

OSART Good Practices

OPERATIONS

Organization and Functions

Belleville, France

Mission Date; 9-26 October, 2000

A new process of individual qualification which integrates training, management and supervisor observations, personal performance, and professional development enables line management to assess the skills and qualifications of operations personnel. The uniqueness of this process is based on the integration of various programmes to develop an overall perspective of individual skills. The key objectives of this programme are:

- To ensure professionalism of staff.
- To provide assurance that staff will handle difficult situations with a collective approach capable of compensating for individual error.
- To ensure credibility in the view of external agencies.

Skills evaluations are built around three methods of observation:

- Daily monitoring of the individual.
- Assessment of training.
- Meetings between line managers and individuals.

An assessment guide is created for each field operator and control room operator. This comprehensive guide groups the following information:

- Monitoring of training.
- Monitoring of the quality of performance of daily actions and activities.
- Monitoring of rare or unusual activities that necessitate maintenance of skills through training.
- Identification of areas for progress, and tracking of these areas with respect to key safety-related activities.

Skills assessments are carried out throughout the year on the basis of criteria defined in the Corporate Skills and Knowledge Guide (GNCC) for operations job functions. These criteria form the reference base for each job function. They are transposed into practical applications that can be observed and measured by the Shift Manager and Unit Shift Supervisor. Monitoring is carried out on a continuous basis. In the event of an anomaly being detected, it is traced in the form of an "area for progress", and dealt with immediately. The individual is therefore able to assess his own performance with respect to the observations made. Meetings between line management and the individual enable validation of the information in the assessment guide, and provide the basis for the decision to issue or re-issue the qualification.

Shift personnel, returning from the scheduled ten day break, go through a systematic review of operational data the day before returning to shift. Within the shift system, one normal working day is scheduled on the day before returning to morning shift duty after a 10 day absence (rest period, plus one week training on simulator). This day enables the whole crew to be brought together to communicate all of the necessary data to ensure a calm and well-informed return to shift duty under optimum nuclear safety conditions. The meeting comprises two parts:

The first part, coordinated by the operations planners from the off-shift Operations Planning and Logistics Group, who are responsible for technical monitoring of the units within the In-Cycle and Outage Projects, consists of:

- A summary of key events occurring during the team's absence.
- A description of ongoing problems.
- A description of the programme of activities planned for the coming week.

Each crew member is given the opportunity to request clarification on any points as needed, and to ask for further information on the processing of work requests issued by the crew during the previous shift cycle.

The second part of the meeting, coordinated by the Department Manager or Deputy Manager, provides an opportunity to:

- Debate issues relating to the department, the plant and the company.
- Communicate information and obtain the views of crew members.
- Answer questions asked by personnel concerning ongoing issues.
- Provide reminders of priorities and requirements, particularly in the areas of nuclear safety, risk prevention and industrial safety.

Based on the quality of the information provided and the direct contact that it affords with department management, this meeting helps maintain dialogue between management and staff and enhances the level of safety with respect to activities performed by crew members.

Civaux, France

Mission Date; 12-28 May, 2003

As part of the self-assessment activities carried out by the operations department, a formalized control program has been introduced. This programme monitors the performance of key safety-related operations activities.

Key safety-related operations activities such as surveillance test scheduling, temporary procedures, administrative lock-outs, alarm management, operating documents in the control room, etc. are formally monitored on control sheets.

17 types of check targeting key operating activities have been introduced and are identified by a letter of the alphabet. These internal checks monitor the effectiveness of operations department activities and assess their performance. They are tracked in independent, stand-alone control sheets including:

- control points,
- the person responsible for carrying out the check,
- frequency,
- processing of deficiencies.

The various checks are systematically discussed at the week-end and during the Monday operations meeting to ensure proper implementation of the process. A comprehensive report is drafted twice a year and presented to operations management.

This control programme has improved performance of key operations activities. In particular, it has helped to reduce the number of temporary operating instructions and the number of alarms in the main control room. Another aspect is that the program has been effective in ensuring that operations staff complete their required training in due time.

Civaux, France

Mission Date; 12-28 May, 2003

Civaux NPP has developed an innovative support and expertise structure for the on-line process. This unique structure has the advantage of providing a direct link between the shift team and maintenance work planners and placing the shift-manager at the heart of the decision-making process.

The shift manager is supported by two shift supervisors. The CTTD or deferred-time shift supervisor plans and schedules weekly activities. He provides a direct link between operations staff and maintenance work planners. He relieves the shift manager of planning activities, thereby enabling the latter to focus on operational safety. Unlike other French plants, this position is incorporated into the shift structure.

Thanks to this structure, the CTTR or real-time shift supervisor can focus more closely on daily operations activities, both in the control-room and in the field. He ensures that the interface with maintenance runs smoothly at all times, and has enough time at his disposal to provide the shift team with hands-on support.

This system has proved to be so effective that it has been tested and adopted by other French plants.

With this organization in place, the shift team is truly at the centre of the process.

Establishment of a comprehensive shutdown risk program.

Administrative Procedure ADP-1.3.030, Plant Safety during Shutdown, provides instructions for safe plant operation during different shutdown states. It defines the required equipment to be available to ensure defense-in-depth of shutdown safety functions. A combination of deterministic and probabilistic risk assessment techniques is used.

There are seven shutdown safety functions defined:

- reactivity control
- shutdown cooling
- inventory control
- spent fuel pit cooling
- electric power availability
- cooling water and other vital support systems
- containment integrity and cooling

The outage is divided into nine shutdown states according to the status of the reactor coolant system and the methods used to ensure shutdown safety functions. Required equipment operability is defined for each shutdown state to ensure each shutdown safety function.

The requirements for shutdown safety are built into the outage plan, where the outage schedule is composed of several phases that are directly related to shutdown states. Each activity and each work order within system windows used in the scheduling program are assigned a shutdown safety function code for the ORAM(R) computer application that is used in the outage schedule preparation phase and during the outage execution phase to recognize the impact on shutdown safety functions.

In addition, the shutdown safety requirements are assessed in the MCR by the Shift Foreman and by the Shift Engineer using a detailed checklist each shift and before each transition to the next Shutdown State. Simplified composite system schematics are developed in advance for each outage phase. System and equipment requirements are designated in each outage phase by highlighting the required equipment for the specific outage phase in red. These diagrams give the operator a very good overview to control the protected equipment and to recognize the impact of any outage activity on the operability of the equipment required to provide the safety functions. These diagrams are also used by other plant personnel who are directly involved in outage activities such as outage coordinators, tagging coordinators and supervisory personnel.

Many workers find working rotating shifts difficult. Most conventional rotating shift schedules result in some measure of degraded human performance as the worker's circadian rhythms adjust to the new schedules. Research shows this is most severe after several shifts on nights. Additionally, after years of continuous rotating shift work, some employees are subject to more health disorders.

To deal with these issues, KKP endeavored to improve the schedule for rotating shift workers at KKP1 and KKP2. Following a recommendation of their company physician, an improved system was created, which was designed to have less impact on the shift personnel compared to the old shift rotation schedule (7 consecutive days of morning shift, afternoon shift and night shift).

The improved schedule employs a short-segment shift rotation. The shift workers voted 55 % in favor of a one-year trial of this new rotation schedule. After the one-year trial, the employees liked the new system so much they voted 98% in favor of retaining it.

Note that KKP employs a six-section shift rotation. The short-segment shift rotation is characterized by frequent shift changes with rotation always in the forward direction. I.e.: morning shifts are followed by afternoon shifts and nightshifts follow afternoon shifts. Within a period of seven consecutive days there are a maximum number of 3 consecutive days in morning, afternoon or night shift. Between shift sequences, there is a full 5-day week of regular working days followed by a 2-day week as well as days off. The plant has a graphic depiction of this schedule and can provide details.

- This short-segment shift rotation provides the following advantages:
 - Improved health and well-being of shift workers,
 - Minimization of sleeping disorders,
 - Less impact on human performance,
 - Improved family life results from short segments in a shift sequence and blocks of identical working hours,
 - Better integration of employees in plant activities,
 - Improved, interface of shift workers with other departments or sections,
 - A larger pool of employees finds shift work acceptable resulting in easier recruitment of operations staff.

Kashiwazaki 3/6, Japan

Mission Date; 1-18 Nov, 2004

The operation departments have operators create short videos, for transfer of experience and knowledge of rare operations.

There is a three-year plan for having operations personnel in each shift team choose a work-related subject and make the video by themselves. These videos will then be used for training new field operators, for re-training confirmed ones, or for discussing work practices.

When an activity is not frequent, such videos are an appropriate way for preventing human errors on a long-term basis, by transferring field operations experience. This "video bookstore" can then be used, both during planned training, or just before a field operator is to perform the specific activity.

Moreover, getting operators be the major actors of an important training action is also beneficial for their motivation.

Penly, France

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

Operations Forum

A computerised forum is providing access to the following information:

- attendance and training schedules
- work authorization tracking
- common documents (standard outlines, reference standards, etc.),
- department key performance indicators

The department training administrator suggested setting up an interface providing simple and user-friendly access to data that would be useful for staff. It facilitates sharing of common information for operations staff. It is conducive to greater thoroughness in training and qualification running. The tool can be used by management to verify completion of mandatory training courses and training surveys.

Cernavoda, Romania

Mission Date; 22 Jan.-10 Feb, 2005

Shift crew peer review.

The plant has a unique mandatory programme for shift crew's assessment of other shift crews. It is documented in procedure IDP-OP-028. The review is done by senior managers of the department, but is done also by operators of the same level from different crews.

Quarterly shift supervisor, control room operator, senior field operators and experienced are performing review of other crew activity. Results are presented to the reviewed crew and discussed. Also there is a checklist for essential activities that must be reviewed.

Self-assessment by other crews gives the workers the opportunity to enhance performances for each reviewed team. It is also good to observe their own position and tasks from another perspective.

Human Performance Improvement Plan for shift crews

Specific shift crew plans for short-term improvement of performance of the main operation actions are used as effective dynamic tool for focusing and re-enforcing the correct behaviours required to reduce the human errors.

Like many other stations TQNPC has suffered from human performance related issues particularly while making the transition from commissioning to continued operation. The Human Performance Improvement Plan was implemented to address the issue in an aggressive manner. The plan is focusing on the key aspects of the operator's role by breaking the operators job down to five major areas: work permits/equipment guarantees; safety related system tests; equipment changeover; shift turnover and field rounds.

Shift Supervisors take the initiative and lead improvements to raise standards on their individual crews. Each crew Shift Supervisor develops an Action Plan to initiate improvements in the above target areas. Plan covers the next shift cycle (50 days) and should be submitted to the Operation Superintendent for review and comments.

The plan should include the intended actions for improvement in each of the above 5 areas and also actions that lead to the proper use of Event Free Tools by each member of his crew, measures and indicators that demonstrate improvement. At the end of each shift cycle the Shift Supervisor submits his progress reports to the Operation Superintendent with an evaluation of the plan accomplishment.

Operations Superintendent and Deputy Superintendents should review and comment on shift crew Action Plans, sharing the appropriate comments with all shift crews. Subsequently they evaluate the progress reports and completed observations reports, evaluate trends and evolving issues and initiate department corrective actions as required. Based on that the Operation Superintendent provides feedback to the Shift Supervisor.

The crew improvement plans, including monthly progress status reports are now formalized and along with observation report data are filed on the operations intranet website. This provides operations management with an evaluation tool that can be used to initiate corrective actions to longer term or evolving issues. The posted information on the intranet site provides a convenient media and opportunity for staff to learn from the experience of their peers. The program is now continuous and dynamic with status summaries and new plans are generated every 50 days (equivalent to one shift cycle) by the respective crew shift supervisors.

Blayais, France

Mission Date; 2-19 May, 2005

Operations management has implemented a comprehensive staffing and succession plan (GPEC) for all operations staff for the next 10 years. The staffing plan has factored in recent company policy that reduced the work week to 32 hours and incorporates considerations such as retirement, promotions and training requirements. The team considers that this is a good practice.

- Known departures (retirement) and foreseeable departures (change of position including promotions) factored in.

- Intake needs are defined on the basis of unfilled positions.

- Training periods prior to filling the position are factored in.

- Hiring dates (internal or external) are defined and positions are advertised.

- Department management is responsible for adapting actual qualified manpower to department needs.

- A specific GPEC management meeting, chaired by plant senior management, is held twice a year in order to review possible job changes for managers in operations, safety/quality engineering and training departments.

- A user-friendly tool (Excel application) is used effectively.

Brunswick, USA

Mission Date; 9-26 May, 2005

Discussion at shift turnover

There is a mandatory requirement that during shift turnover, with the entire shift crew present, the first two items discussed by the shift superintendent are safety and human performance issues. New internal and external operating experience feedback topics are also discussed during the shift turnover process.

Brunswick, USA

Mission Date; 9-26 May, 2005

Rotational assignments

The operations department uses an extensive personnel job-rotation plan to provide on-shift personnel with experience and knowledge of other site disciplines and contributes to the affected organizations ability to produce high quality products. While many plants utilize job rotation schemes for operators, this programme is unique in that it is so extensive and it places experienced operators in jobs where operational experience is useful but seldom found.

Experience in off-shift positions also aids in the professional development of personnel. Personnel are routinely rotated into and out of these full-time positions every two to three years on a staggered basis. These rotating positions provide development opportunities for shift superintendents, control room supervisors, senior reactor operators (including shift technical advisors), reactor operators and auxiliary operators and the programme provides for depth of operational knowledge in the organization.

Volgodonsk, Russia

Mission Date; 1-19 October, 2005

Management has created excellent working conditions which support a safety oriented attitude among the operations staff.

The plant uses the aim oriented approach that a suitable working environment supports in carrying out the work safely and satisfactorily, without imposing unnecessary physical and psychological stress on the personnel (NS-G-2.4, § 6.61).

Furthermore, a policy on fitness for duty and mental fitness is set e.g. the operating staff is psycho-physiologically examined yearly.

A periodic anonymous screening of the confidence of the shift personnel towards the plant management is performed in order to recognize early trends and, if necessary, to improve the work atmosphere towards open-minded and safety oriented one.

During the review a well organized working environment was observed in the MCR, the Main Electrical Control Room and in many other areas of the plant.

The improved working environment supports the operational management efforts to transmit their expectations on the safety culture and the ownership attitude to the staff.

The good housekeeping status of the NPP, and the motivation of the staff are indicators for the achieved success. The learning process is going on.

The operational management experienced that it is not sufficient to submit messages only in a hierarchal way. Complementary down-up procedures were implemented. In 2004 additional to the route checklists for field operators route guides for the senior management were introduced. The operation managers periodically perform joint inspections with the field operators during which they assess the quality of personnel activities and promote their expectation on a safety oriented inspection directly on-site. The introduction of managerial tours improves the quality of work of field operators provides evaluation tools and allows directly clarify safety concerns from individuals. The feedback on safety culture improves the route checklists, route guides and the whole inspection procedures.

Mochovce, Slovak Rep.

Mission Date; 4-20 Sept., 2006

A specially written computer system (JESETER) is used by operations day staff to support shift personnel. JESETER has become the main method of preparing, communicating and authorising daily work schedules. In addition to other information, it facilitates the rapid transfer of safety related items, such as 'Just-in-Time' information for briefing purposes and can be used as the administrative tool to confirm familiarisation with documents.

JESETER was developed to meet the exacting standards ISO 9001:2000. It enables the on-line participation of authorised persons in the development of work packages. This process includes input from the safety Engineer.

A strength of JESETER is that it incorporates the results of a detailed analysis of the actual responsibilities and interactions which take place between personnel during the preparation of work schedules. JESETER has been engineered to run on the station network and has been incorporated into the unified system for the management of operational activities. It can be readily accessed by all involved personnel. The effectiveness of the JESETER tool is monitored and confirmed on a monthly basis.

JESETER system helps to avoid unnecessary load on shift staff, to optimize staff activity, to reduce the possibility of making wrong decision.

The plant has created a technical file database that contains the intricacies of current issues that are being investigated and resolved. The database is accessible to all parties involved in resolving the issue.

The practice proves beneficial for several reasons.

- Important information regarding the issue is not lost during periods of turnover.
- The information is accessible by all disciplines involved in the issue to view a running tally of issues faced and resolved with the issue
- The documents stay within the database for reference in case of repeat problems with other unit's equipment, which minimizes the "re-learning" process.

In the past 4 years, 892 equipment files have been created and are in use today, many of which have provided rich information to swiftly move through like situations with plant equipment.

Results of the database include the implementation of lessons learned on similar issues associated with:

- Air in-leakage to the Boron and water makeup tanks on Units 3 and 4. The evolution was expedited by implementing lessons found in the database from a similar occurrence on Units 1 and 2.
- Another case used was for an air system leak into the reactor building on Unit 4. This occurrence was repaired previously on another unit. The use of the database allowed input to the development of schedules, dose assessments, and trouble shooting plans to expedite the repairs.

Arkansas, USA

Mission Date; 15 June. 2 Jul, 2008

Worker ownership of improvement programme to enhance safety and performance of plant operations.

Human Performance is recognized as being a vital part of the successful and safe operation at Arkansas Nuclear One.

An Operations organization (Human Performance Improvement Group, "HuPIG") has been formed, significantly by individuals at the worker level in the operations organization. This group, which is led by the workers and is fully supported and trusted by the management team, has developed a series of operational focused human performance tools, designed to improve the safety and performance of Operations Department. This group also reviews condition reports, operating experience and human performance improvement forms. The results are communicated to the site leadership team and to the individual crews to use as lessons learned.

Individuals in this group have influenced their peers to make their minor errors and near misses public, so that the entire department may learn from them, but also to look for good performance and ensure that these get recognized. The results and examples of Human Performance Improvement Forms and Good Catch awards are visible on the "HuPIG web page".

The results of this group's efforts can be for example seen in the Component Status Control Performance Indicator. In August of 2007, the human performance group was asked to help resolve the degrading performance in the area of plant status control. The group developed a recommended action plan and presented it to the management. This plan was implemented and, within a short time, the degrading trend turned into an improving trend.

Cruas, France

Mission Date; 24 Nov -11 Dec., 2008

The plant has a programme for performance of crew (comprised of a shift manager, shift supervisor, tagging officer, control room operators and field operators) team projects to improve safety, efficiency, capacity and compliance with environmental regulations. Crew projects are developed to achieve the aims of Department and site projects.

These projects enhance crew team work while providing tangible benefits to the plant. The projects are designed to involve all crew members in solving existing issues. The target for these projects is to facilitate team building and improve all crew members' skills and safety culture attitudes.

The plant benefits not only through better crew dynamics but also through enhanced plant performance, increased efficiency and an improved safety culture. When a crew project is adopted by the plant all crew members are recognized by their peers and by plant management by the use of awards and plant news releases.

As an example of a crew project the performance of the RPR (reactor protection system) surveillance test was optimized to decrease unavailability of components and systems important to safety, reduce time spent in Limiting Conditions of Operation (LCO) and save critical path time. This enhancement has already been adopted by the EDF fleet.