2-4 Realistic Application of Safety Assessment Methodology to Disposal Environments
–Arrangement and Development of Basic Information Using FepMatrix Tools–

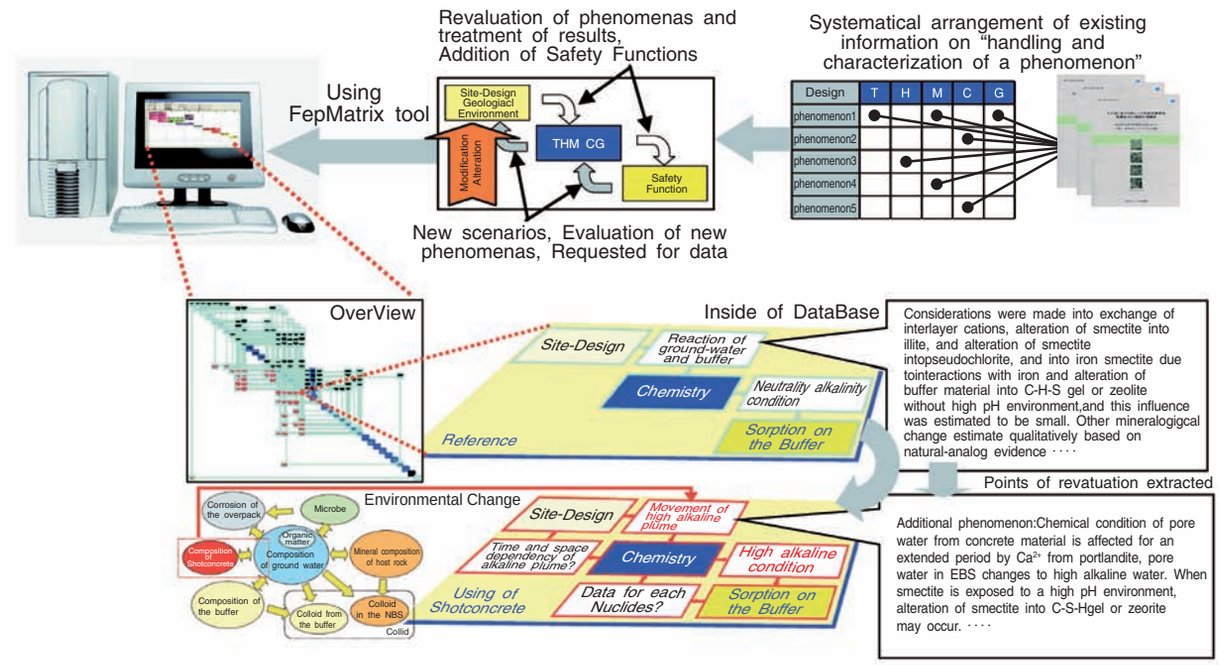

Fig.2-7 Example of information flow in safety assessment

In the safety assessment of radioactive waste geological disposal, there are wide-ranging characteristic features and phenomena to deal with, and it is also essential to consider those features and phenomena in the time scale of hundreds of thousands of years and in the space scale of an enormous natural host-rock. For the safety assessment, it is very important to accurately take in these uncertainties, hence, investigation of the uncertainty comprises several stages, such as the stage of understanding the relevant phenomena classifiable into various specialized fields and the stage of the model building based on this understanding. Therefore, a method to easily understand the process of creating the safety assessment procedure and to improve the tracking of this process are considered in this project.

The characteristic features and phenomena to deal with in the assessment can broadly be classified into four categories, Thermal (T), Hydrological (H), Mechanical (M), and Chemical (C). It is important to organize them considering geometric (G) time change. (Hereinafter "THMCG".) This is because operation of a barrier function (safety function) giving concrete form to the long-term behavior and the safety assessment thought to result from the geological disposal system based on the geological environment as interpreted by THMCG and a design suited to that environment can be systematically characterized. By organizing the above information, it will be possible to review scenarios considering the interaction of the phenomena which should be assessed. To confirm the effectiveness of this concept, we tried organizing the process of making the safety assessment of a reference case which was used for the H12 report's second evaluation of geological disposal R&D using FepMatrix which is a scenario analysis tool (http://www.jaea.go.jp/02/press2007/p07061901/index.html). FepMartix is a publicly available tool developed for organizing the mutual relation functions of vast numbers of characteristics and phenomena in chart form in a computer. With this method, the conditions of geological environment, design of the disposal, and the phenomena of concern and how they are dealt with are reflected in the safety assessment of H12 in an organized fashion.

For instance, in investigating the impact on the environment of the alkaline component of cement in the rock which needs concrete support, this method enables us to extract easily points of the current safety assessment which have been modified or added, by following the modification history of the information (in the balloon boxes of Fig.2-7). Moreover, it was found that when settings which were made according to quantitative assessment of safety functions are too conservative or oversimplified and were to be removed, by tracing back the flow of information from the safety function, we could extract easily the phenomena which should be considered in more detail and the scenario that should be given attention. Thus, the prospect for the extraction of scenarios and the modification of analysis cases looks brighter, even though the results are updated and the designs are modified in future geological research.

Reference
Inagaki, M. et al., A Study of Methodology and It's Applications for the Evaluation of Total System Performance which Considered the Site-Information and the Design-Information, JAEA-Research 2008-022, 2008, 37p. (in Japanese).