Development of Web Based Input Database System on Total System Performance Assessment for a Potential HLW Repository

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1. Introduction

Korea Atomic Energy Research Institute (KAERI) has developed the disposal concept for permanent disposal of High-Level radioactive Waste (HLW) in Korea [1]. To assure the safety of the proposed repository is the one of prime concerns of the research and development. So-called Total System Performance Assessment (TSPA) was proposed to measure the safety of the system and TSPA is needed preparation of input data sets.

To collect data needed for TSPA literature surveys and laboratory and field experiments as well as expert elicitation have been performed [1]. Since many of data sets will be continuously used in the future among many concerned parties, transparent management of data sets such as mean values, probabilistic density functions, names of recorders, date of collection should be stored in well maintained places. Traditionally, they were recorded in papers and stored in a special room for further use and audit.

In many cases these data comes from experts in different institutes. Sometimes, many data lose detailed conditions essential for proper interpretation later. It is needed therefore, to apply the Quality Assurance (QA) processes to keep all records on data and to manage input data for TSPA in the specific database system [2]. KAERI has developed the Cyber R&D Platform including web based QA system and the database program, Performance Assessment Input Database (PAID) [2-3]. PAID system is based on the web technology combining ASP and html with database soft wares, so data collected from many aspects of R&D's can be logged into a centralized database without any difficulty. Data in PAID are categorized into five areas such as waste, near field, far field, biosphere, physical constants, etc. All data saved in the PAID are recorded into the Cyber R&D Platform through QA processes and are searched by using two functionalities. Qualified and well-managed data will be used for TSPA on a repository to dispose of HLW.

2. Input data for TSPA

In TSPA data from inventories, solubility limits and distribution coefficients of species in pore water in a bentonite buffer and rocks, porosities, diffusion coefficients, information on groundwater migration, biosphere, etc are required.

In PAID system it is more convenient to classify the data by physical systems; waste, near field, far field, physical constants, and biosphere. And the information of data is expressed in two folder systems, Material name and Parameter name. These mean the specific property and individual data in physical systems respectively, e.g., Expressing the information on distribution coefficient of I-129 in reference buffer under reducing condition, the Material name is Reference/Buffer/Reducing and Parameter name is distribution coefficient I-129. If choosing a specific Material name in table, the next screen shows the other component, Parameter name. Based on this classification, all of data is expressed their information and data search functionality is developed.

There are two search functionalities, normal search and search a word in PAID. The functionality of normal search is composed of three steps as shown in Figure 1. User can choose the data category by physical systems

in 1st step and sequentially click appropriate material name, parameter name in 2nd and 3rd step . After all user can view the specific data values in web screen.
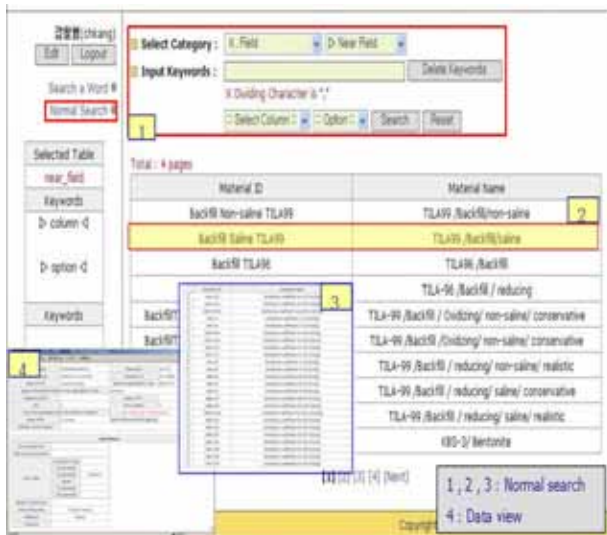

Figure 1. Normal search function in PAID system.

The functionality of search a word should be omitted one step among three steps in normal search, that is, user can choose all categories of physical systems and use a key word search by both Material name and Parameter name as shown in Figure 2. Only knowing a few words in Material name or Parameter name, user can easily search the data by search a word function. Whereas, not knowing the accurate Material name or Parameter name of the target data, it is convenient for user to search by normal search function. Also it is possible to use a key word search in 2nd and 3rd step of normal search function.
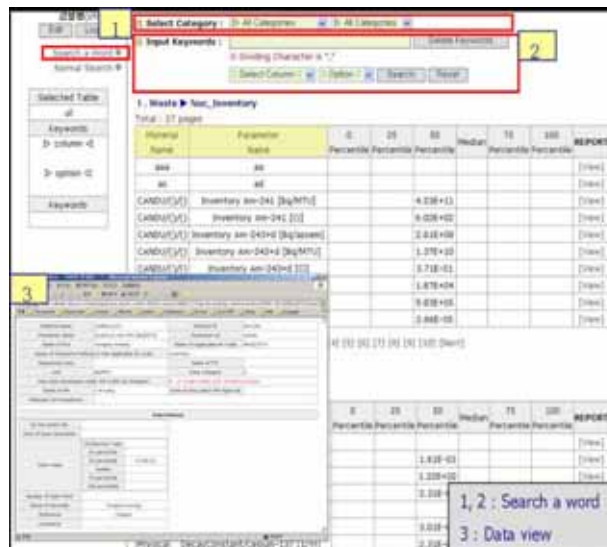

Figure 2. Search a word function in PAID system.

3. Conclusion

To collect data needed for TSPA literature surveys and laboratory and field experiments as well as expert elicitation have been performed, and the data set is managed in PAID, Performance Assessment Input Database.

All data saved in the PAID are recorded into the Cyber R&D Platform through QA processes and are searched by using two functionalities. Qualified and well-managed data will be used for TSPA on a repository to dispose of HLW.

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