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Development of an electronic Human Factor Management Program (e-HFMP)

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1. Introduction

Human error is one of main contributors of reactor trip in nuclear power plants. Therefore, HFE application is essential in every field of nuclear power plants such as operating, maintenance, and plant design. However, HFE is an unfamiliar term and field for plant staffs. Lots of activities has been carried out to reduce human error and to enhance human performance. During these efforts, it is frequently asked where human factor guidelines are, and how the guidelines are applied to their usual activities. This paper explains e-HFMP for this purpose.

2. e-HFMP Overview

The web-based HFMP(e-HFMP) supports human factor issues tracking, procedures and standards searching, main control room through navigator, HFE education, project management and design documents management. Using e-HFMP, personnel can design MMI (Man-Machine Interface), write procedures suitable for human factor principles. Because of being developed as a web system, e-HFMP enables lots of people can access HFMP simultaneously.

Once work domains are completely analyzed, it is possible to develop their supporting web systems. Google and Facebook are the typical examples. However, there is no web system to support human factor activities. e-HFMP has been developed for 4 years. It has been continuously optimized for user's convenience.

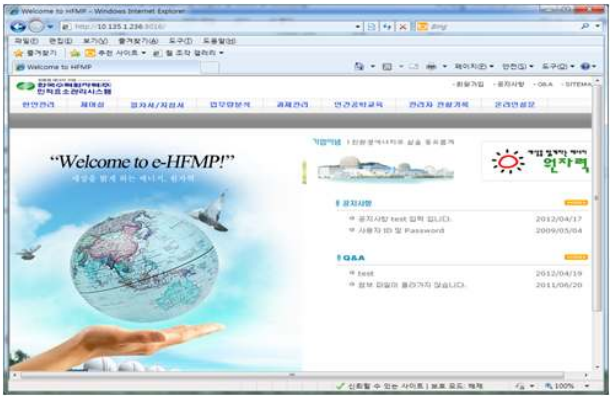

Fig.1. e-HFMP main display

3. Main Functions

3.1. Management of Human Factor Issues

Human factor issues are classified into three categories such as general issues, plant specific issues, and project specific issues. Everyone can write issues in each category, but the issues need a review by each category manager to be official issues. Users can add their opinion to each official issue by means of comments, and vote on it considering importance of each official issue. Besides, the official issues are tracked as 'on-going' and 'completed'.

There have been lots of human factor issues. For example, NRC have published human factor issues and rated their importance. One of the issues is control room design review performed after TMI. Korean nuclear power plants have human factor issues derived from PSR. All these issues are managed in this module.

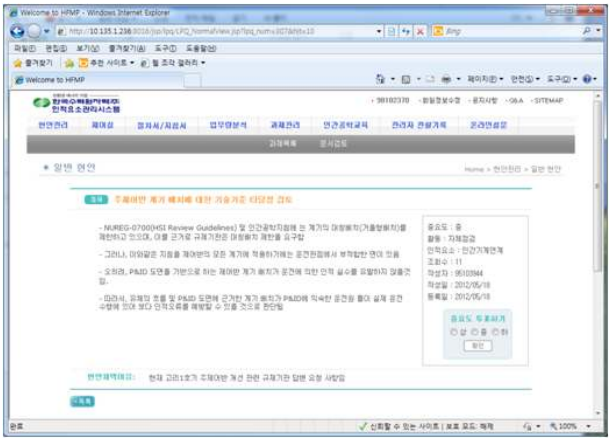

Fig.2. Human factor issues display

3.2. MCR Navigator

MCR navigator provides a variety of information on controllers, switches, indicators and alarm windows in main control room. Users can access and find the information that is location, arrangement status, features, and tag name with real photos. The access to devices is achieved hierarchically from MCR overview through control panel (Fig.3, Fig.4). Also, it is possible to find instruments directly using tag name in searching engine. Once the target object is searched, its relevant human factor guideline can be displayed.

MCR navigator enables users to contact MCR information even though they are not in the MCR. The navigator enables HFE applicant to acquire basic data

for MCR upgrade and maintenance, and major information in case of event analysis.

Presently, this navigator is equipped with 10 MCR including Kori unit 1 and the remaining units will be added continually.

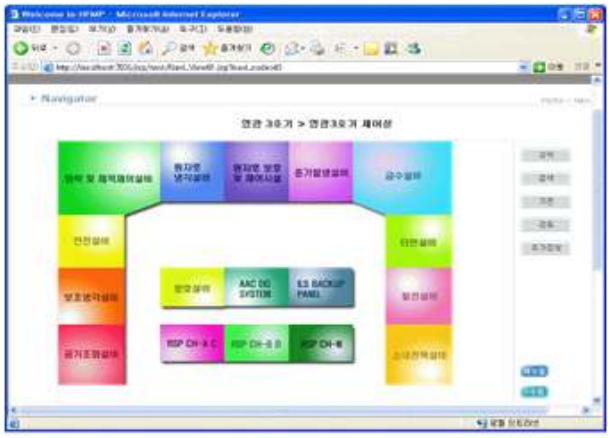

Fig.3. MCR arrangement display

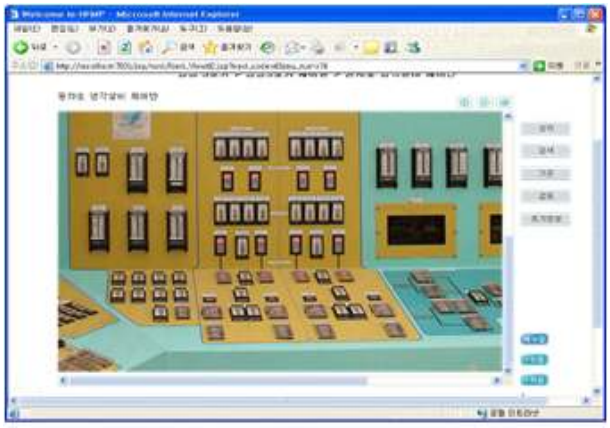

Fig.4. MCR control board display of Navigator

3.3. Procedures and Standards

HFE standard and procedure are provided. The standards include man machine interface, procedure, training, workload, human error prevention tool etc. About 20 human factors are summarized in a top document, and related sub documents are linked to the top document. The sub documents comes from standard administration procedure of KHNP, plant specific human factor procedures such as alarm tile surveillance, nuclear human factor guidelines developed in KHNP-CRI, and industry guideline such as NUREG-0700.

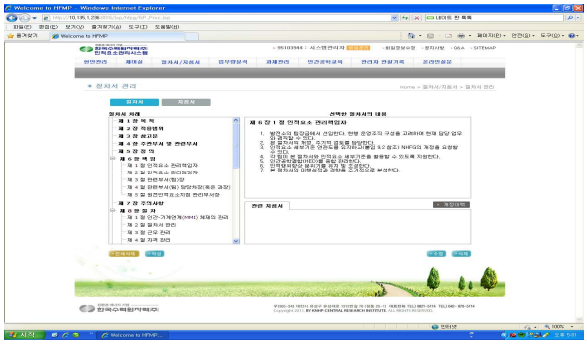

Fig.5. Procedure and standard display

3.4. Project Management

Those who carry out projects or researches can post their project overview, current situation, and important issues for their participant to read and share the information. Other users as well as the stakeholders in the projects are able to upload their opinion on the bulletin board of each project.

3.5. HFE Education

HFE education materials with pictures, video clips, and reports are provided to explain human factor principles. Once educated, they can evaluate their skill in this module. About 200 questions have been developed and collected.

4. Conclusions

e-HFMP helps nuclear power plant staffs apply human factor principles to their usual works. MCR upgrade project of Kori unit 1 make full use of e-HFMP [1]. e-HFMP will be optimized and extended for all nuclear plants in Korea. And contents of e-HFMP will be continuously updated and added. It is confidently expected that e-HFMP would contribute to reducing human errors in plants.

REFERENCES

[1] Y.S.Jung, Kori unit 1 HFMP Development Plan, KHNP, April, 2006