Establishment of a Data Management System to Administrate Inspection History

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1. Introduction

There are total 28 nuclear power plants, including 23 units in service and 5 units under construction, in Korea. Tremendous amount of in-service inspection data for Westinghouse type plants, which are Kori unit 1, 2, 3, 4 and Hanbit units 1 and 2, exist from 1978, in which Kori unit 1 started a commercial operation, to current date. During one in-service inspection cycle, over 1,000 points of 4,150 inspection points should be inspected with non-destructive evaluation methods for a Westinghouse type plant. Therefore, huge amount of data have been accumulated as the time operating plants increase. Some power plants such as APR1400 and OPR1000 have over 10,000 weldments. The inspections of weldments are conducted with various non-destructive evaluation methods such as UT, VT, PT and MT described in the long term plans (LTPs) of plants. Book-type reports showing the results of the inspections were issued currently.

There are huge amount of results related to flaws detected by non-destructive tests, because the results have accumulated for about 40 years since Kori 1 started the commercial operation in 1978. However, the data are spread on plant attribute libraries, departments associated with inspections, etc. As the increments of plant operation year and construction of new plants, the data related to inspection for the weldments on the principal components of nuclear power plants. Therefore, it is needed to administrate the data systematically, which have been being produced

In order to resolve that problem, Central Research Institute of KHNP has developed an in-service inspection data management system to administrate the history data related to the in-service inspections of 23 nuclear power plants with the reports associated with pre and in-service inspections accumulated for 40 years. In this paper, the system is introduced briefly.

2. Development of a system describing in-service inspection history

The integrities of safety related components are checked through the periodical in-service inspection for the weldments. The basic data for in-service inspection is obtained during pre-service inspection which is performed at the stage of the end of construction. The pre- and in-service inspection is scheduled by pre-service inspection plan or in-service long-term plan according to the requirements of applicable code. In the long term plan, the points to be inspected are discriminated by the safety classes of components, and the detailed inspection requirements (method, procedure, standard and number of inspection) are presented.

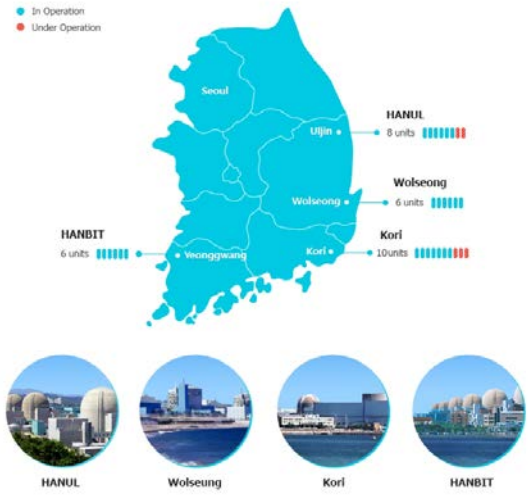

Fig. 1 Nuclear power plants operated and planned in Korea

The pre- and in-service inspection is conducted according to the approved long term plan and the inspection results are documented with examination reports. A detected indication as a result of inspection should be judged whether pass or not according to the applicable code and it is decided through fracture mechanics analysis whether the repair is needed or not. The information about indications detected by inspection is important in order to retain the integrity of plant. The trend of growth of flaw should be analyzed monitoring the size and shape of indication. Because of that systematical procedure, tremendous amount of inspection data for the weldments are accumulated. The administration of data related to the inspection history is important because it shows the information about the past trends of indications on weldments.

The examination reports of the in-service inspection for the nuclear power plants have been issued with hard copy type and they are scattered on plant attribute libraries, departments associated with inspections. It is very hard to find the required data promptly from the scattered data at an emergent situation. Moreover, there is a possibility to make any human error because the personnel enters the analog information retrieved in the hard copy.

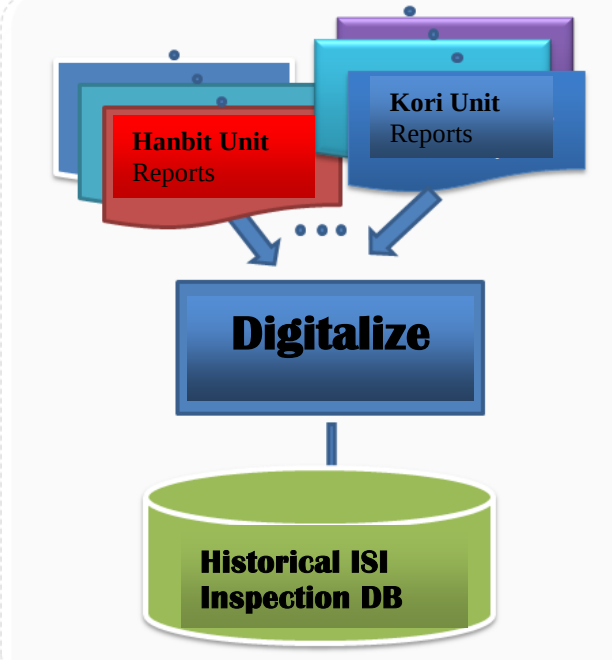

Fig. 2 Flowchart to digitalize

In order to establish the history data, the long term plans, inspection plans and examination reports related to in-service inspections of 23 power plants for 40 years have been collected. It was very hard to grasp all the information completely because of missing data due to many causes. Moreover, some reports were not kept because there was no regulation to keep the old data.

an in-service inspection data management system to administrate the history data related to the in-service inspections of 23 nuclear power plants with the reports associated with pre and in-service inspections accumulated for 40 years. Because converting the reports with micro film type to the digital image is a time consuming work, the reports with micro film type are made to be referred to the plant attributed libraries. To make up for the fact, the system established to refer the long term inspection report, which described the significant results for weldments for 10 years. The detailed information for that can be utilized by downloaded reports. The collection and classification of all the reports other than them are finished.

3. Conclusions

The in-service inspection of nuclear power plants is a forensic examination and it is very important because it has an effect on the reliability of integrity of nuclear power plants. There are tremendous amount of data produced from the in-service inspection currently. They are issued as hard copy type reports. It is very hard to find the required data promptly from the hard copy type reports at an emergnecy situation. In order to resolve that problem, Central Research Institute of KHNP has developed an in-service inspection data management system to administrate the history data related to the in-service inspections. It is now to support the in-service inspection effectively. Moreover, it is possible to counteract promptly to requests by any external agency. It is expected that the reliability of the in-service inspection for nuclear power plants would be improved because the system shows the examination history and results systemtically.

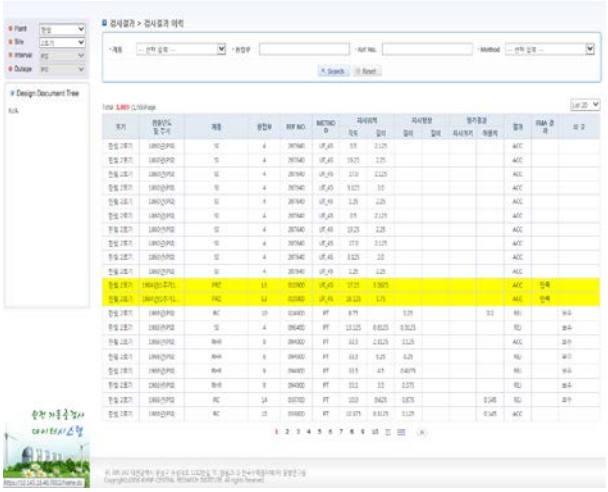

Fig. 3 Significant history data obtained in former ISI for Hanbit unit 2 (Example)

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