

Improvement of the Nuclear Radiation Protection Training for the Simulator and on sharing method of the Safety Parameter with the Emergency Organization

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1. Introduction

People have increased the interest of the Nuclear Power Plant safety since the Fukushima accident.

It could be a great risk when it comes to the disaster like Fukushima accident happens in the NPP even though there are 5 layers to protect the radiological impact in the nuclear power plant.

Radiation Emergency alert will be announced when the radiological impact is limited within the NPP or radiological impact to go out of the NPP.

Radiation Protection Training is scheduled and proceeded to prevent for the radiation accidents, possibility of the radiation accidents, or radiation accident expansion, the training is to reduce the damage to property and health for the nuclear power plant worker and the people near the nuclear power plant.

This paper shows the improvement of the nuclear radiation protection training for the simulator and on sharing method of the safety parameter with the emergency organization.

2. Nuclear Radiation Protection Training by using simulator

Nuclear Radiation Alert is categorized as the white alert, the blue alert, and the red alert by the operability of the plant safety function, damage of the core, and etc. Each emergency organization (Emergency Operating Facility : EOF, Technical Support Center : TSC, Operation Support Center : OSC) will be formed by the degree of the alert.

Each emergency organization form and work in the main control room at the NPP to give the technical support and administrative support coordinate with the administrative districts and radiation disaster prevention & response headquarter to reduce the damage.

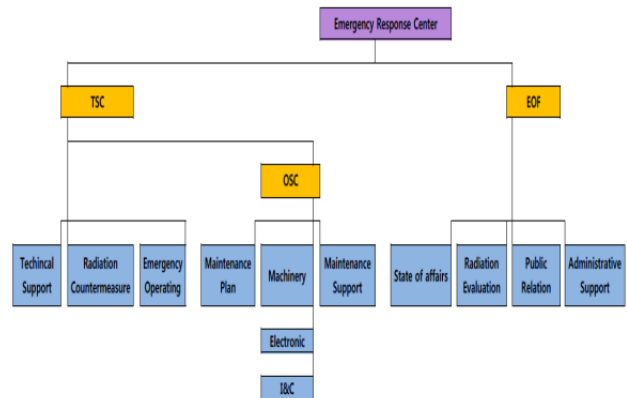


Fig 1. Radiation emergency organization in national nuclear power plant

Radiation Protection Training program in Korea includes the radiation training scenario and the simulator to create the emergency situation. The training program begins in the simulator and their situation is forwarded through the land line, fax, and video call to the Technical Support Center and Operation Support Center in the NPP, and Emergency Operating Facility outside of the NPP for the effectiveness of the training program.

Radiation Protection Training program creates the situation in the simulator in the light of the real NPP situation. At this time, the situation of the simulator environment instead of the NPP environment is shown the safety parameter such as Safety Parameter Display System : SPDS, Critical Function Monitoring System : CFMS, Realtime-Plant Monitoring System : Rt-PMS, Safety Parameter Display and Evaluation System : SPADES+ for APR1400 so that the each emergency organization observes the NPP status.

Safety Parameter Display and Evaluation System (SPADES+) in the APR1400 provides integrated information on the critical safety functions(CSF), alarms, success path monitoring(SPM) through the man machine interface(MMI). Nuclear safety parameter such as SPADES+ is provided through the ovation database to each emergency organization monitor.

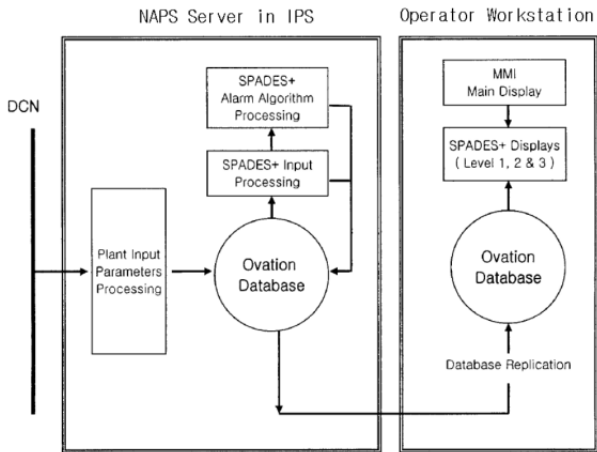


Fig 2. SPADES+ Function allocation and conceptual data flow

SPADES+ is designed as operation function only given to the Shift Supervisor(SS) and the Reactor Operator(RO), but others only has the observation function to see the display that SS and RO operation.

3. Improvement on nuclear radiation protection training system

Each emergency organization has SPADES+ for the NPP but the organization doesn't have the SPADES+ for the simulator, so operator has to talk through the land line or fax the parameter to the emergency organization to have the Radiation Protection Training. Technical support and the response planning are not very effective under these circumstances. Also unnecessary action for the operator will lower the concentration on training because the unreality of the training environment.

Emergency organization shall have the safety parameter in real time from the NPP and as well as from the simulator. Also the redundancy data line shall be constructed in case of the cable damage.

If this improvement on nuclear radiation protection training system is applied when severe accident module will be installed in simulator, radiation protection training program will be expanded to the training included severe accident.

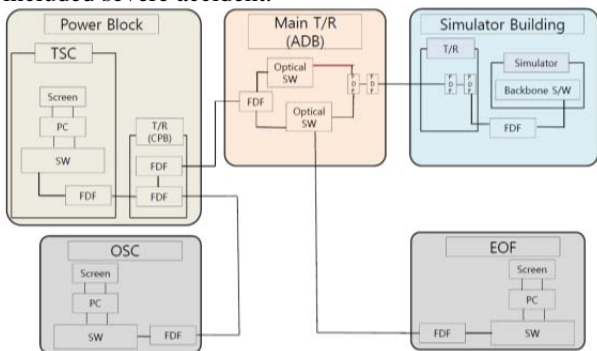


Fig 3. Data linkage between simulator and emergency

organization 4. Conclusions

Accident shall be correctly and quickly prevented when the NPP accident is inevitable. Therefore the radiation protection training for the operator and the emergency organization will be effective when the accident happens if the simulator has the same environment as the NPP.

REFERENCES

- [1] Radiation emergency plan in Hanvit nuclear power plant, Korea Hydro & Nuclear Power, 2013
- [2] SPADES+ Technical Specification in BNPP, KEPSCO E&C, 2013