

RESULTS OF A COMPREHENSIVE WELL TEST PROGRAM TO ASSESS THE ZUGDIDI-TSAISHI GEOTHERMAL FIELD, REPUBLIC OF GEORGIA

Sanyal, S.K.¹, Granados, E.E.¹, Brown, P.J.¹, Hallberg, J.², Menteshashvili, Z.²,
Bachakashvili, D.³, Buachidze, G.⁴, Vardigoreli, O.⁴, and Tsertsvadze, N.⁴

¹ GeothermEx, Inc., 5221 Central Avenue, Suite 201, Richmond, CA 94804 USA

² Burns and Roe Enterprises, Inc., 1400 K Street, NW, Washington, D.C. 20005 USA

³ Sukburgeotermia, Georgian Geothermal Association, 31 Rustaveli Avenue, Tbilisi,
Republic of Georgia 380008

⁴ Geotermia Ltd., 87 Paliashvili Street, Tbilisi, Republic of Georgia 380079

Key Words:

Interference test, moderate enthalpy, hydrologic properties, flow capacity

ABSTRACT

Republic of Georgia has substantial geothermal potential. In the Zugdidi-Tsaishi area, geothermal water was historically used for district heating and other direct uses. During the armed hostilities (in 1992-93) near this area, the geothermal district heating facilities in the area were destroyed. In the reconstruction effort, an assessment of the geothermal field was conducted through a comprehensive well test program during 1997-98. The field has two aquifers, an upper one and a lower one; of the 13 wells used in the test program, 10 are completed in the upper aquifer and 3 in the lower aquifer. The test program was designed to be a minimum cost program utilizing as much of the existing local facilities as possible. The goals of the test program were; (1) to determine whether the two aquifers are in hydrologic communication and (2) to estimate the storage and flow properties of each aquifer. The test program lasted three months; various wells completed in both the upper and lower aquifers were brought on line and shut in at different times. Some wells were found to have significant leakage during the test period while the flow rate data from certain other wells were unavailable. During the test, the water level was monitored in some wells and the wellhead pressure in certain artesian wells. Therefore, constructing adequate flow rate and pressure histories of the wells proved challenging. Even though this made for an unexpectedly complicated, multi-rate, multi-well test program, the objectives of the program were achieved satisfactorily. The data were analyzed using superposition of the "line-source solution" to the "diffusivity equation" for fluid flow in porous media in both space and time. Using the measured and inferred production histories of the wells, the observed and calculated pressure histories of the observation wells were matched satisfactorily by trial and error. The analysis of the results showed the two aquifers do not communicate hydrologically. The flow capacity of each aquifer was estimated to be high, in the range of 128 to 159 Darcy-meters. The storage capacity of each aquifer was estimated to be 0.44 E-3 to 1.15 E-3 meters per bar, which is typical of such shallow aquifers. The analysis further showed that the reserves of geothermal fluid per square kilometer of field area is 3 to 8 million cubic meters (3 to 8 million tons) in each aquifer.

[For a copy of this paper please e-mail us at mw@geothermex.com](mailto:mw@geothermex.com)