

## 2-5 Development of Knowledge Base for HLW Disposal Technology –Technical Know-How and Analysis of Decision Criteria for Characterization of Geological Environment–

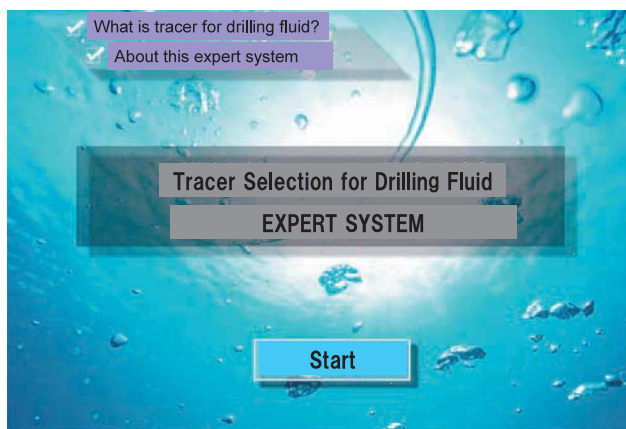


Fig.2-8 Start page of expert system to aid in selection of tracer for drilling fluid

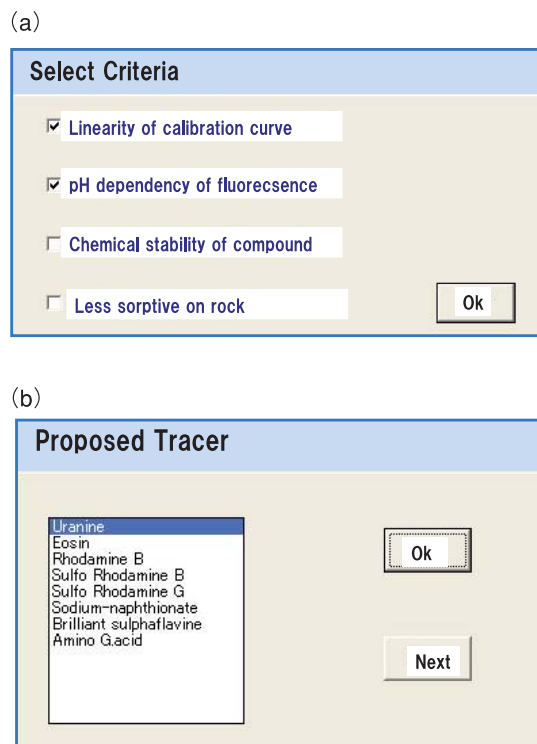


Fig.2-9 Proposed tracers for drilling fluid

In this example, two criteria were chosen by the user. Then, the expert system proposed eight compounds.

The Mizunami Underground Research Laboratory Project (MIU Project) has been carried out since 1996 in Mizunami city, Gifu prefecture, as a part of R&D for HLW disposal. A report giving all results of the surface-based investigation phase (Phase I) was published in 2007. In this report, methodology for the characterization of geological environments was summarized. On the other hand, the decision making process leading to the modification of the investigation program and the setting of input parameters to be used for modeling was not described. The experiences and knowledge gained during investigations of geological environment are only preserved in the program specifications. The above decision making process, experiences, and knowledge are however important for the implementation of HLW disposal.

In this study, we tried to clarify these decision making process, experiences and knowledge obtained through the Phase I investigations. For example, the decision making process can

be expressed as following rules of an “if-then” format. In total, seven types of expert system have been developed. Fig.2-8 shows an expert system for the selection of tracer for drilling fluid. Suitable tracers are proposed by the expert system based on the experience obtained through the MIU Project (Fig.2-9). Additionally, basic information (chemical structure etc.) of each compound is available.

We found that so-called “expert judgment” can be expressed as rules. In this way, knowledge and experiences dealing with characterization of geological environments can be passed on to the next generation. This approach is desired for the implementation of HLW disposal project because the target duration of this project is several decades.

This work was carried out by JAEA under the contract with the Natural Resources and Energy Agency, Ministry of Economy, Trade and Industry.

### Reference

Saegusa, H. et al., Final Report on the Surface-based Investigation (Phase I) at the Mizunami Underground Laboratory Project, JAEA-Research 2007-043, 2008, 337p. (in Japanese).