Overview of R&D on Environmental Impact Assessment for MH Exploitation Program

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In the Environmental Impact Assessment group of the research consortium for methane hydrate resources in Japan, MH21, Engineering Advancement Association of Japan has conducted a number of researches and developed activities to establish basic technologies associated with environmental impact assessments.

To clarify the extent of environmental impact on marine environment by methane hydrate, MH, exploitation, we should accomplish two action items as follows; 1)To understand the baseline of marine environment and characterize the marine environment around Nankai trough, 2)To predict and assess environmental impact of many factors produced by MH exploitation on marine ecosystems. Moreover, we should adjust the management system for safe, environmentally friendly development. Now, we have conducted the researches as follows; A) Environmental baseline survey around Nankai trough to gather baseline date, B) Development of the numerical models to predict the behavior of environmental impact factor in the water column and the simulator to predict the seafloor sediment deformation during MH exploitation, C) Development of core technologies to monitor these factors in deep sea environment. D) Research of major issues related to environmental impact assessments and safety and environment management. In this EIA group session, we introduce the contents above A to C related with earth science.

Regarding to A), we understood the environmental condition around Nankai trough before development and characterized environmental properties of three zones, the offing from Tokai coast, Daini Atsumi knoll and the sea of Kumano. These data will be the index of EIA on MH development.

Regarding to B), we developed the two numerical models to predict and assess the behavior of environmental impact factors in the marine aquatic environment, such as the leaked methane gas and the discharged water during methane hydrate dissociation, and the simulator for seafloor stratum deformation prediction. It is able to predict and evaluate environment impact on marine ecosystems when used in combination of the predicted extent area of leakage of the methane gas and the discharged water by the former numerical models with the impact on marine organisms including EC50 and so on. And it is possible to predict and evaluate environment impact on marine seabed to estimate the extent of the seabed subsidence and the presumption of impacted zone during MH exploitation by the latter simulator.

Regarding to C), we developed the basic technologies to detect leakage of the methane gas on real-time using dissolved methane sensor and to monitor minute displacement of seafloor stratum deformation using servo-accelerometers, and so on. More over, we developed the basic design of the methane monitoring system which is integrated these sensors. It is able to implement EIA on the offshore production test when used in combination of this monitoring system with environmental baseline survey.

Regarding to D), we adjust the characteristic risks of MH exploitation besides the conventional oil and natural gas exploitation to develop the basic handbook for safe and environmental management. Recently, we have been concerned with global warming, so now we are gathering the information of the relationship between MH and the global environmental impact including climate change and slides of the seabed.

Now, we have completed almost all of aim during physe-1 as follows; 1) Establish the methods of EIA for offshore production test, 2) Completion of the core monitoring system for gas leakage and seafloor stratum deformation. 3) Completion of the prototype simulator for stratum deformation prediction. 4) Gather and readjust the information of safe and environmental management for development of MH. Hereafter, for early commercial production of MH in future, we want to do more research and contribute environmentally friendly development of new energy source in Japan.