

3 2**EVOLUTION OF GROUNDWATER FLOW AND CHEMISTRY ESTIMATED
FROM STATISTICAL APPROACHES: COMPARATIVE STUDY ON TWO
UNDERGROUND LPG STORAGE AREAS FACILITIES**

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This study is to investigate hydrogeological and hydrogeochemical characteristics of groundwaters and the variation of natural impacts, such as seawater intrusion, imposed to the coastal aquifers in cavern facilities, using appropriate statistical methods. The research areas are two underground LPG storage areas constructed in the vicinity of the South Sea and West Sea coastal areas, Korea.

As a result of the chemical analyses of groundwater samples, collected at 7 times since 1998, remarkably high sodium (167~27,700 mg/L) and chloride (1,005~15,368 mg/L) contents are observed at groundwaters and seepage waters. Enriched these ion concentrations showing conspicuous and temporal variance mean that some seawater intrusion into aquifers are occurred in the study areas.

The principal component analysis (PCA) is performed using 8 chemical ions as statistical variables, and its result reveals that the chemical characteristics of the groundwaters are reciprocally dependent upon nitrate and bicarbonate contents.

Time series analyses in terms of cross correlation between the operation pressures of each caverns and groundwater levels suggest that the groundwater levels adjacent to the caverns susceptibly vary in response to very small change of the cavern operation pressure, and their response times are estimated to 1~6 days. The cross correlation between groundwater levels and electrical conductivities shows that gradational drawdown of groundwater levels can accompany the drastic increase of electrical conductivity and it implicates that the periodical variation of seawater intrusion is occurred in accordance with the change of the operation pressure.