

# Geoscientific studies at the Mizunami Underground Research Laboratory in Tono- Outline and current status of construction -

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[http://www.jnc.go.jp/ztounou/miu\\_e/index.html](http://www.jnc.go.jp/ztounou/miu_e/index.html)

## 1. Introduction

Mizunami Underground Research Laboratory (MIU) under construction at Mizunami, is composed two 1,000m-deep shafts and research galleries at several levels. Layout of research galleries is showed Fig1(1). The 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 for deep underground application. We study technologies of design and construction-planning, countermeasure for abruptly large water inflows and rock burst, safety construction, recovery and reduce for excavation disturbed zone. We report outline and current status of MIU project.

## 2. Outline of MIU facilities

### 2.1 Shafts

One of the principal facilities of MIU is shaft. The destination of Main Shaft is for transport route of construction and research materials, and muck. Its depth and size are 1,025m and 6.5m, respectively. The destination of Ventilation Shaft is for ventilation of galleries and space for hoist installed after excavation all. Its depth and size are 1,010m and 4.5m, respectively.

### 2.2 Research galleries

Main location for investigations and researches in MIU are Main and Middle Stage. The destinations of Main and Middle Stage are for various investigations and researches at 500m and 1,000m depth. The destination of Measurement Galleries is for measurement rock mass behavior during excavation around Main and Middle Stage at 470m, 528m, and 970m depths. The destination of Sub-stages is to connect two shafts at every 100m depth. The total length of research galleries is about 2,500m.

### 2.3 Surface facilities and shaft-sinking equipments

Equipments at the entrance to the shaft are headframe, storage space for muck, etc. Auxiliary equipment are hoisting drum house, concrete-mixing plant, etc. Shaft-sinking equipments are scaffold, muck bucket, etc. These equipments are covered with sound-proof house.

## 3. Current status of MIU construction

### 3.1 Total schedule

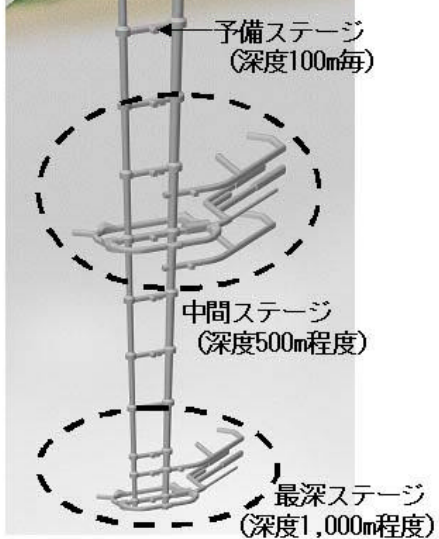
The results of the MIU's geoscientific studies will be applied as the technological basis for safety regulations of the government and for the HLW disposal program to be carried out by the Nuclear Waste Management Organization of Japan (NUMO). In consideration of NUMO's program, one of the mile stone for the MIU project is to reach 1,000m depth around FY 2009. Later, Middle and Main Stage will be excavated, and the investigations at the Phase III (Operation phase) will be performed.

### 3.2 Construction schedule

Excavation of upper part of shaft entrance started at July 2003 after prepare work, and reached 10m depth at September 2003, then concrete work for entrance foundation and setting of facilities around the shaft were progress. Excavation of lower part of shaft entrance resumed at April 2004, and reached 50m depth at November 2004. Shaft-sinking facilities that are headframe, scaffold, hoists, etc, were built at this period. Current status of MIU surface facilities construction is shown Fig1(2). View from bottom of main shaft at 50m depth is shown Fig1(3). Special short-step-sinking method that is two consecutive drill, blast and mucking steps (1.3m + 1.3m) and one shaft-lining step (2.6m) per cycle will be applied for shaft-sinking at deeper part of 50m. One cycle time will be 1.5-2.0 day including research time that are geological observation, take the image of infrared thermograph, etc, at shaft wall.

### 3.3 Rock mass estimation for shaft-sinking

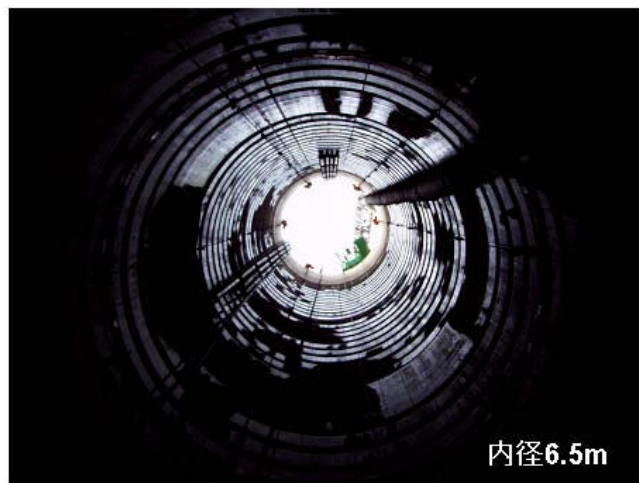
As one example of engineering technical research, rock mass classification for shaft-sinking are estimated using geological data during sinking to 50m depth. As existing rock classification method, for example RMR (Rock Mass Rating by Bieniawski) method were applied. Nevertheless, it is suggested that existing rock mass classification methods have some problems to apply the shaft-sinking. So, we are considering new rock mass classification method suitable for shaft-sinking.



(1) 研究坑道レイアウト



(2) 地上設備構築状況 (H16年12月28日現在)



(3) 主立坑坑底 (GL-51.0m) より地上を見る

図1 瑞浪超深地層研究所の建設状況