10. A Study on the Water Quality of Deep Sea Water in Ulleung Island

○Yong-Hwan Kim, Yong-Jun Song, Tae-Yeong Kim
Gyeongbuk Institute for Marine Bioindustry, Korea

Abstract

It has been more than ten years since Korea started the development of deep ocean water (DOW) applications. In some areas of the ocean, there are places where DOW (Deep Ocean Water) regularly penetrates through the boundary of the thermocline into the surface euphotic zone. The human community would become far more gentle to the earth than it now is by utilizing DOW, a huge, renewable resources.

In this study, we aimed to minimize the impact on the marine environment by developing deep ocean water. The Act on the Prevention of Deep Ocean Water provided for the management of marine environment in designated areas by conducting a water quality test on each developed area.

Therefore, three deep ocean waters of the Ulleung island, Ulleung County Taeha Jeodong waters, and Hyeonpo quality inspections, about the deep ocean water intake area of water for stability secured.

The submarine used the SBE32 Carousel model of American Sea Bird Electronics, CTD used the SBE 911 Plus model that was simultaneously equipped with the aforementionaled submerger. Water temperature, salinity, electrical conductivity, turbidity, chlorophyll-a and pH were measured in real time.

Total coliforms testing was conducted simultaneously with collection on board by prepared 3M Petrifilm and incubator. For nutrient, NO_3-N, PO_4-P and SiO_2-Si were analysed using ACCS-5 of BLTEC. Major elements and heavy metals were analysed using ICP 720 ES of Varian Company for Na, Mg, Ca, K, and Cd, Pb, Cu, Hg. Cs-137, which is radioactive, used a method of air-handling the cesium and capturing it with the addition of an AMP to the specimen. The sample for liquid scintillator was produced and measured using QUANTULUS-1220 liquid scintillator through a distillation process, which Sr-90s were measured using a water scintillator.

According to the results of the water quality analysis of deep ocean water intake in Ulleung County, the basic items were 1.133, 0.276 and 34.006, and 34.058, respectively. Nutritions was 0.172, 0.311, 0.231 nutrite concentraton, 0.033, 0.062, 0.406 phosphorous concentration, 0.207, 1.112, 0.611 silicate concentrations, respectively. The main elements(Mineral) included a Na constant ratio of 10,659, 10,508, 10,484 mg/L, Mg 1,266, 1,246, 1,247mg/L, Ca 386, 380, 384mg/L, K 380, 372, 375 mg/L, respectively. The coliforms were also not detected with harmful effects such as unexamined substances, The radioactivity was satisfied with the water quality standards of 3H unexamined, Cs-137 1.99, 1.56, 1.79 mBq/L, Sr90 1.55, 1.47 and 1.08 mBq/L.

Keywords: Deep Ocean Water, CTD, Main Elements(Mineral), Membrane Separation

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