

NUMERICAL MODELING OF A MATURE, HIGH TEMPERATURE GEOTHERMAL RESERVOIR: A CASE HISTORY FROM THE ONIKOBE FIELD, MIYAGI PREFECTURE, JAPAN

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ABSTRACT

This paper presents the results of a numerical modeling effort (a) to verify the conceptual hydrogeological model of the Onikobe geothermal field in Japan; (b) to understand the reasons for the continuous enthalpy decline experienced in many wells over the 13 year production history of the field; and (c) to verify if the production capacity can be increased from 12.5 to 25 MW. A three-dimensional, two-phase integrated finite difference model of the field was developed and calibrated by matching the initial temperature and pressure distributions in the field and the enthalpy and pressure histories of the wells by trial and error. The calibration process verified the conceptual model and showed that the enthalpy decline was caused by cold water recharge resulting from exploitation of the "upper" reservoir. From exploitation modeling it was concluded that a 25 MW development is feasible if 2 to 3 additional production wells and 2 additional injection wells are drilled and completed in the "lower" reservoir.

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