

# OSART Good Practices

## MAINTENANCE

### Organization and functions

#### Arkansas, USA

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

Plant commitment to industrial safety for maintenance activities is clear and highly visible. Examples of this commitment include:

- Safety Observer:

Following a plant initiative to significantly improve industrial safety performance, ANO management and the general contractor have worked together to introduce and develop the role of Safety Observer. While the responsibility for personal safety remains clearly with the

worker, the safety awareness level of the crew has been augmented by the oversight that the Safety Observer brings to the work. The Safety Observer is selected by the working team, from the team, prior to performing the pre-job brief. The Safety Observer's responsibility is to ensure that the team adheres to all safety rules (such as ensuring personal protective equipment (PPE) is worn and a safety minute is performed at the work area). Additionally, the Safety Observer is a visible point of contact for questions when industrial safety concerns arise or actions need to be taken. The safety observer position is well recognized, his authority is fully accepted among his co-workers and fully supported by management.

The safety observer is identified by highly visible lanyard cards which also details the expectations of the position..

Lanyard card 1 states the following:

Side 1= " SAFETY OBSERVER".

Side 2= What would make the Task Safer??

- REINFORCE:
  - o PPE Requirements
  - o Use of "The Safety Minute"
  - o Fall Protection Requirements
- Reminder of Plant Conditions
- Watch for Heat Stress Issues
- Maintain Questioning Attitude

Lanyard card 2 states the following:

- Employee Authorization to STOP Work

"As a contractor representative, you have the Authority without fear of reprimand or retaliation, to immediately stop any work activity that presents a danger to you, your co-workers, our clients, partners or the public. It is your responsibility to get involved by questioning and rectifying any situation that is identified as not in compliance with our Environmental Health and Safety policies. You are to report any conditions or activities that involve violation of established Environmental Health & Safety policies. If you don't feel the issue is addressed adequately, you have the responsibility to raise the issue higher."

## Fessenheim, France

Mission Date; 23 Mar.-8 Apr., 2009

GIM-EST, a non-profit organization was founded by the EDF, to gather contractors and to enhance industrial safety, health and well-being of contractors.

The GIM-EST association was set up in 1991 with the support of the public authorities, EDF and contractor companies working on the three Nuclear Power Stations in the north east of France (Cattenom, Chooz and Fessenheim). GIM-EST is a non profit making association (law of 1908).

Organizational structure: the association has more than 50 member companies and structures, major industrial groups, training organizations, temping agencies, etc.. It has an oversight committee consisting of 15 members and four full-time employees (1 industrial safety engineer, 2 project managers, 1 secretary)

Roles and responsibilities: training/advice and industrial safety/contractor living conditions/employment opportunities and promotion of nuclear career opportunities/customer relations.

Agreement with EDF:

- o Service agreement between GIM-EST and Cattenom- Chooz- Fessenheim: industrial safety, radiation protection, enhancement of professional skills, skills renewal, working and well-being conditions on nuclear power plants, communication, operating experience, maintenance, etc.

- o Charter on progress and sustainable development in the north eastern region: transparent bidding process, development of contractor skills, reduction of individual and collective dose, improved risk prevention, improved working conditions and housing assistance, housekeeping and environmental protection.

Plant results demonstrating that this good practice produces the expected results:

- o CIESCT (Comite Inter-Entreprise Securite et Conditions de Travail) committee overseen

- by the GIM-EST Vice Chairman

- o Hiring of a full-time project manager at Fessenheim, who attends contractor instruction

- sessions, sits on outage industrial safety committees, participates in accident and near-miss

- investigations (EDF and contract staff), coordinates contractor satisfaction surveys, etc.

- o Contractor training initiatives: human performance and error reduction techniques, bolted assemblies, craft training academy for nuclear professionals

- o Improving living conditions: list of available housing/accommodation options close to the site.

## Vandellos 2, Spain

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

Plant staff and permanent contractors working for the maintenance department follow the same initial and refresher training courses.

During normal operation, the maintenance workforce at the plant is made up of 50 % own personnel and of 50 % permanent contractors. Both follow the same initial training courses on nuclear and industrial safety, human performance, radiation protection, and other topics. In addition, the same refresher training is given to both groups.

As a result contractors are regularly informed on the expectations and requirements set up by the plant on nuclear and industrial safety.

The permanent contractor supervisors also attend the daily operational meetings together with the plant supervisors and they are encouraged to participate and provide solutions to plant issues.

This approach has helped to achieve a 30 % decrease in the number of events with incapacity as well as a 70 % decrease in the number of events without incapacity for the permanent contractors in maintenance since 2006. In 2009 there were two events with incapacity and one without incapacity.

## Doel, Belgium

Mission Date; 8-25 Mar., 2010

Certification program for maintenance work planner

The work planner has a key role in the Maintenance department at the plant. An intensive training program has been developed for this particular function, leading to a formal accreditation. The training program lasts 18 months and consists of 4 modules. During the training program, there are 3 examinations (after the first 3 modules), a on the job training period, and a final examination with certification after the fourth module, where line management is present. This program entails classroom training modules, self-study and formalized on-the-job training.

In this programme equal weight is given to the 3 barriers of the defense in depth model (design, work practices and behavior).

The head of Care Nuclear Safety is a member of the evaluation committee, to determine if the work planner has sufficient knowledge in that particular area.

Maintenance has drawn up an accreditation program for maintenance work planner with the same depth as that of a reactor operator.

### Assessment of contractors' competency in nuclear safety culture during outages

The plant has established a coaching and training program in nuclear safety culture for all contractors.

A 4-day training course was developed for this purpose, involving general training in nuclear

safety culture as well as more specific training for contractors in the management expectations of the plant. This is comparable with the contractor safety and quality programs

that exist in other countries.

In addition, a coaching program is provided in which the instructor coaches the contractors in the field during outages.

To ensure that the training program is about more than just attaining a certificate, the contractors receive an assessment of their competency in nuclear safety culture after the field coaching program, to underline the importance of continuous improvement, which is a key characteristic of nuclear safety culture.

A special edition of the management expectations designed for contractors has been produced for this purpose. The booklet of management expectations is the common denominator throughout the training. The contractors receive a copy of this booklet during training.

There is very strong focus on Human Performance during the training. The head of the 4-day training program is also the HU coach from the plant Maintenance, which ensures that contractors receive identical HU training to plant staff.

All contractors who work in technical installations at the plant, must obtain a certificate in nuclear safety culture. This certificate is issued after a theoretical and practical evaluation of contractors' competency in Nuclear Safety Culture.

Up to now, 3,938 contractors have been certified.

The training programs are given in Dutch, German, English and French.

The instructors are trained and have been qualified by the plant.

### Supervisor Short Course – Standards Training

A supervisor Training program is delivered in order to enhance site and contractor supervisory leadership skills to ensure that poor jobsite behaviours are recognized, confronted and corrected. This training is delivered to all managers, supervisors, stand-ins, temporary and new short term contract supervisors prior to each refuelling outage. The training is current for up to 2 years unless absent from the site for greater than 6 months. On completion of the theoretical components, individuals complete a practical and oral assessment

#### Examples:

- Program is designed to ensure understanding and alignment with site standards, expectations and processes
- Program focus is on standards “What to correct” and coaching skills “How to coach”
- The “What to correct” focus includes such topics as:
  - o Station safety programs including situation awareness
  - o Arc Flash ( electrical safety )
  - o Human Performance Tools and expectations
  - o Rework and quality of work
  - o Foreign Material Exclusion ( FME )
  - o Contamination and Dose Control
  - o Lifting and Rigging
- The “how to” focus includes such topics as:
  - o Approach and Coach
  - o Assertiveness
  - o Building rapport
  - o Communication Skills
  - o Observation Skills
  - o Conflict Management

## Koeberg, South Africa

Mission Date; 22 Aug.-8 Sep., 2011

In order to enhance lessons learned and improve CAP quality the Maintenance Department developed the Maintenance Corrective Action Review (MCAR) process.

Maintenance Department has established a weekly meeting with the maintenance managers and CAP support staff (CAPCO) to review department CAP program performance and individual investigation results. The meeting is intended to review the department CAP investigations to reinforce department standards and enhance lessons learned across the department.

Examples:

- Reviews all department investigations and assessments
- Share OE across the maintenance departments
- Quality of assessments, analysis and corrective actions is reviewed
- Identifies trends for the department
- Review of corrective action completion to ensure CA meets the intent and proper evidence is provided.

## Gravelines, France

Mission Date; 12-29 Nov., 2012

Use of valve skill map to select the most suitable workers for field activities

A valve skill map has been developed by the plant, which maps out skill levels (level 1 being the lowest and level 4 the highest) for each individual in the valve group for work on differing

valves. This skill map is used to identify the most appropriate worker(s) for the job to be carried out, particularly for sensitive activities.

It provides the following advantages:

- Easy identification of working group skill level prior to starting work;
- Establishes checks to be carried out prior to starting work;
- Selects the most appropriate person for the activity, particularly for safety-sensitive work.

Following the implementation of this approach, there has been a reduction in the number of maintenance deficiencies in valve maintenance activities.

## Chooz, France

Mission Date; 17 Jun.-4 Jul., 2013

Crossover professional development for maintenance personnel.

The plant has adopted a programme for crossover professional development of maintenance personnel. A joint employment structure, which is shared by the plant and its contractors, recruits two persons for duration of two years: one of them will be hired by the plant and the other will be hired by the contractor.

These two persons are seconded to the plant for outages, where they provide support to the

work coordinators. The rest of the time, they work for the contractor on outages at different plants in the EDF fleet. The two year programme enables the trainees to carry out numerous

activities, develop professional capability, understand practices and experience different plants in terms of work planning and coordination.

The persons who have gone through this crossover development programme have shown some marked characteristics:

1. They have a more complete overview of the way things are done at EDF and within the contractor companies.
2. They are more knowledgeable about the practices on other sites.
3. They acquire the necessary technical skills for infrequently-performed activities.
4. They are qualified more rapidly as work coordinators or contractor monitoring supervisors at NPPs.

## Dampierre, France

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

The Stewardship of Skills training programme for new maintenance employees has provided

a credible framework to systematically deliver knowledge and skilled training to the workers.

The plant has received corporate support to deliver a training programme to new employees

that focuses on mentoring the staff in specific areas to develop the knowledge and skill necessary for them to be productive and proficient. The output is a log book which is completed, reviewed and used as a tool to track progress.

The programme makes use of experienced workers and leaders that are willing to share and

coach new employees to transfer knowledge and skill prior to retirement.

The programme is focused on skills and knowledge gaps that were identified through analysis of sub standard work and event history.

The effectiveness of this initiative is measured by the department leaders and between 2011

and 2015 there has been a marked improvement in this area while the plant has increased the number of new employees by 100 new workers per year for a total of 400 new staff.

This

represented a significant challenge and the improvements can be seen in the following indicators linked to the performance of the workers:

- the number of safety significant events has declined from 40 in 2011 to 20 in 2015
- the number of sub-standard maintenance work events has reduced from 27 in 2011 to 16 in 2015
- the number of events resulting in a production loss has reduced from 15 in 2011 to 4 in 2015



## Use of Maintenance Key Performance Indicator (KPI) monitoring tool Qlickview

Qlickview is a tool for maintenance managers and supervisors to monitor and analyse the performance of the department or team against the maintenance KPIs. High level KPIs are displayed with those on target automatically set to green or red to indicate a performance gap.

The strength of the Qlickview system is its connection to the plant's work control and information system databases and its ability therefore to produce almost real-time data for the user as well as historical data retrieval.

In Qlickview tool it is possible to drill down from the top level (maintenance unit) to a single supervisor to see and analyse all KPIs relevant to the area selected. It is also possible to analyse trends over different time periods.

The Qlickview software is designed to monitor and analyse different kinds of data based on various user specified requirements.

At the plant, the maintenance unit has used the Qlickview-tool to monitor and analyse maintenance selected KPIs and this has helped to drive performance improvement within teams and across the department improving Nuclear Safety and plant performance.

The first page on Qlickview tool provides an overview of all KPI's (figure 1).

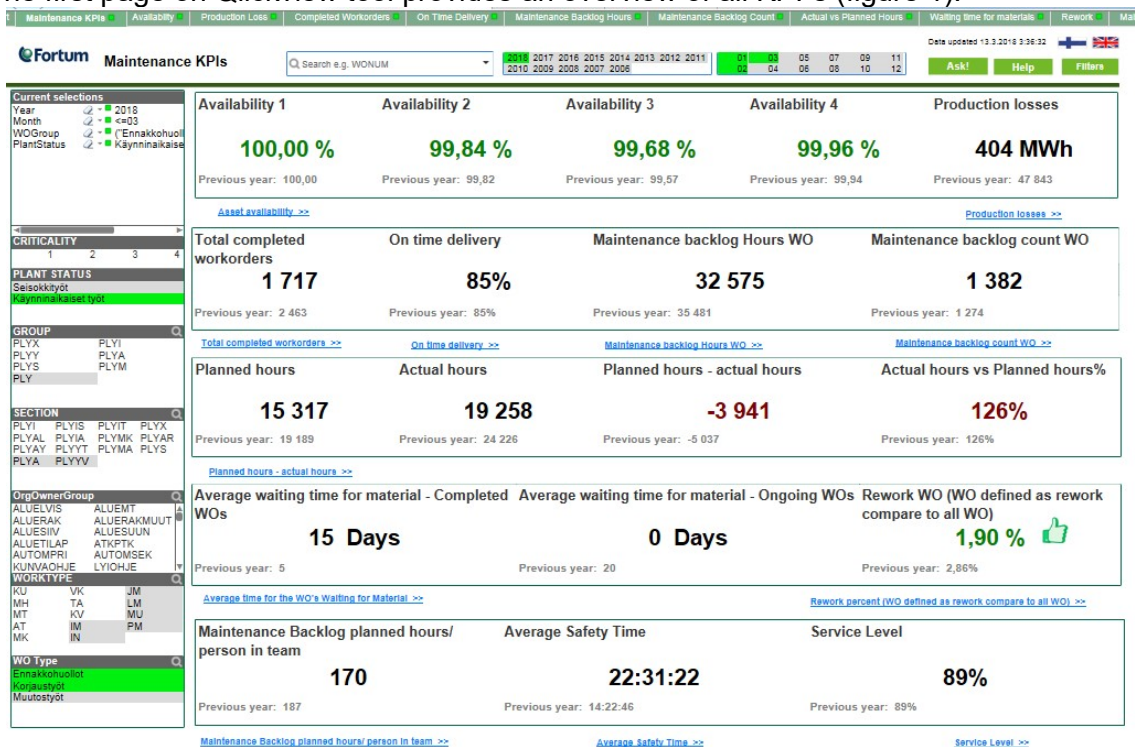


Figure 1. Qlickview first page summarising all KPI's and status of KPI's.

Each KPI has its own sheet on the Qlickview tool and gives an opportunity for users to analyse trends by time, critical classes, maintenance groups, maintenance teams and work type.

KPIs that are followed up by Qlickview:

- Asset availability by critical classes (fig 2).
- Average work time on safety systems that causes unavailability by critical classes (fig 3).
- Production losses by critical classes.
- Completed work orders by critical classes.
- On time delivery %.
- Maintenance backlog, number of tasks on each critical class, planned hour`s per maintenance person.
- Actual and planned hours on maintenance works.
- Time waiting for materials on maintenance works, Rework & Service level.

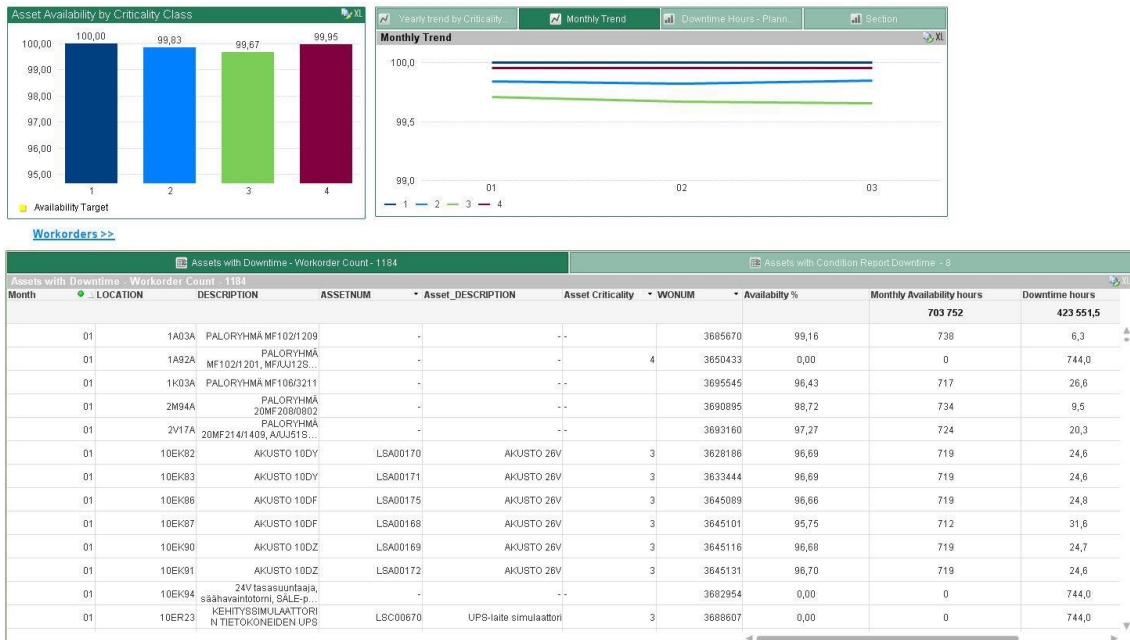


Figure 2. Asset availability by critical classes

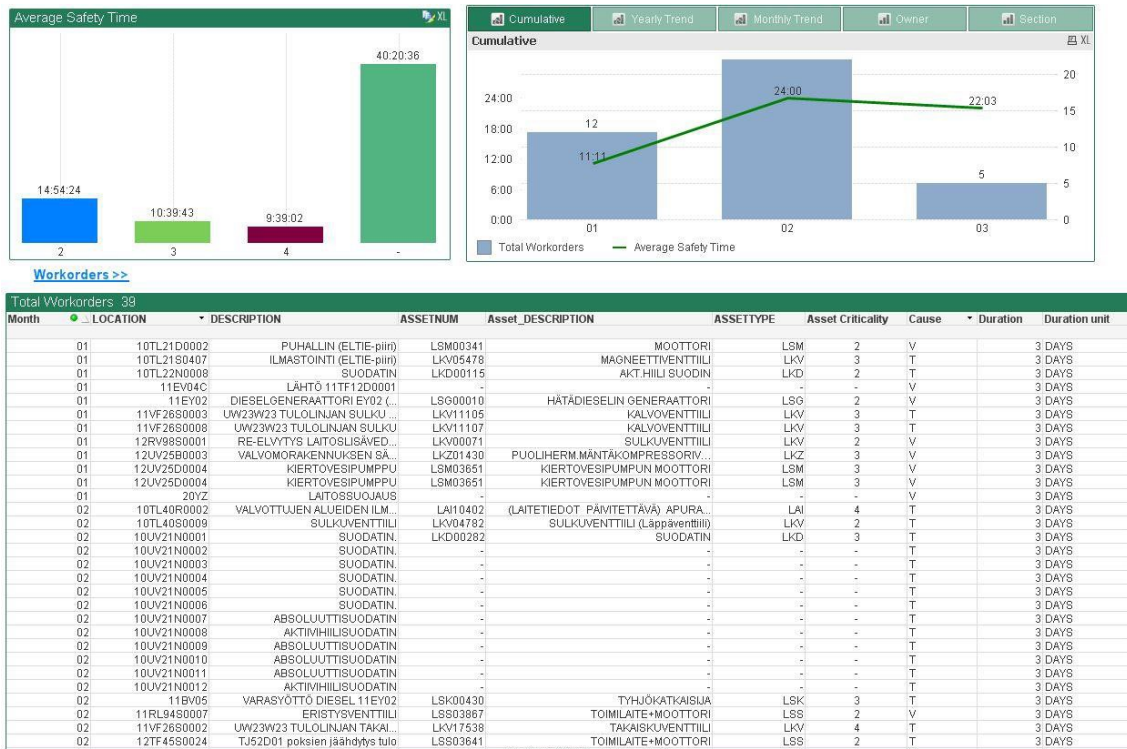


Figure 3. Average time for works on safety systems that cause unavailability to systems by critical classes

### The use of a valve book when executing maintenance activities

A valve book has been developed by the plant which explains, with pictures, good practices and operating experiences from different types of valves. The valve book is used to identify possible challenges during the work and shows how the work should be performed in order to minimize mistakes.

It provides the following advantages:

- Easy identification of valve type and comprehensive collection of operating experiences,
- Establishes check list to minimize mistakes during executing the maintenance activities at the workshop,
- It guides technician to select the right tools to execute work.

Following the implementation of this approach, there has been a reduction in the number of maintenance deficiencies in valve maintenance activities.

