Striving to improve performance and sharing of good practices,
- Sharing of knowledge.

Blayais NPP is overseeing the INDEX project, with a view to implementing participative working methods between French nuclear plants, with most of the nineteen plants involved in and associated with the project.

The INDEX information system, intended for use by plant engineering entities (FIL), i.e. all engineers and planners working for the nuclear operations division, is more than a simple communication tool. It provides engineers with a service, by grouping together all products and tools need by them on a day-to-day basis:

- A full-fledged directory of engineering skills (Who does what?)
- A set of OE databases, supplemented with data on their content and compilation,
- A networked forum that integrates the activities of NPP engineers.

Easy to use thanks to its "full text" search engine, engineers can retrieve information and technical analyses from a pool of operating experience obtained from 58 reactors, thereby enabling them to enhance efficiency and performance.

This network structure, divided up into crafts or specific areas (reactor series or functions, for instance), complements the nuclear fleet's existing system. The network provides a daily link-up with NPP engineering entities, thus enabling engineers to mutually identify areas for improved performance. Because the network is run by peers, plant-specific issues can be discussed, such as optimised maintenance as well as sharing, development, promotion and implementation of good practices.

The INDEX intranet site has been up and running since 15 January 2005. Its web address is <http://intranuc-index.edf.fr>. This site groups together the main technical OE databases of the EDF nuclear operations division. One of them is used to collate "position sheets" from the 19 NPPs and corporate entities, amounting to more than 8500 documents.

The networks dedicated to "valves", "main generators", "ventilation systems", "1300-MW plant operation" and "IEC" are up and running. The skills directory, currently being compiled, has 2500 entries. A set of comparative key performance indicators is used to monitor participation of the 19 NPPs.

## Blayais, France

Mission Date; 2-19 May, 2005

Preparation of just-in-time OE information for plant staff pre-job briefings during the outage. At the beginning of every outage meeting, a safety update is provided by the outage safety engineer. On this occasion, a document is handed out and presented to all participants. This document lists the activities of the 3-day schedule (title and code) where nuclear safety risks have been identified. It also specifies which craft will be performing the activity. Each activity where risks have been identified is directly linked to:

- Operating experience feedback, particularly from safety significant events occurred on other EDF plants,
- Safety expectations
- Traps, which should be avoided.

The document is also distributed to shift teams and discussed at the start-of-shift briefing. Useful OE information for future activities is presented (in order to prevent errors from recurring events). Craft attention is focused on risks associated with their activities. Risks are illustrated using concrete examples. Expectations for each activity are restated. Crafts are provided with a document that they can then discuss with their teams

## Volgodonsk, Russia

Mission Date; 1-19 October, 2005

A weekly video conference is performed to communicate and disseminate OE.

A weekly video conference is performed to communicate and disseminate OE. During the mission weekly video conferences have taken place with the participation of Rosenergoatom technical director, Rosenergoatom chief inspector, Head of licensing, Chief engineers and managers of all NPPs. The agenda of the videoconference included general comments of technical director about the importance of departmental level events and the results of major inspections by chief inspector. A detailed presentation about recent event at Beloyarsk NPP due to a small leak of hydrogen into the stator water of the main electrical generator was performed. The presentation included background of the event, sequence of the event, event consequences, direct and root causes and corrective actions. Also another video conference took place during the mission to discuss operating experience, this time with participation of other countries, such as Ukraine and Armenia.

In case of a safety relevant event at a nuclear power plant, there is an extra videoconference to provide technical assistance to the plant. In addition to nuclear plants, the conference is attended by design/engineering companies, scientific support organizations and manufacturers. There is an on-line detailed discussion of the event and of its consequences. Plant participants tell about similar events at their stations, if any, and on corrective measures. Other participants give design and engineering recommendations. On the whole, owing to the videoconference, the owner of the event receives assistance essential for implementing measures to resolve the event and prevent the event recurrence.

Using the videoconference to promptly communicate and disseminate OE to all Rosenergoatom NPP's is considered a Good Practice.

### 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.

## Yongwang, Korea

Mission Date; 17 Apr. - 4 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).

Use of operating experience for determining plant-specific reliability indicators for probabilistic safety analysis.

The plant uses all sources of internal operating experience for determining reliability data for plant-specific probabilistic safety analysis.

Probabilistic Safety Analyses (PSA) are used as an addition to the safety evaluation based on deterministic fundamentals. In the Neckarwestheim NPP Event Analyses section (ZS section), the existing PSAs for power and no-power operation were updated and stage 2 of the PSA was added for power operation. New PSAs will be made available by the end of the year for the cross-plant events of fire and earthquakes.

The assessment indicator for each PSA is the core damage frequency. For a valuable PSA, up-to-date plant-specific reliability data must be used. This requires continuous analysis of operating experience of the components modeled in the PSA.

Neckarwestheim NPP has been recording plant-specific failure data since 1994. This involves analyzing fault reports, maintenance and test reports as well as job orders, and documenting in a database any failures of PSA-relevant components in the form of event reports. The database also includes the so-called master data (plant identification and technical features such as design and operating values) and annually updated operating reports (component lifetimes and standby times, repair, isolation and outage times, test intervals) for all components modeled in the PSA. The completeness or quality of the data collection is ensured by storing all reports relevant for the analysis in the operations management system and by a peer checking method in event assessment.

The event and operating reports for one year are sent to the central reliability and event database, to which all German nuclear power plants, as well as the Siemens/KWU plants at Borssele (NPP in the Netherlands) and Gösgen (NPP in Switzerland) supply failure data.

The benefits for the plant are:

- Incorporation of the current technical status and operational experience of the plant itself.
- Improvement of the statistical dependability of the reliability data by making use of the operational experience of similar plants.
- Meaningful PSAs for the plant itself (assessment of modifications, modification of test frequency).

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.