THE CURRENT GEOTHERMAL EXPLORATION AND DEVELOPMENT OF THE GEOTHERMAL FIELD OF MILOS ISLAND IN GREECE

Constantine Karytsas [a] , Dimitrios Mendrinos [a] , George Radoglou [b]

a Geothermal Department, Centre for Renewable Energy Sources, 19 th km Marathon Ave, Pikermi-Attica, Greece
b Milos, Company for Water Supply of Milos island, SA

INTRODUCTION

Milos island is located in the Aegean Volcanic Arc and is characterized by abundant geothermal resources of high temperature. Early geothermal exploration undertaken by the Institute of Geological and Mining Research of Greece, summarized in Fytikas (1977), includes temperature measurements in shallow wells drilled for this purpose and Schlumberger resistivity measurements of subsurface rocks. The results, which are shown in Figure 1, indicate that the eastern part of the island and especially the plain of Zefyria is the region with the highest temperature gradients and lowest apparent resistivities, hence the parts of the island most promising for high enthalpy geothermal potential. Later drilling exploration undertaken by the Public Power Co (PPC) of Greece, summarized in Mendrinos (1988), identified geothermal fluids of temperature 300-323 ºC at depths 800-1400 m below sea level in theZefyria plain. The results of the geochemical exploration financed by the PPC are shown in Figure 2. By examining Figure 2, we conclude that the region of the island most promising for exploitation of shallow, low enthalpy (<100 ºC) geothermal resources, is the one where deep fluids are present in shallow aquifers, namely the east half of the island.

Mendrinos (1988) performed evaluation of exploration data, well test analysis, resource assessment and computer simulation of the Milos geothermal system and indicated that the deep geothermal fluids correspond to boiled seawater of 80,000 ppm salinity. Mendrinos (1988) also calculated that by cooling the upper 2 km of the hot rocks below Zefyria, Vounalia and Adamas by 90 ºC would release 5 x 10 18 J of heat (or 141 million TOE), which justifies the commissioning of 260 MWe geothermal power plant. In parallel, the evaluation showed that the minimum heat flow from deeper rocks cannot be less than 87.8 MWth. This value is slightly higher than the natural conductive heat flow towards the surface of the island, which has been estimated as 77 MWth (Mendrinos 1991) due to the convective heat flow component. The figure of 87.8 MWth was based on small amount of natural convection through the geothermal system, due to the low permeability measured in the deep geothermal wells. Recent drilling in Vounalia, however, performed as part of the MIDES project, showed very high permeability and seawater infiltration to shallow rocks, as described above. This indicates that heat flow from deeper layers should be considerably higher.