Safety Culture Improvement Activities of YGN 3 & 4

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1. Introduction

In nuclear power industry all over the world, we can never overemphasize the importance of nuclear safety.

After the Chernobyl accident occurred in 1986, Korean nuclear energy industry had made every effort to enhance nuclear safety culture further. And, as a result of the efforts, Korean government declared the five principles for the nuclear energy safety regulation, which were included in the Nuclear Energy Safety Policy Statement published in 1994.

In 2001, through the announcement of Nuclear Safety Charter for the peaceful use of nuclear energy, the Ministry of Science and Technology proclaimed at home and abroad that the protection of citizens and environment by securing nuclear safety should be the highest priority in nuclear energy industry.

Occupying almost 40% share of domestic electricity generation, Korea Hydro and Nuclear Power Co. decided "Safety Top Priority Management" as president's management policy, and clearly presented the safety goal to the personnel. By this, the management can effectively place stress on securing safety, which is our highest priority and the only way to win public confidence toward nuclear energy industry.

This is prepared to shortly introduce the activities for improving safety culture in Yonggwang Nuclear Power unit 3 and 4 (YGN 3&4) .

2. Background on YGN 3&4

YGN 3&4 nuclear power plants are CE type Pressurized Water Reactor with 1,000MWe generation capacity, and reference plant of Ulchin 3&4, which are OPR-1000 type, Optimized Power Reactor 1,000 developed as Korea standard nuclear power plant. In spite of various misgivings regarding the safety and performance during construction period, domestic enterprises successfully carried out the design, construction and commissioning phases as prime and major contractors. YGN 3&4 went into commercial operation in 1995 and 1996 respectively, and we have operated plants with good performance in both the nuclear safety and the operation efficiency.

□ Plant History

Content	Unit 3	Unit 4
Operating License	Sep. 9, 1994	Jun. 2, 1995
Initial Fuel Loading	Sep. 13, 1994	Jun. 9, 1995
First Criticality	Oct. 13, 1994	Jul. 7, 1995
First Synchronizing	Oct. 30, 1994	Jul. 18, 1995
Commercial Operation	Mar. 31, 1995	Jan. 1, 1996

□ Major Achievement

Content	Unit	Period
The Best Capacity Factor over the world (3 times)	3	Apr. 1, 1997 ~ Mar. 31, 1998
	4	Apr. 1, 2000 ~ Mar. 31, 2001
	3	Jan. 1, 2001 ~ Dec. 31, 2001
Series of OCTF* (8 times)	3	Fuel Cycle : #3, #5, #7, # 9 (4 times)
	4	Fuel Cycle : #3, #4, #6, # 8 (4 times)

* One Cycle Trouble Free : continuous operation for the planned period without shutdown since refueling

3. Safety Culture Improvement Activities

3.1 Presenting Safety Goal to Personnel

YGN 3&4 formulated basic goal to attain the long-term vision for the world top-class nuclear power plant through safety-first operation.

The nuclear safety is the top priority to be pursued by all the staffs, which is clearly presented in strong will and policymaking of plant manager.

3.2 Improving Human Performance

3.2.1 Introduction of STAR method

STAR stands for the catch-phrase to prevent human errors during work in plants. This is a self checking technique for staffs to basically apply to equipment operation. STAR's major concepts are as follows.

STOP: Stop and think before action. Concentrate on the subject systematically and precisely. Pay attention to the detailed item of present task.

THINK : Arrange appropriate devices and tools, procedures, and personnel. Check the procedures, facilities, positions and time limits. Expect the response after action.

ACT : Check the subject unit, system and equipment. Perform the task safely with carefulness.

REVIEW : Observe and confirm the performance of the action taken including the function and arrangement of equipment and system comparing with the expected response.

3.2.2 Education and Information sharing

The improvement of safety awareness has been attained by the introduction of various techniques and education on operational experiences of domestic and foreign nuclear power plants. All personnel of YGN 3&4 participates in the safety instruction sessions more

than 24 times a year, and shares the domestic and foreign operational experiences with not only KHNP but other cooperative companies working for maintenance in the morning TR(Trouble Report) announcing meeting.

Also, posters for human behavioral improvement are put up and periodically replaced in the primary areas of plants. This helps for preventing such human errors from recurrence as well as for informing the staffs of the causes of the events. In addition, meetings are held every year for case-study presentation on human errors, and all the staffs share such information to actively raise the safety awareness.

3.2.3 Application of Advanced Preventive Techniques for Human Error

Benchmarking advanced operation technique is also one of the important methods that can improve the safety of power plant. YGN 3&4 benchmarked "Human Performance Tool" of Exelon in the U.S., and has been applying the advanced operation techniques such as Peer Confirmation, First Check before action, Concurrent Verification, Independent Verification, Pre-Job Briefing, and 3-Way Communication to the operation procedures. Besides, we have done our best to improve human behavior by developing various preventive tools against mishandling of equipment.

3.3 Safety Supervision on Equipment

3.3.1 Assignment of Check-out Sector

Continuous and frequent inspection of local equipment can predict the abnormal conditions, and prevent any transients by quickly coping with the abnormal situation.

Monthly equipment safety check-out that all the managers of KHNP and its cooperative companies participate in intensively cross-checks equipment and system in assigned area by groups.

The operation shifts also check its own assigned areas out of 12 sectors divided in plant, and report inspection results to plant manger every month. When any problem is found out, the proper steps are taken and managed to correct the problem.

3.3.2 Blue Card Issuing System

Sometimes slight defects in the workplace seem to be disregarded by worker.

Even though defects or problems of plant equipment and systems are quickly coped with appropriate measures, e.g. issuing TR, however, minor defects in doors, lamps, or structures could be delayed to repair if not asked immediately at the spot.

Since the year 2002, YGN 3&4 has introduced "Blue Card" system, by benchmarking "White Card" system of WANO Reviewer, and issued blue cards to about 3,000 minor defects and taken the proper actions. This is used for detecting errors in procedures as well as for finding physical defects.

This system has been transmitted to other plants of KHNP as a good practice. Now, this Blue Card system has been applied to some plants, or is in the preparation of application in other plants.

3.3.3 Safety Supervision on Equipment during Weak Times

YGN 3&4 intensively inspects vulnerable equipment and implements check-out programs to prevent any problem by seasonal effects according to winter, summer, and thawing season's equipment safety inspection program. Also, systematic inspections are especially performed during the first 100 days after overhaul maintenance for the stable operation and prevention of equipment breakdown.

3.4 Review and Deliberation of Safety

PNSC deliberates and resolves the safety of the power plant. It is the conference body that deals with important matters such as all the design changes and procedure revisions. The committee consists of Plant Manager(chairman) and Plant Main Engineering Department Managers. Last year, total 43 times of PNSC were held in YGN 3&4 and 239 cases were deliberated.

3.5 Rational Regulation

There is MOST resident office for regulation in Yonggwang Nuclear Power Division, where MOST and KINS(Korea Institute of Nuclear Safety) staffs work for checking and confirming the plant safety. KINS inspectors supervise and report about plant operation on behalf of MOST for stable and safe operation.

As a result of supervisory efforts, resident officers advise improvements and publish point-out reports. Especially, YGN 3&4 periodically hold a meeting with these resident offices as a way of trying to exchange information and interest of each other.

4. Conclusion

The nuclear safety culture could be defined as the integration of attitude and sincerity of individuals and organizations that have interests in the plant safety.

YGN 3&4 has carried out continuously improvement of safety custom, systematic safety training and introducing advanced techniques by benchmarking to promote safety culture based on plant manager's clear safety goal.

Recognizing a trivial mistake makes bigger accident, we try to firmly form the safety-first mind when all the staffs do their jobs. All YGN 3&4 staffs have strived for accomplishing long-term vision of world top-class plant realization trusted from the citizen through safety-first operation. We will be driving current safety activities ceaselessly, and continuously trying to develop more effective tools for the highest nuclear safety.