OSART Good Practices
TECHNICAL SUPPORT
Surveillance Programme

Civaux, France

Mission Date; 12-28 May, 2003

PROSUR and SIAT Programs
It is important that document and procedure configuration controls be managed closely to adequately promote reactor safety. The PROSUR and SIAT Programs provide important elements of this control.
PROSUR - The Prosur program is a single reference program that encompasses all plant system activities, for example: maintenance, operations, chemistry, surveillance tests. The Prosur program provides configuration document and procedure management controls. These controls apply to technical specifications, procedures, and governing documents for the applicable equipment.
SIAT - Siat is a rigorous configuration management tool especially for outages. It was developed to control the change in reactor states during outage periods. This ensures compliance with operations and maintenance requirements during outages. Prior to any change in reactor state during the outage, coordination files are prepared via SIAT, reviewed by the outage safety committee and validated by the shift operations manager. SIAT is linked with the outage work schedule i.e.: work windows, milestones and outage safety committee hold points

Zaporozhe, Ukraine

Mission Date; 6-23 Sept, 2004

Use of a new non-destructive inspection method ("magnetic memory" method) developed for detection of stressed areas before occurrence of cracks.
The method of "magnetic memory" inspection is based on measurement of stressed/strained condition of metal with the use of the coercive force meter. In the course of the analysis of the obtained data, it is possible to identify the most stressed areas of the welded joints and base metal and estimate occurrence of the cracks in future. Also, it is possible to determine the metal hardness and to calculate its mechanical properties. Having such data, it is possible to take measures for reduction of stresses (e.g. heat treatment, pipeline layout change).

Philippsburg, Germany

Mission Date; 11-28 Oct., 2004

To preserve the knowledge of the components and piping of the plant, KKP has developed a computer data base that describes all piping and related component information for all safety related systems.

To develop this database, KKP initiated a program to verify their documentation was in line with what was physically installed in the plant. This verified information was then loaded into a computer database for easy retrieval.

The objective of this program is to have faster access to the current design basis of the plant, when carrying out maintenance and introducing modifications. The database provides the engineers with status of piping systems and their connections (including geometry, material composition and related calculations.) This ensures that engineering has the correct information on what is current design basis of the equipment installed in the plant.

This program, combined with similar programs such as the pipe flange database, allows KKP to have a strong understanding of the components in the plant. Evidence of this strong understanding can be seen in the material condition of the plant (e.g. limit amount of plant leakage and no evidence of use of temporary sealant to stop leakage).

An additional benefit is that this program provides a good source of information for less experienced engineers. This provides KKP with a good knowledge management tool in maintaining its knowledge of the plant.

Philippsburg, Germany

Mission Date; 11-28 Oct., 2004

KKP Engineering has implemented a holistic approach for the aging management of their equipment.

Aging management is an area that all nuclear power plants have to deal with. KKP have developed specific aging management reports for critical components. These reports contain information on the current state of the equipment and are updated periodically. The reports contain such items as, testing and inspection results for that period, operational transients that component may have experienced, and other relevant information.

These reports are then discussed with a group of component engineers in the respective areas (NDT, systems, fatigue, radiation damage..) within KKP to determine how the current information impacts the condition of the component. They then determine if any thing should be changed with respect to that component (e.g., more NDT testing) to ensure that the component will meet its intended design function.

Another benefit of this report is that it contains all of the historical information for that component. This is a very valuable tool in preserving the knowledge base for the plant.

Penly, France

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

A safety functions monitoring system was developed in Penly NPP. The system is a simple and pragmatic method for assessing the status of key safety functions, based on the use of already available safety parameters.
Connected to a simple computer tool, this method enables plant senior management to have a monthly tracking system based on a set of indicators, representing the 'health status' of six main safety functions: containment, fire protection, reactivity control, core cooling, plant heat sink and electrical distribution.

Every month, this tool automatically tracks and processes around 450 parameters related to 60 elementary systems, making it possible to:
-Obtain an overall 'health and status' indicator with a set of various indicators (system based on green-yellow and red traffic lights), green meaning OK, yellow: warning, red: unacceptable;
-Be aware of equipment condition at a given point in time, thanks to spider web drawings. Any potential equipment failure can thus be identified;
-Display the status of the six key functions and all related elementary systems over the last 12 months. With this system, any negative drift can be detected at an early stage, for pro-active processing of potential equipment deteriorations
-The implementation of this method at Penly has led to ongoing safety improvements, as the relevant diagnoses are easy to obtain. This method can be reproduced at other plants, the resources necessary for its implementation being quite limited.

Cernavoda, Romania

Mission Date; 22 Jan.-10 Feb, 2005

Computerized data acquisition system
Since 2000 the plant has developed and installed data acquisition systems for a Plant Information system, named PLATON. This is a collection of software applications developed by the plant staff to meet the need for management, engineering, operations and system surveillance. The systems are connected to the plant digital control computers (DCC) and provide inspection of trends, bar graphs and other displays, hard copied in the Main Control room or built to historical trends of process variables.
The system allows station-wide access for quasi real time parameter monitoring and are used for trending, historical archiving, systems health and performance monitoring, work management, training and inclusion in the procedures.
This system has also proven to be crucial in transient analyses; it is unique facility for capturing and reporting real system behavior during an event.

Blayais, France

Mission Date; 2-19 May, 2005

Assistance and advice is provided by the safety and quality department (SSQ) through the use of questions and answer sheets (called 'FQR'). In particular, these are used for applying the general operating rules relating to surveillance activities.
The question raised by the line departments and the answers provided by the SSQ are formalized and used via question and answer sheets. These sheets are accessible to all players through computer network as FAQ.
These sheets contain not only the reference standard from general operating rules and the questions raised by the line departments, but also extracts from background policy that lead to aspects of reference standards being made clear.
These data are exchanged with corporate level and other NPPs and feed back from other NPPs is conducted.

Borssele, Netherland

Mission Date; 8 Nov.-7 Dec., 2005

The PSA based Safety Monitor has been introduced to allow Operations to calculate risk consequences of systems, structures and components (SSC) unavailability's and to take this into account.

The plant has built a Level 3 PSA for all plant states and for its spent fuel pool. This PSA is kept up to date with respect to the plant's configuration and operating procedures, operational experience on component data and event frequencies, and environmental developments. International developments are followed and incorporated when it is applicable.

As a result of using the Safety Monitor in the short term scheduling process, the plant - among many others - has achieved:

Reduction of workload in the refuelling outages while at the same time reducing the risk profile, both for the outage and for the complete fuel cycle.

Optimized surveillance intervals for Reactor Protection System (RPS) and Engineered Safety Features Actuation System (ESFAS), where a new surveillance strategy reduced the common cause failure probability. This has resulted improved safety level and lower cost.

Risk increase due to planned SSCs unavailabilities is evaluated in the planning phase and re-evaluated prior to execution of the work to ensure the lowest possible risk increase.

Ignalina, Lithuania

Mission Date; 5-21 June, 2006

Implementation of leak detection system
A unique for the RBMK reactor concept of leak detection system (before break) is being implemented at the plant. It allows lowering the sensitivity threshold significantly and as a result improving detection of coolant leaks on pipes and equipment located at the boundary of leak tight compartments. A system for monitoring of the pipelines in under reactor compartment and sections of steam pipelines has already been put into operation. The test results of the installed systems confirmed that they ensure leak detection within one hour and inform about leak tightness failure at coolant pipelines and equipment by the rate of leak 10 times less than the critical one. This system also informs the location of the leak.
For the steam line leak detection, isolation humidity control according to the radar principle is applied. If there is ingress of moisture to the detector, its electrical resistance of fiber cable changes and can detect leak and identify the place. For another places like below reactor, humidity measuring and aerosol activity measuring is used. All these data are automatically analyzed and shown on the computer screen including main control room in a user- friendly manner.

Mochovce, Slovak Rep.

Mission Date; 4-20 Sept., 2006

Cooperative work of field and engineering activities results in successful utilization of computer based systems applied for various uses of technical evaluation and analysis.
-Surveillance test
Data issued from surveillance programmes are collected in databases. Databases enable the plant to collect data, analyze, archive, create trends and prepare to interpret the analyzed data. Computerized data are easily acquired from the database. Owing to this database, the tests are performed on the schedule, and technicians can know the necessary workforce in advance.
-Plant modification system
Status of prepared modification is controlled by a computer system. The system relevant to modification schedule deal with priority, schedule and so on. The system enables the plant to list the modification plans and perform co-ordination between different kind of plans. The system archives data on deadline for each modification plan, so that relations between modification plans are easily organized. Data are available on the network for all departments involved in plant modification system.
-Aging Management
Specialized database enables the plant to collect and analyze data from the plant related to aging management. The analysis not only enables the plant to predict ruptures early, it enhances communication between technical staff and administrative staff by showing the aging curve. The analysis provides users with a good view of equipment and tables of archived data.
-PSA
PSA analysis is referred to for decision making of modification, to determine the impact from the given modification.

Balakovo 4, Russia

Mission Date; 19 May - 6 Jun., 2008

The methodology "Defining of steam-air medium leak from containment via measurement of pressure difference and flow" used for measuring the containment tightness.
Balakovo NPP put into operation the system of containment tightness measurement using the methodology "Defining of steam-air medium leak from containment through measuring of pressure drop and flow", developed by JSC IN-PK "Russian Energy Technologies".
The methodology comprises 3 methods of "leak measurement":
- method of leak measurement by pressure drop, in %/ day (MLMPD);
- method of leak measurement by flow, in cm3/h (MLMF);
- method of leak measurement based on pressure drop compensation, in m3/hour (MLMPDC).

The 3 methods of "leak measurement" are detailed below:
- MLMPD method is based on measurement of pressure drop between the control tank, which is the part of VIU-D device, and the containment. For the testing period three VIU-D devices are installed in the containment to measure pressure drop. The concept of this method is as follows:
- Due to medium leak, the pressure in the containment reduces. At the beginning of measurement pressure in the containment and control tank is kept in balance with the help of the measuring valve. After the valve closure the air mass in the control tank remains permanent. After the fixed time period the leak measurement instrument will show difference between absolute pressure in the control tank and containment.
- The method of leak measurement by flow is based on measuring the air mass flow after opening of the measuring valve. The MLMPD and MLMF are performed simultaneously.
- The MLMPDC method is based on balancing of the air mass escaping from the containment because of the leak and the air mass pumped from the outside. Balance of the pumped and the leaking air is tracked on the base of flow and change of differential pressure between the control tank and the containment. In case the flow and the differential pressure change are equal to zero, the medium leak from the containment and medium pumping are considered to be the same.

The leak is calculated based on the data obtained.
Advantages of the new "Methodology"
- Total testing time according this"Methodology" is 22 hours, including time for depressurization, pressure rise, stabilization, measuring and pressure drop within the containment (before implementation of the new method the testing took up 2 days);
- It is performed by three independent methods and so it is more reliable;
- In future this method can be applied with Unit on power;
- Human factor impact on testing results is excluded.