

OSART Good Practices

MAINTENANCE

Maintenance Facilities and Equipment

Temelin 1/2, Czech Republic

Mission Date; 12 Feb.-1 Mar., 2001

The plant has established for its operating phase a method to monitor and analyse electrical disturbances and equipment performance. The operating organisation arranged to leave in service the start-up commissioning electrical monitoring system (MOSAD-4) to provide continuous on-line monitoring capabilities as a way to record important event information for

assessment of electrical disturbances. The capability for electrical system monitoring consists of inputs from 112 analogue and 3264 binary signals of Unit 1 Temelin. An external time standard source for correct time marking of the events and flexibility in setting sample rates set for both analog and digital inputs are features of the system. This allows for the analysis of electrical related events to be explained as the large number of binary signals and correct time makes it possible to determine the sequence of events and make determinations that the equipment is performing correctly.

Since the system is capable of high speed sensing and analysing electrical parameters during transient conditions, it is being used to monitor most of the electrical tests performed at the plant. The range of testing being monitored is from relatively simple activities like motor starts, to very complex tests such as the loss of offsite power and start of the 5 diesel generators with simultaneous back-up energization of all 6 kV switchgears. The plant is now recording routine tests performed during operations, for example the diesel load sequence test or back-up energizing of a switchgear, to analyze and compare the results with previous or other similar tests as a method for detecting deficiencies.

Data from the monitoring activities is saved in the computer and subsequently stored on CD media for subsequent use.

Zaporozhe, Ukraine

Mission Date; 6-23 Sept, 2004

Before the job starts, a briefing is performed. The briefing covers all aspects of the job and is normally performed by the supervisor/foreman in charge of the job. All participant, briefer and briefed have to sign off in the work permit that the briefing has been done. The way ZNPP perform documented briefing prior start of maintenance works could be seen as a good practice.

Kashiwazaki 3/6, Japan

Mission Date; 1-18 Nov, 2004

Foreign material exclusion has been taken into account when planning the work and controlling the work sites.

Foreign material exclusion activities are proactively planned and built into the work orders. List for tools accessing the containment and software for tools accessing the pressure suppression chamber and turbine work site has been established. Safety cords in the tools are being used in critical work sites to prevent them falling. The amount of material accessing the containment and pressure suppression chamber is reduced. Reactor pool is covered with concrete slabs and pool for steam dryer with steel covers during operation. The fences around the pools in the reactor hall were covered with coloured plastic during outage.

Penly, France

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

The team recognized the stowage of field installed hoisting equipment as a good practice. This practice consists of placing lifting equipment located near safety-related equipment in a secure state to protect against damage to seismically qualified equipment. An ingenious, award winning hook has been developed to assist with this practice.

The main actions carried out consisted of:

- Hoists located above safety-related equipment were removed.
- The slack from the chain on the hoist carrier was coiled around a metal hook so as to prevent the chain from swinging free and the carrier from moving.
- Safety stops were installed on the booms.
- Safe stationing positions were identified on the beams for all handling equipment at risk (hoist carriers, cranes, etc).

A set of actions easy to implement and which prove the compliance of lifting equipment with the nuclear safety reference for 1300 MW series (topic "external hazards of natural origin - earthquakes").

The plant implemented a policy and wide programme to support usage of new equipment facilities/tools/stands and training mock-ups for mechanical maintenance. The main objectives are preparing and performing maintenance activities and implementing ALARA programme and practices.

There is a plant policy to enhance facilities/mock-ups for all mechanical maintenance workshops:

a) new equipment facilities/tools/stands:

- machine-tools in most workshops;
- hydraulic/pneumatic facilities;
- welding automats;
- new plasma-cutting facilities;
- full scope-test stand of Main Circulation Pump;

b) training mock-ups:

- mock-up for main circuits 300 mm tubes welding;
- removable insulation mock-up;
- cutting/welding/reinstallation full scope mock-up of fuel reactor tube-channels.

Size and arrangement of these maintenance facilities are appropriate for safe and efficient completion of work. Most of these maintenance facilities/mock-ups are used for maintenance training as well as for maintenance and maintenance tests to allow the improvement in the quality of works, industrial safety, skills, ALARA programme, qualification of personnel and interaction between managers and workers within maintenance staff.

In connection with the forthcoming plant decommissioning, the team evaluates this improvement as a good decision to enhance mechanical workshops and guaranty high-level safety requirements after Unit 2 shut down.

South Ukraine³, Ukraine

Mission Date; 9-25 Oct., 2006

Welding simulator

To train the welders in arc welding the plant equipped the Training centre with the computerized simulator named DTS-02.

The advantages of the DTS-02 simulator during welders' initial training are:

- simulation of welding with the help of low-amperage arc;
- limiting values and parameters of simulated welding (arc length, electrode displacement speed, etc.);
- saving welding materials;
- energy saving;
- no necessity to arrange "special" conditions in simulator premise,
- "WWSim" software tracks arc length, electrode angle of slope, values indication on the monitor;
- "WWSim" identifies deviation from prescribed parameters of training;
- trainees are able to see their errors on the monitor;
- after the training course the trainee makes a debriefing followed by a report;
- allows training welders in different positions, in different modes (simulates welding of different class steels).

This simulator provides an automatic assessment of trainees' performance.

Yongwang, Korea

Mission Date; 17 Apr. - 4 May, 2007

YGN 5&6 use a strong system of ownership for visual identification on maintenance of plant equipment. YGN 5&6 has developed ownership cards, with the name and picture of the responsible maintenance and contractor technicians, which are placed on the equipment being worked on.

This system of identification is designed to inspire responsibility and pride in technicians, assure the quality of maintenance being performed and improve the capability of identification of ownership on safety related equipment. The ultimate goal of the identification system is to ensure that materials are thoroughly checked for quality before maintenance begins, abide by the regulations and YGN 5&6 process and procedural requirements.

After maintenance is completed, there is a concerted effort to double check the quality of the work performed and to prevent human errors. This is accomplished by the responsible supervisor verifying that all information and corresponding joint cooperation of contractors is well coordinated and that the maintenance history and details of work performed are complete and documented. This system of visual accountability of technician's work practices and good maintenance practices is evaluated before the next plant overhaul and maintenance teams are awarded excellence status.

This good practice has resulted in no transient operation caused from maintenance work in 2006 on YGN 5&6, and has significantly motivated maintenance and contractor personnel to take pride in their work.

