INTRODUCTION

Seventy–two percent of the world’s known reserves are in Türkiye. All borate deposits in Türkiye are located in the western Anatolia. The Bigadiç borate deposits under investigation with 935 Mt reserve are the largest borate deposits in the world. The known borate deposits of Türkiye were deposited in the lacustrine environment during Miocene when the volcanic activity occurred from Tertiary to Quaternary. All of the Turkish borate deposits are classified as volcanic related deposits. Boron ore deposits intercalated with claystone, mudstone, tufa and fine layered limestone show lens shape. Borate minerals formed in two zones. Tiilu and Acep-Simav open mines represented the lower and upper borate zones, respectively. Colemanite and ulexite are the dominant minerals at all ore zones. The major elements of Bigadiç borates contain Ca, Si, Mg, Al, Fe, S, Na, P and Mn at Tiilu, Ca, Na, Si, Mg, S, Al, P and Mn at Simav, and Ca, Na, Si, Mg, S, Al and Mn at Acep samples respectively. Except for Li, Mo, Sb, As, Sr and Se, concentrations of other trace elements are significantly lower than averages of earth crust and andesite at the three mines. With respect to averages of earth crust and andesite, Mo, Sr, As, Li and particularly Se are enriched significantly in the Bigadiç. In examining depth-dependent variations of major and trace elements, four element groups at the Tiilu site and six element groups at the Simav and Acep sites were determined. Element abundances or element geochemical trends show differences at the Tülü, Simav and Acep mines. These differences can be explained by the diversity of physicochemical conditions in the deposition environment by the effect of differences at the recharge regime and source.

MATERIALS AND METHOD

Stratigraphic studies indicate that there are two borate zones in the Bigadiç basin, the lower and upper borate zones [9]. Samples from the lower and upper borate zones of the Bigadiç borate deposit comprise the...
material of this work. Samples were collected from the wells drilled by Etibank Bigadiç Borate Management. Geochemical investigations were performed on read 8 samples from the Simav quarry and 12 from the Acep quarry representing the upper borate zone and 22 samples from the Tülü quarry, representing the lower borate zone.

Geochemical analyses of samples were conducted in ACME (Canada) Laboratories and Laboratories of Technology Development Department of the Eti Mine Works General Management. Analyses of 53 elements cataloged as 1F at ACME were performed with the inductively coupled plasma-mass spectrometry (ICP–MS) method. Analyses of major oxides and trace and rare earth elements described as 4A + 4B were made with the inductively coupled plasma-emission spectrometry (ICP–ES) method. B₂O₃ analysis was conducted at the laboratories of Eti Mine Works with volu-