

## Outline of the Horonobe Underground Research project

# Hironobu Abe[1], Noboru Nakatsuka[2]

[1] JNC, [2] Horonobe,JNC

### 1. Introduction

The Horonobe underground research project carried out by Japan Nuclear Cycle Development Institute in Horonobe-cho, Hokkaido is one of the URLs planned in Long-Term Program for Research, Development and Utilization of Nuclear Energy (Atomic Energy Commission of Japan, 2000) to study the geological environment of sedimentary rocks in the deep underground. This study, started in March 2001, will be divided into three stages over a period of about 20 years. A candidate area of approximately 3km square was selected as laboratory construction site in the Hokushin, Horonobe-cho in July, 2002. Shaft excavation will start in fiscal 2005, to be completed by fiscal 2010.

### 2. Outline of the Horonobe Underground Research Project

The objectives of the project are to conduct geo-scientific studies and R&D on geological disposal of high level waste. The four tasks under geo-scientific studies are to develop investigation techniques for assessing geological environments, to develop monitoring techniques, to study the long-term stability of geological environment, and to develop basic engineering techniques for the deep underground. The two tasks under R&D on geological disposal of high level waste include assessing the reliability of disposal technology and advancing the safety assessment methodology.

### 3. Current State of Investigation and Research

The geology of the Hokushin area selected for candidate laboratory site consists of Wakkanai and Koetoi Formations. The distribution of Omagari reverse fault (NNW-SSE strike, E dip) is estimated to be at the center. The research will pay close attention to the geological characteristics already confirmed, which are: the sedimentary rocks contain groundwater of both the salt water and fresh water types; and gas is melted into the groundwater.

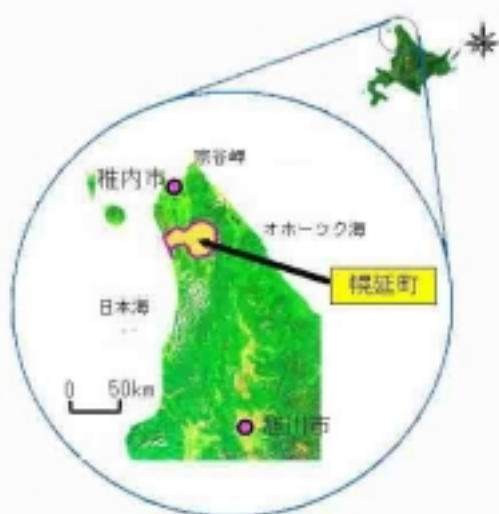
JNC carried out geophysical survey, geological survey, surface hydrological investigation, and borehole investigations (HDB-3,4,5) at the candidate laboratory site and surrounding area to develop investigation techniques during fiscal 2002. Three vertical boreholes of 520m were drilled at the candidate site of the URL and surrounding area, and a laboratory test conducted on the cores obtained. At HDB-1 and 3 to the west of Omagari fault, a distribution of mudstone containing diatom was found up to the vicinity of 400m depth. For HDB-4 and 5 to the east of Omagari fault, mudstone containing diatom was detected only up to the depths of 170m and 100m, respectively.

The uniaxial compressive strength of the core from borehole HDB-3 indicated about the same as that from HDB-1, while the hard shale part of HDB-4 showed a maximum of about 29MPa. Hydraulic conductivity ranged between 10-9m/sec and 10-7m/sec at HDB-3 and 5, and was 10-5m/sec at HDB-4 for the point where lost circulation was recognized during drilling. The data obtained through investigations on the geology, hydro-geology, geochemistry, rock mechanics and gas will be reflected in designing the geological environment model and the actual underground laboratory.

A long-term monitoring apparatus is installed in the borehole drilled in 2001, and pore pressure has been measured. As for the study on long-term stability of geological environment, seismograph, crustal movement observation, GPS system, and electromagnetic instrument are installed and observation is started.

To ensure the reliability of disposal technology, test plans after the 2nd stage include conveyance examination of stationing an engineered barrier and of the low alkaline concrete material. In an effort to advance the safety assessment technique, data are being collected for the safety assessment, confirmation of quantity, precision, application of the model and on its improvement.

The Horonobe underground research project is making steady progress in its 1st stage research and in its planning of the underground facilities at the selected candidate area.

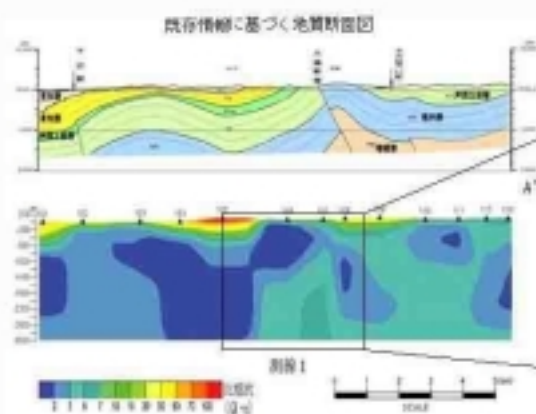


幌延町位置図

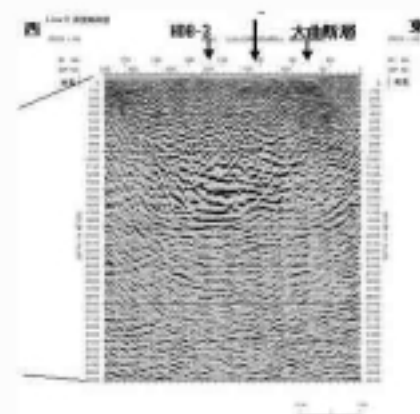


平成 14 年度調査研究位置図

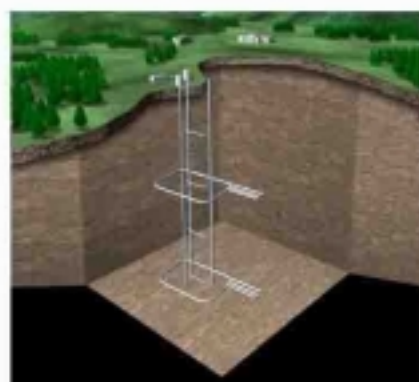
- 凡 例
- 平成14年度試掘孔
  - 平成13年度試掘孔 (GPS調査実施: H6-1)
  - 反射法地震探査線路
  - ★ 河川流量観測システム設置位置



地上電磁探査比抵抗断面図



反射法地震探査結果



地下施設のイメージ