

OSART Good Practices

TRAINING AND QUALIFICATION

Organization and functions

Ignalina, Lithuania

Mission Date: 5-21 Jun., 2006

As a part of the Ignalina NPP preparation for decommissioning, the systematic analysis of decommissioning personnel training needs has been done, including feasibility study of planning, design, and development of a decommissioning training center. The overall aim of the project was the identification of training requirements to meet pre-decommissioning and decommissioning training needs in the short and medium term. The project covered the following stages:

- Analysis of the Unit 1 expected decommissioning activities that require the training of the personnel. For each identified field of activities, the tasks were determined, demanding the training of the personnel.
- Based on the tasks identified in the first stage, personnel training needs analysis was done as well as analysis of requirements for changing the existing training system with respect to the Ignalina NPP decommissioning. As a result, a training matrix was developed identifying the number of people to be trained, the number of trainers, the scope of training programs, and the projects for which they are to be trained.
- In the third stage, needs of training center facilities, infrastructures, equipment, and technical means, including funding, were analyzed.

International support and expertise were used in this project.

Such a systematic approach to training for the decommissioning phase of the plant life cycle done before the real start of specific decommissioning activities can be considered a good practice as it gives the plant an opportunity to prepare personnel with the required qualification in proper timing and a cost-effective way.

South Ukraine 3, Ukraine

Mission Date: 9-25 Oct., 2006

Well thought-out organization of continuing training for operating shift crews employing the recreation activities for the personnel.

A continuing training program for operating shift crews includes both training and health rehabilitation (at the specialized recreation facility). Annual continuing training for operating shift crews includes two training sessions, two weeks each. Every training day, the operating crew attends the Training Centre only for four hours; the rest of the day, the crew spends at the specialized recreation facility located at a beautiful place close to the river. Personnel recover their health according to the individual prescriptions, including individual diet and rehabilitation activities. The recreation facility is equipped with different means for active rest: gym, sauna, and other premises for rehabilitation. An operating crew works in special conditions (rotating shifts, stresses, etc.); and it is crucially important for safety to provide a possibility to recover health during a total of four weeks per year. As a result of sports events, team spirit is developed, which is considered to be an important factor for safe operation. Such training program arrangement allows also a significant increase in training effectiveness (it is a well-known fact that human ability to effectively receive information decreases significantly after four-five hours of intensive learning).

On-line Training Management System

An online management system using business data processing software has been implemented at the plant. This system enables access to training services and allows the plant to effectively track personnel qualification.

Training and qualification records are centralized in a database, accessible from within the company network by all employees and their supervisors. Individual qualification records are linked within this system to the work planning process such that work planners are notified if they attempt to schedule work to be performed by individuals whose qualification has lapsed.

Initial and continuing training are scheduled as required by specific training programs. However, complementary training courses are selected by the individual, approved by the supervisor, and scheduled for implementation through this same system. Employees have the ability to select from courses already entered into the database or to input requests for new training services. The system displays a training calendar for each individual to assist in course scheduling. Enrolled students are automatically reminded of upcoming courses one month before, one week before, and one day before the scheduled class.

Important incoming documents are scanned on receipt and electronically distributed to responsible plant personnel through the workflow system integrated into this software. Managers and supervisors use this system to further distribute important information and operational experience items to their employees. This feature is just one of many customizations of the business software that has been further enhanced by Neckerwestheim personnel for use at the plant.

This system has resulted in better control of work processes through automatic personnel qualification verification. Delays in course scheduling have been reduced. The software facilitates rescheduling because the Central Services Training Section is automatically notified when courses are 80% full. Notification has enabled the training section to look ahead and schedule additional classes to accommodate needs. Course attendance has been improved by automatic notifications sent to enrolled students.

Computerized training management system.

A comprehensive computerized training management system for planning, organizing, and training record keeping has been implemented in the Training Centre of KhNPP. This software is used to set up annual, and monthly training plans and reports; to set up schedules and track the advancement; to easily access the training and regulatory documentation and to keep reports of individual training history. The system has been developed based on existing experience and makes it possible to optimize training planning and record keeping; it has been recommended by the Headquarters of NAEK Energoatom for adoption by all Ukrainian NPPs Training Centres.

The system comprises interconnected modules and supports; yearly and monthly planning of training; compilation of reports and schedules; maintaining of training records; drafting and supervision of training departments` plans execution; keeping and providing access to electronic documents such as design, regulatory, administrative and organizational documents and training materials; tracking of individual training history; assignment of tasks and follow-up of actions as well.

When a regulatory requirement is modified, this application provides the list of all training documents that are potentially impacted and must be reviewed.

All inconsistencies in the training planning, like the reservation of a classroom or instructor for two different training sessions at the same time are detected and immediately signaled for corrective actions.

Training feedback evaluation process

Rivne NPP has implemented and managed effectively a unique training feedback evaluation process (Methodology for evaluation of the training 181-9-M-QA) for all the Rivne NPP personnel levels (from the level of the workers and field operators to the Director General Deputies). It represents an unusual and good approach to review the effectiveness of the training process and individuals' qualification. Also, all evaluators have passed a special training program about the training evaluation process. The TC personnel receive special training on evaluation skills in the Engineering and Technical Center of Nuclear Personnel Training in Kiev. The program for the initial training of department managers (training for new job positions) contains topics on methodology of the SAT and evaluation process. The operating shift personnel also receive such training within the frame of continuing training in TC. The above-described evaluation practice was implemented at Rivne NPP in the period from 2004 to 2008.

The Methodology for the evaluation of training (181-9-M-QA) covers the following aspects:

- Entry-level evaluation of trainees' knowledge;
- Intermediate evaluation of knowledge;
- Exit-level evaluation of knowledge after each stage of training (theoretical training, simulator training, on-the-job training);
- Assessment of training programs;
- Assessment of training arrangement (questionnaire);
- Evaluation of instructors.

For specific operating positions, the department managers perform the training feedback assessment at the plant 9-12 months after the assumption of independent job performance by the trainees. Also, the personnel training efficiency is assessed in external educational institutions. In the course of the simulator training, the operating personnel provide a self-assessment for the simulator training session and also they evaluate their colleagues. The important aspect of training quality assurance is a feedback process based on the training evaluation results. The feedback process ensures continuous monitoring of training indicators and criteria, and provides benchmarking against the established norms. The specially trained personnel in the Training Centre perform integrated analysis of training efficiency, develop the corrective measures, aimed at improvement of the training components and entire training system at the Rivne NPP. The information about the training evaluation results is communicated to all people involved in the process (managers of all levels).

Fessenheim, France

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

The process of trainee assessment is well developed and implemented and is comprehensive.

Task observations performed by management are an essential means of confirming that staff have acquired and maintained the requisite skills, as they enable management to assess staff skills in their immediate working environment. As they require management presence in the field, they are also an effective means of implementing good practices across the board, detecting deficiencies, and discussing work-related issues with the staff (cooperation).

These observations are performed during the initial work authorization phase for recently hired staff, and during the authorization renewal phase for more experienced staff. This practice is implemented by a number of crafts:

Initial authorization: The training academy arranges for management to perform task observations in order to approve the acquisition of skills at the end of the basic training module, for all specialities.

The training academy also arranges for management to perform task observations in order to issue partial work authorization during the specific training module, for operations and I&C staff.

Renewed authorization: The chemistry, fuel, risk prevention and safety/quality functions also implement this practice. Operations has drawn up observation reference standards and has already initiated the program (underway for shift managers).

The practice is already implemented within the mechanical maintenance and I&C and is now being extended across the plant under the supervision of the human resources function. A formal agreement has been signed with the DPN (corporate level organization) and the plant has committed itself to the regulator for implementing this practice throughout the plant. It forms part of the human resources macro-process (Integrated Management System - action A141). A deadline has been set for the end of 2009.

Plant results demonstrate that

this good practice produces the expected results.

Ling Ao 3 & 4, China

Mission Date: 16 Nov.-3 Dec., 2009

The Nuclear Training Center (NTC) works with universities for basic nuclear training.

Basic nuclear courses are organized in the universities before new-comers arrive in the company. These courses are defined by the Nuclear Training Centre department and the universities.

As China Guangdong Nuclear Power Company (CGNPC) engages about 1000 employees per year, the Nuclear Training Centre has set up two forms of partnership.

- Partnership Training: Under the Partnership Training Agreements between CGNPC and 11 domestic universities, CGNPC pre-employs some grade-three (3rd year) students from the 11 universities and signs Pre-employment Agreements with those selected. Those students shall, in addition to the curriculum of their own professions, study professional nuclear power courses in accordance with the education program agreed between CGNPC and the universities in their grade-four (4th year). Upon completion of their study, they will become employees of CGNPC. It is through this Enterprise-university Partnership Training, CGNPC can secure the selection of outstanding new staff in terms of quality and quantity.
- External Pre-job Training for New Graduates: New staff recruited from university directly will be dispatched to the designated universities according to their professions and demands to receive a 5-month external pre-job training.

Contents: 13 courses on basic theoretical knowledge of atomic energy, thermodynamics, and electricity.

Objective: to enhance the new staff with basic theoretical knowledge of different professions required in nuclear power plants in a short time

As a result, newcomers engaged by the company have good background knowledge of nuclear theories and they can immediately start with specific training according to their jobs. This kind of relationship improves the knowledge of the students and decreases the gap between students and employees.

Integrated approach to recruiting, selection, psychological diagnostics and training of new plant employees.

The plant has developed and implemented an integrated, active, and well-defined program for the recruiting, selection, psychological diagnostics, and training of new plant employees. The program is yielding high potential entry-level employees and has supported consistently high pass rates for licensed operators, greater than 90%, over the past ten years. The process was designed and is managed by the recruitment and human resources development departments in conjunction with nuclear plant training and production groups.

Recruiting begins with company collaboration at secondary schools and technical universities. Twice a year, a three-day nuclear training experience is conducted. Students and teachers participate in classes, competitions, workshops, and plant tours designed to help students learn about nuclear power plant operations and its working conditions.

Preconditions for participation include academic requirements, teacher recommendations, and competence screening for their potential to work as secondary system operators. This combination of prerequisites and a desire by the student for further consideration makes them eligible for company scholarships for study at a technical university. University students participate in a two-week 'Summer University' each year. This combined integrated experience allows the student to assess if a nuclear career is right for them, and for the company to assess if the student has a high potential for future success as an employee.

Selection is focused on licensed operators and other specialized technical areas. The selection process uses a corporate database of applicants. Each applicant must meet specific requirements such as level of education, professional qualification, and experience.

Competence testing is a key element of candidate screening. It is used to predict the successful completion of theoretical and practical training and the potential for an individual to work as a safe, reliable, and long-term productive employee starting as a secondary system operator having future potential. Professional psychologists perform comprehensive diagnostics focused on performance ability and personality characteristics including technical talents, combination thinking, stress resilience, ability to concentrate, emotional stability, conservative approach to problem-solving, discipline, reliability, adherence to rules, teamwork, and avoidance of substance addictions. Results of competence testing are part of an employee's long-term profile.

Licensed operator training throughput rates and overall employee job satisfaction data indicate this integrated approach to recruiting, selection, psychological diagnostics, and training is being applied successfully to nuclear plant employee training and development.

Seabrook, USA

Mission Date: 6-23 Jun., 2011

Station Use of the Learning Management System (LMS) for the daily qualification verification.

This is a useful tool to check personnel qualifications, provide information for future training, and supply automatic notifications of upcoming training. The benefit of this tool is that every individual and manager can easily check if they are qualified to perform the work before they do it.

Plant personnel access the Learning Management System (LMS) to ensure that they are qualified to perform work. Using their own computer workstations, workers and supervisors in the station line organizations access the online database of training and qualification records. Workers perform this qualification check at least daily or prior to performing work to ensure that they are qualified to perform their assigned work. This is a view of LMS used to check qualifications (also known as "curriculum status").

In addition to checking qualifications, plant personnel can check if they are scheduled for future training sessions and can also check if they are due to complete web-based training. If web-based training is required, the worker is able to select the item in LMS and complete it.

LMS also provides automated email notifications to personnel of upcoming open training requirements or class enrolment information, which can be added to the individual's calendar. A daily computer reminder and a culture of verifying that personnel are qualified to perform work ensure work in the station is performed to management's expectations. Daily checks also ensure that training is attended as scheduled, and that qualifications do not lapse due to incomplete training requirements.

Laguna Verde, Mexico

Mission Date: 1-18 Oct., 2012

Extensive benchmarking, self-assessment and the review process on Training and Qualification contributed to the significant enhancement of the initial and continuing training programs at the plant.

The Training Centre has established a strong self-evaluation and benchmarking program which includes the following activities:

- One self-evaluation per year on different training topics such as "The use of OE on Training Programs", "Simulator training" and "On-the-Job training program". Taking advantage of corporate agreements, training has incorporated into these self-evaluations some experts from other Training Centres.
- Two self-evaluations per year for each SAT-based training program which includes the tracking of personnel performance on-site, the tracking of Condition Reports and its relationship to training requirements, the OE and plant modifications feedback. All this is conducted in addition to the training schedule tracking.
- Benchmarking with different NPPs in order to enhance plant training programs resulted in a very detailed system analysis and the design of the plant training management system. Eight benchmarking visits to plant training departments from different countries and ten visits of plant training staff to various NPPs were conducted in the period from 2010 to 2012. Other enhancements have been implemented after benchmarking activities of the simulator.

Mühleberg, Switzerland

Mission Date: 8-25 Oct., 2012

At the plant, a method for preserving and transferring knowledge has been implemented so that operating the plant safely, reliably, efficiently and with care for the environment is achieved.

Not all knowledge and experience is documented, but it exists as tacit knowledge of each individual employee. Preserving this know-how and handing it down constitutes a major challenge. The plant has developed a procedure for the retention of organizational knowledge including several methods e.g. exit reviews, technical seminars, senior consultancy and overlapping periods, travelling and course reports.

BKW actively reinforces and supports the plant in its succession planning. In the last 10 years, the responsibility was handed over early to seven managerial successors so that the previous holder of the position was available in an advisory role as Senior Consultant for at least two years. In the case of a more technical role, detailed exit reports have been produced and know-how handed down to wider audiences at various technical meetings.

The early succession planning with the associated transfer of knowledge has proven successful. As a result, safety and plant availability were maintained at a high level in spite of long-standing managers changing their positions or leaving the company.

A Management of Training & Authorization (MANTRA) system has been developed by the station Nuclear Training Centre (NTC) for the management of training activities. The system has features for

- Generating training needs;
- plan and develop training program;
- conduct training;
- feedback and evaluation of training program.

This training management system has helped in the implementation of SAT (Systematic Approach to Training) at station NTC. All the steps of SAT are carried out through this software. This software has additional modules for Induction Training, Trainer development, Line manager feedback, and Line management training. Station NTC is responsible for centrally coordinating all the types of training conducted at eight unit sites, which means organizing different types of training such as Managerial training, Simulator training, License & Qualification training, Performance-based training, Needs-based training, and Safety training catering to 2649 personnel. The enormity of the job can be sensed from the volume of training required at the site, therefore the MANTRA software program was developed, which is of great help in organizing these training programs and makes retrieval of training-related data easy.

This system integrates Line managers with NTC, as Line managers play key roles in identifying and analyzing training needs. They can immediately address their needs through the online training need generation module of MANTRA. Line managers also give feedback on the performance of their employees post-training, which helps in assessing the effectiveness of training programs conducted and the performance of NTC. MANTRA has been designed with the objective of:

- Generating annual training calendar;
- Receiving training needs from line managers;
- Analyzing, plan & develop training;
- Assigning coordinator & registering training program;
- Online generating of training notifications & mail to all concerned;
- Receiving online nominations for training;
- Organizing training program;
- Generating detailed training report & distribution through mail;
- Obtaining training feedback from line managers;
- Conducting qualification & licensing exams/interviews;
- Recording line management training;
- Online display of "Program in progress" and "Forthcoming programs";
- Obtaining records related to training conducted.

In addition to above MANTRA has the following additional features:

- Induction training module: Induction trainee batch details, faculty, mark-sheet generation, and training schedule preparation are done through MANTRA.
- Station duty module: NTC employees can plan their station duty and fill the station duty proposal through this system.
- Line manager feedback module: Feedback from line managers is automatically taken through this system two months after the completion of training. This helps in analyzing the effectiveness of training.
- Line management training module: Record of Line management training conducted at the plant is updated through this module.

Dynamic skills mapping process for all staff members contribute to the significant enhancement of the overview of collective and individual skills and provides proactive management in the loss of skills. The plant has established a skills mapping process supported by a PC application, which has the following benefits:

- 5-year forward planning of collective and individual skills, focusing on rare or critical skills
- Overview of team and job functions and areas of skill
- Identification of targeted required resources
- Measuring gaps between current status and set targets
- Proactive management in the loss of skills based on specific training, shadow-training, recruitment campaigns, etc.
- Tool interfacing with forward planning (quantity and quality) to provide the ideal requirements when submitting requests for new recruits.

The benefits of this process are:

- Creation of forward-looking recruitment plans according to department priorities and required job profiles
- Skills transfer including the development of apprenticeship
- Competence retention
- Specific training actions within departments

Flamanville 1&2, France

Mission Date: 6-23 Oct., 2014

A skills mapping application is provided that employs a polar chart illustration to provide managers with a clear graphical presentation of the current status of skills in departments on the plant to identify skills availability, including critical areas, which makes a significant contribution to effective skills management and planning of staff training for up to a 5-year period (Skills Mapping Tool).

The plant has implemented and developed a generic computer-based skills mapping application to illustrate the skills available on the plant, which includes the following features:

- Graphical presentation using a polar chart of personnel skills by department and team.
- Clear illustration of the availability of skilled persons in each area.
- Graphical comparison of current skills levels with future values, and identification of gaps.
- Data is collected for a 5-year period.
- Graphical presentation of skills variation with time.

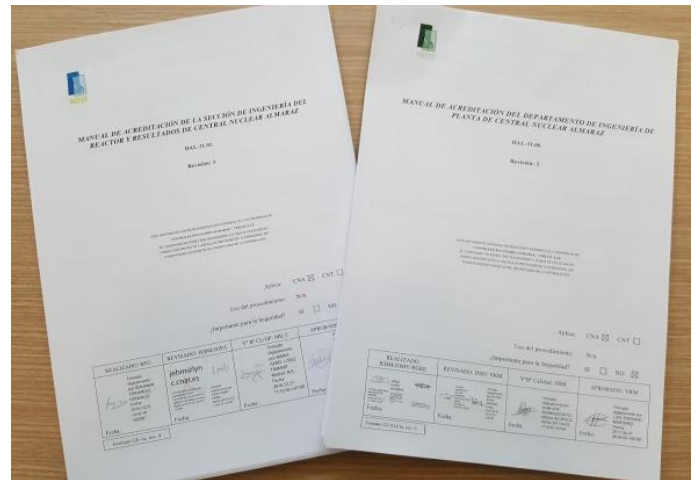
The benefits of the process are that it allows management to present data graphically to:

- Compare current skills to critical and optimum levels, and future skills targets.
- Identify skills shortages, scarce skills, and skills that will be lost in the future.
- Inform the staff recruitment profile.
- Illustrate the effect of retirements/transfers on skill levels.
- Balance skills within departments and teams etc.
- Develop individual skills to meet local needs.
- Identify skilled individuals who could make a contribution in other areas (professional development).
- Identify future training requirements within departments.

The plant considers that, by using a graphical illustration of the data, the plant has improved the management of skills on the site including the identification of training requirements. The tool coordinates and presents data graphically in a way that is easily assimilated and reduces the amount of time needed to interpret the data.

Almaraz and Trillo Nuclear Power Plants (CNAT) accreditation and continuous training manuals

An Accreditation Manual defines the general criteria for initial training, qualification, and continuous training requirements in order to provide external and internal personnel due to fill a vacancy with necessary theoretical and practical training. This is a means of guaranteeing that appropriate and necessary competency levels for each position are obtained and maintained.



Accreditation and refresher training manual content is obtained through a systematic approach to training (SAT). The manuals define the pedagogical roadmap for each candidate in a given position. Learning objectives are distributed across courses or modules and form the basis of the content of the accreditation and continuous training manual that is produced for each department.

Accreditation manuals are used taking into account that the scope of the theoretical and practical training program devised for each position is based on a typical model candidate who has been given minimum regulatory job training and has no professional experience in the nuclear and electrical energy generation industry.

An accreditation manual is typically structured as follows:

- A brief description of the purpose of the manual, the requirements that must be met and the documents used in order to analyze needs and design the manual.
- A list of job positions. The relevant positions are listed in accordance with the CNAT Organization Manual. Typical job positions on which the training programs are to be based are identified and any necessary clarifications are provided.
- Training program development. The programs include training and practical exercises for each position designed for a typical model candidate.
- Task / Competency Matrix. The manual includes a task or competency matrix for the job position.

Accreditation and continuous training manuals are validated in formal training observatory meetings held with the appropriate company area. Once any improvements that have been identified have been included, the document is approved and signed.

Accreditation manuals are routinely reviewed in collaboration with the line in order to include new practices, tasks, operating experiences and/or needs detected during observatories or when supervision is carried out.

Advantages:

- The entire training process required in order to obtain and maintain the qualifications that are needed in order to sustain maximum levels of professionalism and optimum performance results is covered in a single document.
- All organizational units have an accreditation and continuous training manual and this is a guarantee of absolute consistency in training.
- The fact that the accreditation manual includes a definition of learning objectives (linked to tasks that must be learned and competencies that must be acquired or retained) and the

corresponding course content is a guarantee of consistency when transferring knowledge. This is done as a standalone task without instructor criteria input (in terms of choosing course content).

- This process makes devising annual continuous training programs easier because refresher training frequency and the skills and knowledge that need to be covered on the course are already set out in the accreditation manual itself.
- Needs that come up at the plant can be swiftly included in the training process.

Benefits:

- A standardized and robust qualification process for CNAT personnel.
- Clarity in terms of training itineraries both for the qualification process and for the upkeep of that process.
- The fact that the link between tasks or competencies and learning objectives for each job position is defined in the accreditation manual.

Results: A guaranteed robust qualification process for CNAT personnel aimed at ensuring compliance with expectations for efficient and safe plant operation.

HEYSHAM 2, United Kingdom

Mission Date; 2 - 19 Oct., 2023

The plant has used military training expertise to develop high quality Crew Resource Management training.

After the plant identified 'Crew Resource Management' as an area requiring improvement, Training began to involve members of the Royal Air Force (RAF) to provide simulator observations and feedback. This feedback focused largely on developing non-technical skills, such as communication, leadership and decision making. This framework, initially used in the aviation industry, is equally applicable to the nuclear industry, especially as it relates to stressful or emergent situations.

The military training expertise and experience is used to reinforce teamwork behaviours and staying in role in an environment characterized by stress, ambiguity, time pressure and significant consequences for an error. As a result of the simulator observations and feedback from the RAF, individual performance diagrams are created for Duly Authorised Person (DAPs) to illustrate performance against the framework of Crew Resource Management. This information is then more widely used when looking at a shift teams' composition, enabling management to build the most compatible teams and improve overall performance.

As a result, this benefits operating crew's teamwork effectiveness during emergency situations.



Figure 2.1: Crew Resource Management