OSART Good Practices
OPERATIONS
Operating rules and procedures

Ignalina, Lithuania

Mission Date; 5-21 Jun., 2006

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.

Neckerwestheim, Germany

Mission Date; 8-24 Oct., 2007

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.

Forsmark, Sweden

Mission Date; 12-28 Feb., 2008

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:

- Reactiviy A B C D
- Core cooling A B C D
- Barrierrs 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.

Fessenheim, France

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

Shift Managers use of a reference standard for performance of safety assessment.

The Shift Manager's plant safety assessment is an essential safety fundamental. This assessment essentially takes the form of a panel walkdown (including periodic checks performed in the nuclear instrumentation room and in switchgear rooms for plant radiation monitoring channels). At the plant this assessment is performed using a document specific to each reactor mode. The document includes the items to be checked as a minimum requirement by the Shift Manager. These documents list the key technical specification items to be checked during each shift: current Limiting Conditions of Operation and requisite courses of action, special instructions and technical specification exemptions, Surveillance tests to be performed during the shift, important computer and window alarms, checking for absence of technical specification violations, safety-related parameters, key points not covered by alarms and, event-related checks.

The check lists also contain additional checks to be performed at specific intervals during the week:

- o Nightly checks: List of work requests, list of current work permits, review of computerized log every 24 hours, rate of change of reactor power and load variations are within the limit of technical specifications.
- o Functional check of plant radiation monitoring channels three times a week.
- o Weekly check of boron concentration levels in required tanks and primary circuit iodine 131 equivalent every Monday night.

The document also states that the key deviations detected during each shift must be addressed at the operational focus meeting or raised by the Shift Manager with the Safety Engineer during their meeting.

These check lists have a number of advantages:

- o Extensive, standardized checks performed by all Shift Managers.
- o Technical Specification compliance checks performed at required frequency.
- o Assured position of certain valves and components, correct configuration of regulation channels and certain required systems that are not connected up to the main control-room alarm system.

Plant results demonstrating that this practice produces the expected results:
Improvements in the detection of Technical Specifications breaches:

- o Simultaneous presence of a group-1 LCO that is incompatible with actions to be taken in response to a special instruction.
- o Deviations from requisite course of action in the event of a limiting condition involving the aux. feed system.
- o Failures to follow requisite course of action stipulated by special instructions pertaining to the full-length control-rod system.

An example of effectiveness of this practice is that no safety-significant events were reported relating to excursions from level or pressure ranges on safety injection accumulators over the past 3 years. The document makes it easier for new shift managers to perform safety assessments specific to the various outage conditions.

Flamanville, France

Mission Date; 6-23 Oct., 2014

Operational limits and conditions (OLC) display screens have been installed in the main control rooms and tagging offices at each unit.

Display screens have been installed in the main control room and tagging office of each unit making it possible to display the same information in both rooms. The screens display information regarding active LCO's; equipment required in extended design conditions (MDC) and chemistry specifications. Display screens with real time information in both the main control room and the tagging office means that the operators and the tagging supervisor has real time information on the status of the unit and, in particular, real time details of all active LCO. This guarantees the safe release of tagging authorizations. Personnel using the tagging office have a real time overview of each LCO on the unit, the scope of the LCO, the date it was raised, the dates of isolations and the isolation strategy.