Belleville, France

Mission Date; 9-26 Oct., 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.
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 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.
Quinshan3, China

Mission Date; 5-24 May, 2005

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 plant 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

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.

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.
Volgodonsk, Russia

Mission Date: 1-19 Oct., 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 Sep., 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 Jun.-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.
Fessenheim, France

Application of human factors specialist knowledge and human performance error prevention tools to shift operations.

The position of "Pilote de Tranche" was created in 2008, with a view to centralising the day-to-day operational-decision making process in a single location: the main control room. The "Pilote de Tranche" is responsible for coordinating the schedule, for setting priorities and for distributing work within the shift crew.
As part of his duties providing direction in the performance of daily activities, he incorporates nuclear safety considerations and manages the shift-manager and deputy shift manager call-up system.

During power operations, he provides technical supervision for both units. When one unit is in outage, he provides technical supervision for the operating unit and common plant, thus freeing up the deputy shift manager to deal with matters on the unit in outage.

In 2008, the position of "Pilote de Tranche" was introduced in one shift crew on a trial basis.

Since the end of 2008, 7 "Pilotes de Tranche" have successfully gone through the authorization process, making a total of 1 per shift crew.

In May 2009, a 4-week trial (2 weeks during power operations and 2 weeks during outage on unit 2) will be conducted at department level, in order to make the necessary adjustments to the creation of this new position.

The operations department has chosen to provide the "Pilote de Tranche" with specific training in human performance tools, thus enabling them to acquire specialist knowledge in this area. They will provide the reference model for the use of error reduction techniques within the crews. Their duties will include reinforcing the use of human performance practices and promoting the use of these practices both within the crews as well as within other departments. This facet is already being implemented within the shift operations crews.

Plant results demonstrating that this good practice produces the expected results: The trial conducted in 2008 showed that the position of "Pilote de Tranche" has given deputy shift managers more time on shift for providing technical guidance, for going into the field and for supporting crew projects. This will eventually enable shift managers to take a step back from day-to-day, hands-on aspects, allowing them more time to focus on day-to-day operational safety matters and focus their attention on the management of their crews.

The "Pilote de Tranche" (Human Performance specialist) is an additional asset in terms of promoting the use of error reduction techniques. He provides strong support to shift crew management regarding the use of these techniques. The most obvious advantage is that crews are becoming more and more accustomed to using these techniques as a matter of course.
The plant has taken a very thorough and pro-active approach to its preparations for the new digital instrumentation and control system (DCS) of Ling Ao II.

This has required a comprehensive commitment from all managers and departments. Specific good practice examples are:

Transfer of tranches of over 40 operators to DCS controlled plants in France to embed learning and experience on the control system.

Creation of a DCS human performance team to resolve the specific human performance challenges that the DCS presents.

Creation of DCS behaviour standards and practice and use of these in the simulator to reinforce operational procedures.

Using operator experience to develop standard tailored system status display and parameter monitoring

Use of a joint working team with suppliers and DNMC to develop modifications such as 3 levels of simulator including verification and validation platform and classroom simulator.

Use of cross team competitions on the system to engender a deep understanding of the system for the operators and technical staff.

These practices will help minimise the potential for human errors during operation of the power plant which may be caused by the significant differences between traditional control systems and DCS.

Other power plants that are planned are suggested to review this approach since it would hold significant benefits in the development and training of staff.
Operations department internal control – one shift crew – one area

Every year, the department defines an internal checking plan to enforce compliance with the requirements defined by the baselines as well as to assess effectiveness of safety-related processes adapted within the Operations Department. The fields to be checked and enhanced are defined by the Deputy Department Head, assisted by a Shift Manager. This depends on operating experience from the previous year and priorities are defined in the departmental contract. Each shift crew is assigned to a specific topic and they are responsible for implementing control actions in the area or areas assigned to them each year and according to specification defined to allow them to meet expectations. The breakdown for 2010 is as follows:

- Team A: alarms and follow-up of monitoring means in the control room.
- Team B: surveillance testing.
- Team C: SAPHIR sheets.
- Team D: temporary modifications (DMP/MTI), temporary operating procedures and fire zoning/volumetric protection.
- Team E: tracking of the checking plan.
- Team F: line-ups, administrative lockouts and temporary safety instructions.
- Team G: work permits. Number of open work permits decreasing.

This organization allows improvement in the quality of supervisory actions, enforces the compliance with processes, allows self-assessment and enhances awareness of responsibilities.
The Operational Focus Performance Indicator

The Operational Focus Performance Indicator (OFPI) provides an aggregate assessment of operational issues that are impacting, or may impact, overall plant performance. The aggregate impact of pertinent Key Performance Indicators is assessed on a weekly basis. Additionally, Operator Rounds Deficiencies and Abnormal Alignments account for equipment deficiencies that individually may not be significant, but when viewed cumulatively could have a negative impact on Operator performance. The indicator enhances the plant’s focus on equipment deficiencies and design limitations that may otherwise receive less attention due to their impacts being minimized through operator performance of compensatory measures. The OFPI is reported on weekly at the Operational Focus Meeting. The Plant Health Committee, Site Nuclear Safety Culture Committee, Operations Management, Work Management, in addition other Station Departments utilize this indicator as a tool in prioritizing work activities and evaluating the effectiveness of actions taken to address deficiencies.

The overall intent of the OFPI is to ensure that conditions that challenge the reliable operation of the unit are addressed in a timely manner and that Operator response actions in Abnormal or Emergency Operating Procedures are not adversely impacted by the cumulative effect of multiple minor deficiencies.

The application of the OFPI has directly contributed to a reduction in the number of:
- operator work around deficiencies, and
- fire impairments

An additional benefit of the indicator is the engagement of the Work Management, Engineering, Maintenance and “Fix it Now” (FIN) organizations who are the owners of the majority of the OFPI indicators.
Operating Observation and Coaching Programme

The Operating Observation and Coaching Programme together with Operating Work Control Group activities resulted in a significant decrease in the number of Plant Status Control (PSC) errors that occurred during Permit to Work (PTW) implementation or revocation. The Observation and Coaching programme is designed to cover 20 operating tasks to establish and reinforce management expectations for operator performance and lead to improvement in conduct of operation.

The purpose of the Operating Observation and Coaching programme is to observe operating tasks while being performed and verify the actions and conduct of the operation against operating standards and requirements as described in operations administrative procedure KSB-005 Operating Standards and Expectations. Every manager in Operating Department, including shift managers, has to perform a minimum of 6 observations in a 6 week cycle i.e. 3 observations of Main Control Room staff and 3 observations in the field with operators.

The programme consists of 20 different observations areas and each area has up to 12 different sub-areas. The observation areas are the following:

- Control Room Conduct
- Communications
- Self-Checking
- Problem Solving / Action Planning
- Log Entries
- Alarm Response
- Pre-Job Briefs
- Authorising PTW implementation
- Implementing a PTW
- Preparing a PTW
- Revoking a PTW
- Reactivity Change
- Shift Rounds
- Unit SSS (Senior Shift Supervisor) Shift Briefing
- Unit SSS command and Control
- Shift Turnover / Handover
- Work Evolutions
- Reinforcement of HP Tools by Control room Supervisors
- Procedure Usage
- Crew team Work and Oversight

Operating observations are evaluated regularly and identified more exemplary performance areas than areas for improvement.

Examples:
A total of 422 observations have been performed by Operating in 1st quarter in 2011 (previous quarter 339), 76% of these were critical observations.

The highest % of the observations for this quarter has been performed on Work evolutions on the plant 16%, Pre-Job Brief 14 %, Procedure usage 16%.

In the first 6 months of 2010, 5 of the 11 PSC events occurred during Permit-To-Work (PTW) implementation/suspension/revocation. As a result of these observations during the second half of the 2010only 1 of the 18 PSC events occurred during permit to work implementation/suspension/revocation.
Rajasthan, India
Mission Date; 29 Oct.-15 Nov., 2012

Programs to develop operations staff and enhance operational focus in support groups

The station has several initiatives that when considered in whole provide a comprehensive approach.
Examples of include:
An operation policy requiring all experienced Shift Charge Engineer qualified staff to be deputed in station simulator to instruct and coach candidate control engineers, thus supplying recent operating experience to the training environment and facilitate identification of latent simulator deficiencies by checking simulator response with their experienced station response during the course of simulator exercises.
The station has made Control Engineer operations license mandatory for new graduate engineers joining the station. They are initially deployed as field engineers and mentored by senior persons to become familiar with operational aspects of the plant. They then progress in training program to complete on the job training, simulator training and exams culminating in licensed as a control engineer. These persons are then deputed to various support groups which has positive impacts on operational focus of the plant.
The use of a “Master Coordinator” who is Shift Charge Engineer or Assistant Shift Charge Engineers qualified for all D2O related critical and infrequent jobs to act as single point of contact for the job. This concept is also used during Biennial planned shutdowns (BSD) for different systems to support shift operations staff by coordinating/interfacing with other concerned sections. Developing engineers are also attached to these job coordinators during BSDs to acquire experience and enhance operational knowledge.

Chooz, France
Mission Date; 17 Jun.-7 Jul., 2013

Self-assessment groups to discuss enhancement plans within Operations.
The Operations Department has set up self-assessment groups to discuss and resolve specific issues within Operations. Topics considered by these groups include:
- Optimizing staffing within operations,
- Improving control room serenity,
- Improving configuration management,
- Sharing operating experience,
- Improving waste management,
- Improving effective plant rounds,
- Improving documentation management

The operations department also participates in 3 cross-departmental self-assessment groups to address such topics as:
- Improving the temporary modifications process,
- Improving the work authorization process
- Improving reactivity management

Each of these groups has at least 1 member of each shift crew and the groups meet at least 4 times a year. The meetings are chaired by Operations management. To allow all members to attend, measures are taken to replace shift crew members when on duty. These self-assessment groups benefit from sharing good practices or problems encountered
between the various shift teams. The involvement of management ensures that action plans are produced as agreed in a timely manner. The plant indicates that the creation of these self-assessment groups has empowered the Operations personnel.

**Kola, Russia**

Mission Date; 11-28 Nov., 2014

Photo-luminescent system for indicating escape routes
Kola NPP has developed and implemented a photo-luminescent system (PLS) for indicating escape routes in order to provide directions to plant personnel in poor lighting conditions. The light sensitive photo-luminescent elements store energy and after the light source is removed they stay illuminated for more than 10 hours. The PLS consists of various combinations of possible elements including guiding lines, warning signs, and additional signs which inform personnel on the escape route. The PLS is an autonomous and non-volatile system. Features of the PLS include: being visible and clearly transmitting information in complete darkness; reducing the escape time in an emergency; and, using additional signage (visual prompts) to help reduce confusion and uncertainty. These features decrease the potential for panic and thereby reduce risks to plant personnel.