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# Application of Tritium and Stable Isotope as the Tracers on Groundwater and Reservoir Leakage study of Limestone Aquifers in Chiang Dao Area, Northern Thailand

The groundwater in Chiang Dao Area, Chiang Mai province is geologically related to limestone, which exposed as beautiful Karst topography. The groundwater system in Karst Area usually formed caves and underground conduits with turbulent flows and rapid vertical infiltration. The unique recharge mechanism make the aquifers tends to be complex, high heterogeneity and change in very dynamic with high surface water-groundwater interaction associate vast of springs. The reservoirs in the area usually faced of leakage problems and short of storage in dry season. The stable isotope ratios (δ2H, δ18O) of 42 water samples of groundwater, surface water and springs, collected in 2013-2014, were analyzed by isotopic H2O laser spectroscopy instrument (Picarro L2130-i) and the radionuclide Tritium content in water samples were ultra low level measured by Liquid Scintillation Counter (LSC) with Electrolytic Enrichment. The data can be applied as environmental tracers to identify the GW recharging sources and SW-GW interaction.

In surface water, the reservoir water can be separated to the streams by very high enrichment (δ18O>-5.0) from higher evaporation effect. The SW-GW interaction can be defined by evaporation fingerprint with δ18O>-7.1 in 2 groundwater wells and 5 springs that located close to the reservoirs. Tritium content in SW range from 1.8-2.3 Tritium Unit (TU.) that the range can be defined as "Modern water". Tritium content in GW in the study area range from 0.3-2.0 TU., and can be divided into 2 groups. The GW in recharge area at higher altitude (>620 m. above MSL.) can be interpreted as modern water recharged by Tritium content of 1.8-2.0 TU., while GW in discharge area at lower altitude (422-620 m. above MSL.) can be defined as mixture of modern and sub-modern (prior 1952) GW recharged by lower Tritium content of 0.3-1.6 TU. The reservoirs and GW system including springs in recharge area (altitude >620 m.), which show evaporation fingerprint and "Modern water" tritium characteristic, will be assessed as higher risk in short of storage or decline of water level by leakage or rapidly recharge to the lower GW water system (base flow) in the dry season.

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