

Chemical and mineralogical properties of backfilling soils of Yokosuka Dry Dock, Kanagawa, Japan

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Three dry docks of Yokosuka Arsenal opened during 1871-1884. The first one was constructed according to the guidance of French engineer, Francois Leonce Verny (1837-1902). These dry dock areas have been occupied by the USA navy after the World War II, and still been in service even today. Surface covering stones of the docks are volcanic rocks or tuff collected from Izu or Manadzuru peninsula (Shizuoka and Kanagawa prefectures). They are cut in the size of around 60×40×30 cm and placed on the surface of cut bedrock, Pleistocene mudstone or silt, reinforced by “Beton” which is improved soil composed by gravel, lime and volcanic ash. In order to investigate the properties of beton, boring core samples were taken from a few points and mineralogical and chemical analyses were carried out using powder XRD and SEM-EDS, respectively. The dominant minerals are quartz and K-feldspar in the bedrock reflecting original sediments, whereas quartz and calcite in the beton. Chemical analysis results shows that the higher contents of SiO₂ and K₂O indicating the existence of K-feldspar, and that the higher contents of CaO, Al₂O₃ and FeO+Fe₂O₃ but low content of SiO₂ reflecting beton. To consider these differences, the CaO/SiO₂, MgO/SiO₂, (FeO+Fe₂O₃)/SiO₂ ratios are fairly useful to compare the influences of lime or cement. From these investigation, it is concluded that the beton had similar characteristics as a dawn cement in civilization in Japan, and that some points were affected by seawater leak.

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