

Geoscientific Studies in the Mizunami Underground Research Laboratory -Project Overview-

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The Mizunami Underground Research Laboratory(MIU) is now being constructed by the Japan Nuclear Cycle Development Institute(JNC), in the Cretaceous Toki granite in the Tono area, central Japan. The MIU is a purpose-built generic underground research laboratory that provides a foundation for multidisciplinary studies to build a firm scientific and technical basis for geological disposal of nuclear wastes. The main goals of the MIU Project are to establish techniques for investigation, analysis, and assessment of the deep geological environment and to develop a range of engineering techniques for deep underground application. The conceptual design of MIU consists of two circular 1000 m shafts, and horizontal research galleries at depths of 500 m and 1000 m. The MIU Project has three overlapping phases:Surface-based Investigation, Construction and Operation. This 20 year long project began in 1996.

Surface-based investigations are ongoing at the MIU site. During the research carried out at the MIU, in addition to data acquisition through a variety of investigations and experiments, models of the geological environment are constructed. These are carried out following an iterative approach to increase the quantity and quality of data and thus to decrease the uncertainties in the data and models. The research has been carried out at several scales: regional, local, site and block scales. Scale was selected in consideration of the size of the targeted geological environments and the required detail of the investigations. As the investigations were carried out in increasing detail, implicit in the above order of scales, the targeted geological environments were more focused and accuracy improved. Also, the research has been carried out so that synthesis of data was done following the logic inherent in JNC's data-synthesis flow methodology presented diagrammatically. This approach is intended to define the final products of researches and describes the sequential linkages between field investigations, data interpretation, modeling, and the final, end-user products.

Stepwise field investigation has been carried out at the MIU site: surface geological mapping and reflection seismic surveying(step1), investigations in an existing 500 m deep borehole and new shallow borehole investigations(step2), deep borehole investigations(step3), and cross-hole tomography and hydraulic testing (step4). Similarly, modeling of the geological environment and simulation activities has been done iteratively following the above investigation steps. Evaluation of uncertainties in the products and research achievements has been done in each step.

Excavation of the shafts in the construction phase commenced in July 2003, and the shafts reached a depth of 50 m in September 2004. A range of geoscientific investigations is also being carried out during shaft construction. The shaft construction is planned for completion in 2010. Accumulated knowledge and techniques, acquired through the MIU research activities, will provide the technical basis for final disposal that will be implemented by the Nuclear Waste Management Organization of Japan, and for the safety standards to be set by the regulatory authority.

