

The Evaluation of Safety Culture in Nuclear Power Plants

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1. Introduction

Since the establishment of the concept of nuclear power safety culture in 1991, both institutions and individual scholars have conducted an array of research in order to obtain a qualitative evaluation of safety culture. Domestically, in March 2004 at the 33rd meeting of the Committee on Nuclear Power Safety and Policy, the importance of developing an index of trust and objectivity towards nuclear power was expressed. As such, in 2005 the Korea Hydro & Nuclear Power Co. (KHNP) undertook 'A Study of Improving Nuclear Power Safety Culture' and made a 100-item questionnaire concerning policy, management and individuals. This paper deals with the results and an analysis of the evaluation of safety culture.

2. Method of Safety Culture Evaluation

The evaluation was carried out as a survey of workers at ten nuclear power plants between July 3rd and 14th 2006. The survey was conducted through an online 'do it yourself' form and the reliability of the data was verified by using Systemix Co. An analysis of the results was conducted using SPSS (Statistical Package for Social Science) 12.0. Through a model assessment conducted in March 2005, the reliability and validity of the survey were verified and a reliability level of 95%, a 1% margin of error and a standard deviation of 10 were taken into account. The importance and satisfaction of detailed items were ranked on a 1~5 scale, then converted into a 100 point system by applying a weight to each item according to factors of this process. Thus, a safety culture index was produced. Items of the survey comprised practical issues of

policy, management, individuals and other issues. Among the items concerning policy were: the emphasis of nuclear power safety and the relationship between power plant management and regulators. Management issues included: handling problems related to safety and information exchange, levels of training, the actual conditional level of a plant's overseer, and items about managerial attitude. Individual issues included individual attitude and items of practical affairs at the work place.

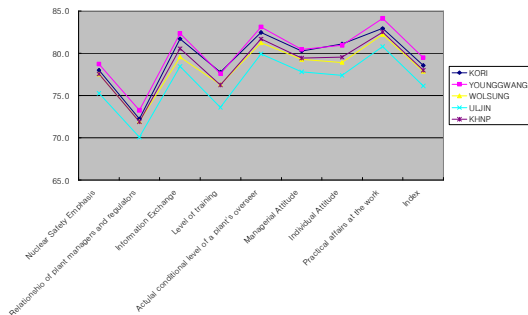
3. Characteristics of Respondents

Of a total of 2,867 respondents, after removing inapplicable responses such as continually repeated answers or incomplete forms, an effective participation rate of 71.2% or 2,450 people were used in this research. Also, to ensure reliability, a minimum of 200 people from each power plant were needed. Separating the respondents by working position, there were general staff (69.5%), section chiefs (23.6%), department managers and above (6.7%) and according to job classification there were operation (53.7%), engineering (39.3%), safety (5.7%). These distribution rates showed similarity among all power plants involved.

4. Analysis of Questionnaire

KHNP's overall safety index of 78 points, when compared with March 2005's model assessment (76.8 points), shows an increase of 1.2 points. <Fig.1> shows that the level of satisfaction over these 8 items follows a very similar distribution and does not reveal any outstanding differences. In general the Young-gwang site shows a relatively high value, while the UL-jin site

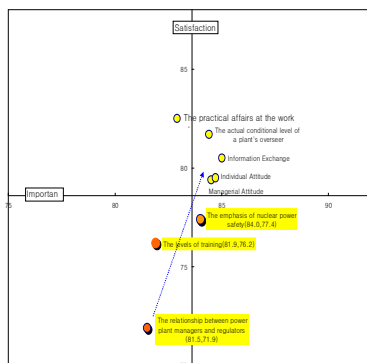
shows a low value.



<Fig.1> Safety Culture Index by Site Location

Among the 8 items were satisfaction in individual practical affairs at the work place ranked highest. However, considering the crucial point that this survey was conducted as an online 'do it yourself' survey, the fact that individuals have a tendency to be more favorable in this format is reflected.

Placing each item on a graph with importance and satisfaction as the x-axis and y-axis respectively, the result of a four quadrant analysis shows that the relationship between power plant management and regulators is the item in need of the most urgent improvement. The second item in need of strategic improvement is emphasis on nuclear power safety.



<Fig.2> 4 Quadrant Safety Culture Index analysis

Among the detailed items, the head manager's safety target presentation received the highest marks. It is made clear through the president's management policy

and the management's safety messages that the first and foremost intention of the administration is safety. Also, through events like nuclear power safety check day on the first Tuesday of every month, it can be concluded by observing the active results that there is constant emphasis on safety. Organization and cleanliness received the lowest score in importance but the highest in satisfaction. Considering the fact that while satisfaction in this item has been increasing but importance has remained low, it can be determined that it is necessary to increase individual worker's level of expectation.

5. Conclusion

As a result of this safety culture study, although there is a difference in safety index scores among each of the power plant sites of the Korea Hydro - Nuclear Power Co., on the whole they all show similar development. It has been confirmed that the main office's safety culture policy is being well implemented and that safety culture is continually improving. Accordingly, if the policy is carried out regularly and materials are accumulated, safety culture's long-term action can be better understood and as weak points are improved upon, nuclear power safety culture can be made a prominent figure.

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