

Hydrological Environment of Surface Water and Groundwater in Ninh Thuan Region, South-east Coast, Vietnam

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The Government of Vietnam is planning to construct two nuclear power plants in Ninh Thuan province, a coastal region of Vietnam with semi-arid climate conditions. This research aims to investigate the hydrological environment of surface water and groundwater in the planned site of Ninh Thuan 2 in order to obtain basic information for the construction of the plant. Inorganic solute ion concentrations and stable isotopes of oxygen and hydrogen in surface water, groundwater and seawater were analyzed to understand their chemical characteristics and hydrological process. The results demonstrate that water resources in this region are limited and groundwater is considered to be a main water source. The groundwater flows in Holocene and Pleistocene aquifers, with the depths of 10 m and 16-21 m, respectively and the dominant flow is from southwest to northeast, corresponding to the river flow direction in this area. There seems to be an interaction of surface water and groundwater in this region. Streams and wells near the shoreline are affected by brackish water with high Na-Cl concentration. Groundwater in the Holocene aquifer shows a chemical characteristic of Ca-SO₄ and Ca-HCO₃ type, whereas Na-HCO₃ water type is dominant in the Pleistocene aquifer. The water chemistry is being influenced by freshwater - brackish water mixing, weathering processes and human activities. The nitrate concentration of groundwater in the Holocene aquifer is higher than that in the Pleistocene aquifer, and much higher than WHO drinking water standards. This means that water in this region is affected by agricultural production activities. Therefore, the project developer should have a careful consideration when consuming water in this region for Ninh Thuan 2 nuclear power plant project.

Keywords: nuclear power plant, environmental impact assessment, water resources