

# Research outline of the examination about the effects of heat and hydrothermal water on surroundings by geological repository

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Research outline of the examination about the effects of heat and hydrothermal water on surroundings by geological repository (part 2)

## 1. Research purpose

For sites selection of geological repository of nuclear waste, the places where the influence of the heat and hydrothermal water by magma is predicted, should be excluded from the candidates. The places where the effects are not clearly identified by references survey, the judgments are carried out after the subsurface survey including boring survey.

In order to grasp the future extent and characteristics of the influence, it is necessary to establish the methods for appropriate surveys and assessments on presently effects to surroundings by heat and hydrothermal activities. And also, the high-temperature anomalous areas not related to Quaternary volcanism should be extracted, and the techniques for these site survey, data analysis and evaluation must be prepared.

Therefore, we started to examine the effects of heat and hydrothermal water on surroundings by geological repository.

## 2. Research outline

### 1) An examination of earth scientific characteristics of high-temperature anomalous areas

(1) Examinations of extraction of thermal anomaly and comprehension method of characteristics based on discharged heat from hot springs

The problems on data acquisition, data use and calculation of discharged heat from hot springs, were investigated. The data of hot springs were collected at Southwestern Honshu, Japan.

### (2) An examination of construction of database for rock alteration, and partially construction of data base

The database for rock alteration was constructed using geothermal bore hole data from 25 geothermal surveyed areas in Honshu. Some representative areas were analyzed by overlay of various kinds of datasets using the explored graphic display system.

### (3) Information gathering on earth scientific characteristics and 2D-3D visualization of data

The distribution maps concerning topography, geology, seismic hypocenter, electric resistivity, Curie-point isotherm, and subsurface isotherms were collected and summarized as input data to the data base for 2-D and 3-D visualization. The datasets were collected from Southwestern Honshu, Japan.

### 2) An examination of genetic origin of high-temperature anomalous areas

Various parameters and boundary conditions controlling the wide scale fluids flow, were collected. The sensitivity analysis was applied first to make clear the degree of effects by various boundary conditions to the models using multi-components and multi-phases simulators.

### 3) An examination of survey, analysis and evaluation methods

#### (1) Analytical method for deep subsurface structures by electromagnetic survey

Pre-existing electromagnetic (MT) data in Tohoku district were compiled and one of them (Abukuma) was re-analyzed.

#### (2) Analytical method of deep subsurface structures by hypocenter distribution

Deep-seated geothermal resources map and hypocenter distribution map in Southwestern Honshu, were compared each other. It is recognized that hypocenter distribution is useful to identify the hydrothermal areas.

#### (3) Analytical method of long-term change of geothermal system by radiometric dating method

The most suitable method for measurement of long-term geothermal activities was concretely assessed.

#### (4) Evaluation method for heat and hydrothermal activity effects based on fluids geochemistry

Characteristics and diversity of fluids in granitic bodies were simulated by various fluids sources and water-rock interaction.

#### (5) Analytical method of subsurface hydrothermal environment using the rock alteration simulation.

Various related data were collected. The conceptual model for regional hydrothermal alteration formation was drawn.