For development of evaluation technique for long term behavior between engineered barrier and host rock in near field

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In order to improve the engineering reliability in high-level radioactive waste disposal with respect to production and construction technique of overpack and the buffer material in terms of long-term integrity in consideration of the environment of deep underground, expansion of knowledge related to the quality and investigation related to the construction of the evaluation technique of the integrity have been carried out for the showing of the assessment guideline. Various experiments and researches have been conducted about the quality of the overpack and buffer material. On the other hand, it is necessary to include host rock around the engineered barrier to the experimental object in order to consider the actual disposal environment. Further, the method of evaluating the long term behavior of the engineered barrier include the experiments for understanding of phenomenon, the modeling and the numerical analysis. Experimental approach is possible to evaluate the actually occurring phenomena. On the other hand, it is difficult to directly evaluate the long term behavior of several decades to several hundred years. Therefore, the long term behavior evaluation requires modeling and numerical simulation. To improve the reliability of long term behavior evaluation by numerical simulation, it is necessary to verify the analysis technique by experimental support. Based on such backgrounds, the present study is aimed to construct a verification method of the long term behavior evaluation between the engineered barriers and the surrounding rock.
Constructing the method of the validation and verification of the evaluation of the long term behavior (such as the numerical simulation), it has been carried out in the following viewpoints in the present study.
1) Organizing of environmental factors that affect the long term integrity of engineered barrier (thermal, mechanics, hydraulic, etc.).
2) Employment of numerical code of coupled thermal-hydraulic-mechanical (THM) processes.
3) Considering various environmental conditions to which are exposed after the emplacement of an engineered barrier, the equivalent data of long term behavior is measured by a centrifuge model test which can be time acceleration test on the basis of the scaling law of centrifugal force field.
4) In the period of several decades in which the surrounding of the waste is headed for saturation, it is considered that mechanical behavior is the most dominant by the reflooding of groundwater in post-closure. Therefore, the evaluation period by centrifuge model test requires period in which the behavior of the post-saturation can also be partially measured.
5) In order to reduction of uncertainty in input value in numerical analysis, we measure the physical properties of the material used in the centrifuge model test, and enter the value in the numerical analysis code.
6) We conduct a sensitivity analysis in parameters of the numerical analysis code, and reveal the sensitivity of the parameters.
7) Then, we improve the accuracy of the analysis code by comparing the results of numerical

simulation and centrifuge model test, and contribute to the validation of the evaluation technique of long term behavior.
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