ALARA program in TEPCO

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1. Introduction

Radiation Protection (RP) group's involvement in outage work planning and scheduling process is important for success of ALARA implementation. Providing the RP expectation to work planning step enables to do a job efficiently with ALARA awareness. We reviewed the " As-Is" work planning process and improved the process by focusing on the interface with RP and maintenance group.

2. Approach on our conventional ALARA

In TEPCO, we positively implemented various dose reduction measures （e.g. Automatic CRD handling machine, Additional Permanent Shielding） in the past. RP and maintenance group have worked together to examine many dose reduction measures, and the management also has positively approved of them.

As a result, we had reduced a collective dose dramatically year after year. And, this is the reason why we reached the lowest collective dose of the world at the beginning of 1990's.

The more a collective dose lowered, however, the more ideas such as "we have already adopted almost all dose reduction measures." came up, and then the cost reduction became a supremacy proposition in our company. Thus, our recent policy on dose reduction and ALARA has been constantly focused on the cost-performance aspect of hardware. For example, there are some discussions explored "how much budget may be allowed to achieve radiation reduction per person Sv at the Fukushima Daiichi Nuclear Power Station", or "no further dose reduction is necessary for the Kashiwazaki Kariwa Nuclear Power Station because its dose is already sufficiently low". In this situation, there has been no mechanism to promote the concept of ALARA systematically and continuously

In the past few decades, despite the trend of dose reduction at overseas, the annual dose of Japan (TEPCO in particular) remains largely unchanged. We have come to a state whereby no valid rebuttal can be offered against criticism that Japan's outage dose is high compared to equivalent figures for other countries. Figure.1 shows the annual average dose per BWR reactor in each country.

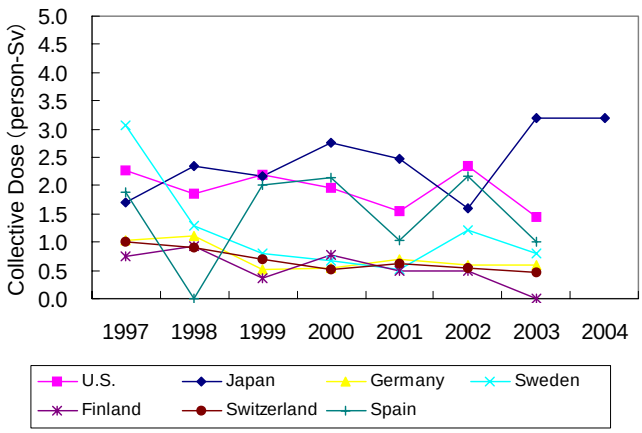

Figure.1 Annual average dose per one BWR plant in each country (1997-2004)

3. “ As-Is” problems

(1) Lack of a mid-/long-term vision

In a sense, there is no “dose goal“ that our company should aim for. Of course, we estimate the annual and the outage dose plan, and we track the trend and also analyze the differences between the plans and actual dose. We have just summed up the dose of each work without any ALARA pictures.

(2) Lack of communication of RP and maintenance group

Although RP is currently involved in processes after Radiation Work Admission (RWA) submission, there is no dose planning process on the outage planning stage. The following problems have been identified.

- ✓ The RP is not involved in the work plans before the maintenance group fixes them (including exposure reduction measures and work coordination).
- ✓ Since RP does not implement dose reduction measures to the maintenance group, only the reduction measures from contractors proposed.
- ✓ RP does not tell the maintenance group “what” they want to know and “by when”.

4. Result of examination

(1) The mid-/long-term vision

Figure 2 shows the image of setting the mid-/long-term vision.

The Site Superintendent decides the vision of dose performance by comparing “Projected actual performance” based on future schedule (e.g. operation plan, improvement works, dose reduction measures) and past performance (e.g. general outage dose, improvement work dose, operational dose) with “Expected ideal performance” based on a basic policy (top -quartile of exposure reduction). The mid-/long-term and annual plans would be decided by this “performance” being converted into “dose”.

Setting “targets” in the basic policy as well as mid/long-term and annual plans, will clarify the direction of our exposure reduction.

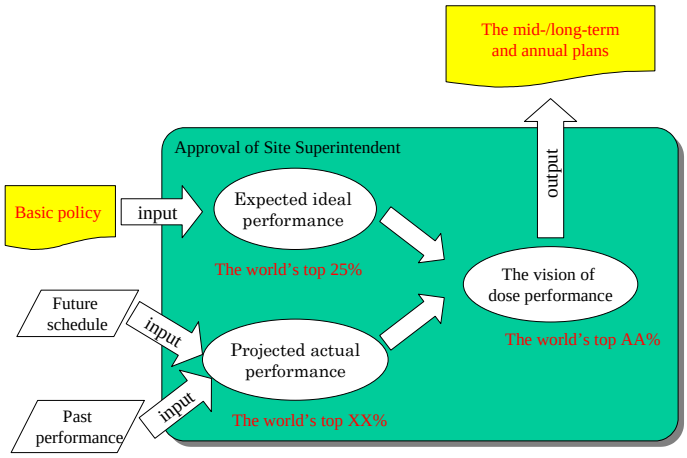

Figure.2 image of setting the mid-/long-term vision

(2) Communication of a RP and a maintenance group

Figure 3 indicates the communication image between RP and maintenance group.

In TEPCO, the Outage Procedure Peer Team is improving the Outage Procedure Development Process, this picture shows so-called "To-Be" process for both RP and maintenance group.

RP proposes the dose reduction measures to maintenance group at appropriate timing in the outage planning stage and in the outage reviewing stage.

The process of becoming involved in dose planning on the outage planning stage, will improve the precision of dose targets for each operation. And, we believed that incorporating dose reduction measures from the planning stage could lead to reduce the overall outage dose.

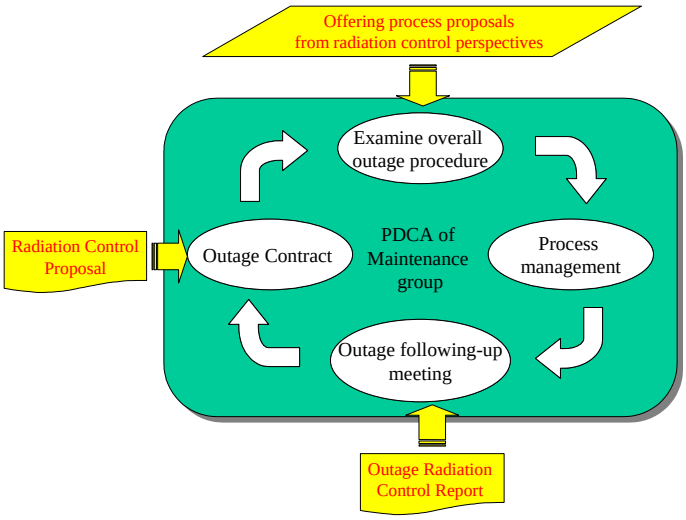

Figure.3 Communication image between RP and maintenance group

5. Summary

(1) We have achieved the process that the management can reflect his vision in the mid-/long-term and annual plans.

(2) We have improved the process that RP proposes the dose reduction measures to maintenance group at appropriate timing in the outage planning stage and in the outage reviewing stage.

6. Future schedule

(1) These process shall be trial-implemented on selected items at some plants, so as to identify implementation problems and achieve improvement before the start of full implementation.

(2) We shall examine the following processes

- ✓ Developing more effective training materials and curriculum on radiation control and exposures for the maintenance group and affiliated companies' workers
- ✓ Assessing whether dose target control is achieved.