

OSART Good Practices

OPERATIONS

Operating Rules and Procedures

Belleville, France

Mission Date; 9-26 October, 2000

Startup, shutdown, and unit operation procedures contain logic diagrams which provide control room operators a clear vision of the overall evolution. Additionally, the startup and shutdown sequences of the outage schedule are customized to each outage and proceduralized to incorporate all activities. Operators have a set of documents ergonomically designed to provide an overview at all times, enabling them to:

- Determine their position within the process at any time,
- Visualize key phases completed
- Have a forward view of future activities

These procedures, based on Normal Operating Rules (RCN) which incorporate experience feedback from corporate level, are structured to include:

- A section focused on principles which states the operating principles common to the operating condition concerned and includes a general logic diagram setting out the sequencing and defining the various stages. This is known as the "Administrative procedure".
- Sections specific to each sequence, which set out, in the form of a logic diagram, the activities to be performed to bring the unit from a given initial condition to a final condition. These are known as "Action procedures." These action procedures are implemented via action sheets which are applied from the control room, in the field, or by maintenance depth.

This logic diagram supplements the startup procedure and specifies:

- All of the activities to be performed in accordance with the logic sequencing of the outage schedule,
 - Reactor mode changes (Outage Safety Committee and final assessment/check)
 - Specific conditions with respect to performance of an activity,
 - Reminders of key safety points and requirements,
 - Pressure and temperature characteristics,
 - Planned surveillance tests.
- It incorporates experience feedback from previous outages.

Paks 1/4, Hungary

Mission Date; 8-25 October, 2001

Technical Specifications are under development to be fully computerized with connection in the plant process signals.

On-line evaluation and presentation of Operational Limits and Conditions (OLC) or Technical Specification (TS) in the reconstructed Paks process computer.

The main function of the TS evaluation and presentation module integrated into the new process computer is follows:

- On-line evaluation of TS algorithms and logic diagrams
- Interactive displaying of evaluation results in form of alarms
- Displaying of those analogue and discrete measured signals,
- Intelligent and structured displaying of text of the TS document a browser.

One of the most important parameters in the TS is the "reactor operation mode" witch given information about the actual reactor status. The signal is also determined on-line, based on the main reactor and primary system parameters.

TS displays can be either called from the process computer workstation header or from the display selection menu. With this system can illustrated about ten different displays.

The advantage is that the system will give the operator a warning when TS is violated. This will reduce the delay time to take action.

There is just now a demonstration of the system on Intranet.

Penly, France

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

Outage surveillance testing deviation report.

In order to facilitate the follow-up on deviations identified during surveillance tests carried out in outage, the outage operations team (ECAT) draws up a summary report containing the analyses.

During outage surveillance tests, the ECAT carries out exhaustive monitoring of the processing of deviations detected. Each deviation is identified and analysed. To improve follow-up and foster communication on deviation processing, the ECAT has drawn up a summary report including the following information:

- Summary of deviations identified and processing carried out.
- Exhaustive analysis of deviation processing along with all documents proving QA.

This database is used by ECAT to monitor deviations and guarantee comprehensive processing. It is also used when the surveillance testing report is submitted to the regulatory authorities at the end of outage. It has been recognized and is well appreciated by the regulator. This is a tool which favours openness and thoroughness, the aim being to reduce the number of deviations identified during outage surveillance testing.

INPP Safety Parameter Display System (SPDS) with the additional functions for supporting MCR operators.

The SPDS objective is to display the processed and systemized data of state of plant and safety systems to control state of the critical safety functions (CSF) with regard to the previously selected parameters. The SPDS was designed by DSS, which designed and developed the upgrading of TITAN Information System and the Diverse Reactor Shutdown System (DRSS).

Additionally with reference to the implementation of the INPP Symptom-Based Emergency Operating Procedures (SBEOP) and outcomes obtained from validation of the SBEOP on the full scope simulator (FSS) the Technical Reference for developing SPDS included a number of additional and extended requirements to support the MCR operators.

Therefore in addition to the control of state of the critical safety functions and parameters of plant and systems, SPDS ensures that MCR operators can:

Control and check in the effective way the actuations of the safety systems with the SPDS algorithms which are specially developed for this System (with reference to both actual events caused the safety systems actuation and scheduled tests and checks of the specified systems):

- Control how accurately the reactor emergency protection, fast power reduction systems actuate;

- Control how accurately the emergency core cooling system (ECCS) actuates with regard to algorithms of ECCS-1, ECCS-2 (namely, with reference to splitting the Primary Circuit (PC) into two loops), ECCS -3, ECCS -4, ECCS -5;

- Control how accurately the accident localization system (ALS) actuates- with regard to the algorithms of ALS-1, ALS-2, ALS-3;

- Control how accurately the reliable power supply subsystem actuates- with reference to the algorithms of the Automatic Actuation of Standby Power Supply Protection (AASPSP).

In case of applying to SBEOP the SPDS calculation aids are used to ensure that actions of MCR operators are supported with reference to the specified SBEOP (totally there are 12 process tasks)

The installation of the SPDS with the extended functions enables plant staff to immediately respond to failures of elements of the safety systems after their actuation. It allows also to reducing the time required to do appropriate actions under SBEOP. This tool helps to lower the stress on the MCR operators during emergency situations. It could avoid human errors which might occur in case of manual calculations and data review and eventually to provide safe and reliable operations.

Use of Alert Cards support the work of the Coordinating Shift Supervisor

The plant has established a comprehensive set of simplified procedures that are specific to emergency conditions. This approach is based on alarm-specific instructions in the form of user-friendly response sheets called Alert Cards. The Alert Cards are designed to be complementary to all the plant response requirements, and focused on specific actions to be taken by all departments. Alert cards are used to address fire alarms, worker injuries, evacuation alarms, escape alarms, plant accidents, disaster alerts, bomb alarms, site security alarms, power plant crisis management team alerts, and hazardous substances situations.

The Shift Supervisor's Alert Card provides clear logic to assist in appropriate response decision making to ensure the event mitigation actions are promptly initiated, in parallel whenever required. This is often the case when a plant team approach is required; all responders have clear instructions without direct Shift Supervisor involvement. For example, if an alarm is received, the Shift Supervisor will select the appropriate Alert Card and initiate response actions. The postholder named in the header of each alert card undertakes the activities listed on the card and forwards the requisite information accordingly. The incident Unit Shift Supervisor is responsible for overall control and implementation of measures rendered necessary to mitigate the emergency condition. The Alert Card procedures define in detail all the actions to be implemented by each responding function, so replication of work is avoided and each individual knows exactly which duties have to be performed.

The parallel response approach of this alert-propagation concept permits speedy and coordinated processing of the alerts and alarms. The response process also transfers administrative actions to the non-incident Unit Shift Supervisor, thus enabling the incident supervisor more time to focus on the mitigating actions.

As a result a very efficient and user friendly emergency response procedure is in place. A complete set of alert cards is kept in each main control room, and the cards required by the responsible supporting staff for the various sub-alerts are kept in the appropriate offices. The alert cards also provide a means of documenting the time completed response actions. For ergonomic reasons, the alert cards are color-coded. This ensures that the alarms and alerts are processed as speedily as possible, in compliance with priorities, and without misunderstandings.

Observation of the use of the Alert Cards illustrated the benefit of enabling the Shift Supervisor to effectively respond to the emergent plant condition while at same time perform Main Control Room supervisory duties.

The burden on senior shift staff of the affected unit is eased as response responsibilities are systematically distributed. For example external notifications that can be made by the Shift Supervisor and Security staff of the unaffected unit.

Computerized Monitoring of Safety Functions (BSF) and Operating Status Checks (DDK)

How does it work?

BSF - The computer compiles the status of safety systems using pre-defined parameters and limits. When a deviation in the BSF exists, an audible alarm is actuated and an alarm annunciator identifies the issue to the operating staff. The BSF-panel is divided into five function-areas and is presented by each train:

- Reactivity A B C D
- Core cooling A B C D
- Barriers A B C D
- Heatsink A B C D
- Electrical systems A B C D

DDK - The computer also has a function to check parameters against plant status. There are more than 700 parameters checked within this program. Deviations are identified on a computer screen. Six plant modes are available:

- Check before start-up
- Check before 100 °C
- Check before 286 °C
- Check before 8%
- Check before 54%
- Check at 108%

Who can use it?

When an alarm is indicated by the BSF the operator is made aware of a deviation from normal status. The operator can then quickly check where the specific deviation exists. The DDK is used at least once every day and is presented to operations management during the daily review meeting. When complemented with results of surveillance tests recorded in FENIX, it is also used prior to changing the reactor operational mode to ensure compliance with Operational Limits and Conditions and that all operational parameters are within normal limits.

What improvements are achieved?

The BSF indication provides an easy way to check deviations that might exist with safety systems and to determine which functions may be threatened. The DDK make it easy to have an overall check that all parameters are within expected values and limits. Safety parameters can be checked in a few seconds.