

Operating Experience Review(OER) and development of Issues Tracking System(ITS) for Jordan Research & Training Reactor(JRTR)

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1. Introduction

The operation of the Jordan Research and Training Reactor which Korean consortium designs will start in March 2015.

Though the power level of JRTR is different from the one of HANARO, a Korean research reactor, experience and expertise gained from the successful operation of the multipurpose research reactor, HANARO, would be applied for the design of JRTR because the basic operation principles of two reactors are almost same. From the point of human factors view, Operating Experience Review (OER) has the accurate purpose of reflecting accumulated knowledge to a new design and this activity are required to perform in the beginning stage of the control room designs in nuclear facilities.

OER is to identify human factors engineering (HFE) issues related to safety. The issues from operating experience provide a basis for improving the plant design in a timely way. Identified issues are reported to an issues tracking system (ITS) so as to manage and resolve issues. HFE related safety issues are to be extracted from OER.

The purpose of this paper is to present the scope and methods of OER for the JRTR design. In addition, a new ITS is proposed. The ITS is effective for issue management and has simplified states for issue development and small numbers of steps for issue control.

2. Operating Experience Review for JRTR

The main purpose of conducting an operating experience review (OER) as a part of the HFE analysis is to identify HFE-related safety issues. The OER should provide information on the past performance of predecessor designs. Negative features encountered in previous designs and operation can be identified and analyzed so that they are avoided in the development of the current system and positive features can be retained.

The resolution of OER issues may involve function allocation, changes in automation, HSI equipment design, procedures, training, and so forth.

OER is the examination and evaluation of specific in-house and industry-operating experience related to system and human performance for systems similar to the system under reviewed.

NUREG-0711 Rev.2 provides information sources (items) for OER performance. However, some of information is related to plants for power generation. Therefore, it is necessary to screen items by considering

the design characteristics of research reactors.

The scope of OER for JRTR was determined as followings;

- HANARO Licensee event reports (LERs)
- NUREG/CR6400 (Human Factors Engineering(HFE) Insight for advanced reactors based upon operating experience)-category 1,2,3
 - 1) Unresolved safety issues/generic safety issues
 - 2) TMI issues
 - 3) NRC generic letter and information notice
- Kori-1 Periodic Safety Review
- Interviews with experienced personnel from HANARO

A structured evaluation for each human factors issue is being conducted to determine the applicability of the operational data to the design of JRTR. Criteria regarding to the identification of the following:

- (1) HFE related safety issues that performance and human error
- (2) Design element that support and enhance human performance

Each operating experience item determined by analysis to be appropriate for incorporation in the design (but not already addressed in the design) is documented and transmitted to the JRTR HFE issues tracking system.

3. JRTR HFE ITS

(Jordan Research & Training Reactor Human Factors Engineering Issue Tracking System)

Issues identified during the OER should be entered into the HFE issues tracking system for JRTR, so-called JRTR HFE ITS.

JRTR HFE ITS is integrated into the all design process for the JRTR design effort. JRTR HFE ITS is available to address human factors issues that are (a) known in the OER and (b) identified throughout the HFE life cycle of HSI design and evaluation.

HFE issues and concerns that are not immediately resolved are entered in the JRTR HFE ITS. The HFE design team members are responsible for issue logging, tracking, resolution, and resolution acceptance. JRTR HFE ITS provides a mechanism to address the items that need to be addressed later in the project and must not be overlooked. JRTR HFE ITS provides assurance that HFE issues are tracked from identification until the potential for negative effects on human performance has been reduced to an acceptable level.

3.1 ITS requirements and construction

Each issue or concern that meets or exceeds the threshold established by the design team is entered into JRTR HFE ITS when first identified, and each action taken to eliminate or reduce the issue or concern should be thoroughly documented. When an issue is identified, the tracking process should describe individual responsibilities for issue logging, tracking and resolution, and resolution acceptance. The final resolution of the issue should be documented in detail.

Proponent, solver, and approval director as actors should be described in documents. Also, a document should show whether an issue has been solved or unsolved. JRTR HFE ITS was developed to incorporate such requirements above mentioned.

Issue No.	Issue Subject	Issue Content	Issue Date	Proponent	Director of HFE Feasibility	Resolution	Director of resolution approval	Resolution Date	Termination Date
1	Station Shutdown	In the Station Shutdown - This is a stop and separation issue with many human factors-related aspects, including control, response, training and procedures.	201.08.11	SRJ020	YJ Kim	Y	CS Kim	201.08.16	
2	Control Panel	Issue related with the control panel located at the end of the control room.	201.08.11	YJ Kim	YJ Kim	Y	SRJ020	201.08.22	
3	Station Shutdown	In the Station Shutdown - This is a stop and separation issue with many human factors-related aspects, including control, response, training and procedures.	201.08.11	SRJ020	YJ Kim	Y	CS Kim	201.08.16	
4	Control Panel	Issue related with the control panel located at the end of the control room.	201.08.11	YJ Kim	YJ Kim	Y	SRJ020	201.08.22	
5	Station Shutdown	In the Station Shutdown - This is a stop and separation issue with many human factors-related aspects, including control, response, training and procedures.	201.08.11	SRJ020	YJ Kim	Y	CS Kim	201.08.16	
6	Control Panel	Issue related with the control panel located at the end of the control room.	201.08.11	YJ Kim	YJ Kim	Y	SRJ020	201.08.22	

Fig. 1 JRTR Human Factor Engineering Issues Tracking System

A document (or a record) of JRTR HFE ITS is composed of many items as follows:

- 1) Issue No. : the unique number of an issues
- 2) Issue Subject : the title that represents an issue
- 3) Issue Content : detailed information on the issue
- 4) Issue Date : date of issue occurrence
- 5) Proponent : person who proposed an issue
- 6) Director of HFE feasibility : decision maker for HFE relationship
- 7) Examination : if an issue is a HFE concern
- 8) Solver : people to resolve an issue
- 9) Resolution : resolution of the issue in detail
- 10) Director of resolution approval : people who confirm the issue resolution
- 11) Resolution approval : if an issue is resolved
- 12) Termination date : time when an issues is resolved

3.2 Process of JRTR HFE ITS:

The flowchart showing the mechanism by which issues are managed in JRTR HFE ITS is shown in Fig. 2. Descriptions for each step and state are as follow:

- 1) Input an issue: enter an identified HFE issue.
- 2) proposed state: waiting for the feasibility judgment after entering an issue
- 3) Examine the issue: Director examines whether the issue is reasonable or unreasonable in aspects of human factors. In this phase, a solver to resolve the issue is specified.
- 4) Issue resolution: a solver describes the methods

taken to resolve the issue and their results.

5) Resolution review: the effectiveness of resolution is verified.

6) Approval: make sure that all steps are performed properly. If resolution is not perfectly done, the issue goes back to step 4(issue resolution) .

7) Termination: enter date of termination.

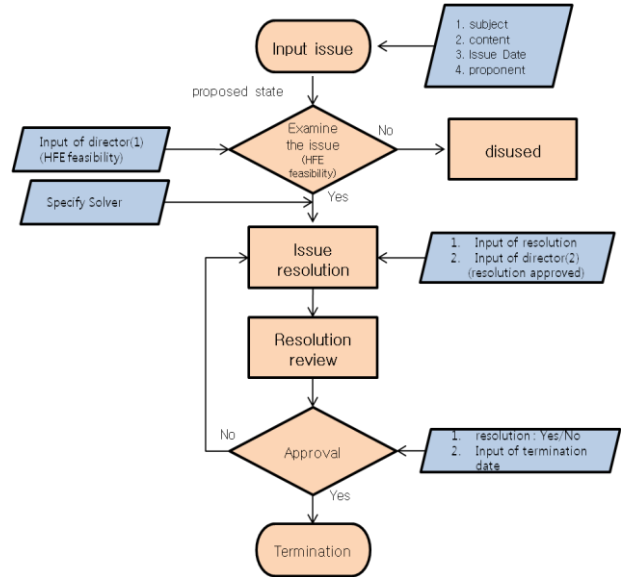


Fig. 2 . JRTR HFE ITS flowchart

3. Conclusions

The scope and method for OER for JRTR were determined on the basis of the design characteristics of research reactor. HANARO is chosen as the reference reactor for JRTR and operators at HANARO will be interviewed to obtain lesson learned from operating experiences. Issues identified during the OER are entered into the JRTR HFE ITS.

JRTR HFE ITS was configured as simple as possible. Such a simple configuration, compared with the pre-existing ITSs for commercial plant designs, brings out efficient access and management. Developed JRTR HFE ITS is used for JRTR design during all design lifetime and expected to contribute to eliminate HFE discrepancies in JRTR design.

REFERENCES

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