

<<中国-澳大利亚含水层补给管理新进展>>

图书基本信息

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前言

Managed aquifer recharge (MAR) is the intentional recharge of water to aquifers for subsequent recovery or environmental benefit. Aquifers may be recharged by a range of methods using wells and infiltration systems , to increase groundwater supplies and improve their quality or to redress saline ingress or land subsidence. To date in China the major applications of MAR have been in infiltration basins established in the 1990s , such as the groundwater dams , infiltration wells and trenches in Shandong province , with a total recharge capacity exceeding 200 million m³/a. River bank filtration projects have been established in South China to improve the quality of water for industry and agriculture. Injection wells are now in routine operational use for sustainable management of geothermal reservoirs in North East China with reinjection of 4 million m³/a. In addition , there are recharge projects to reduce land subsidence in Shanghai. A demonstration project in Beijing is exploring wastewater treatment processes to precede recharge for sustainable projects that protect human health. New research in Jinan is starting to explore recharge of roof rainwater to replenish a karst aquifer that feeds historically important springs. In Australia infiltration basins have been used , for 50 million m³/a of agricultural supplies , since the late 1970s , commencing in the Burdekin Delta , Queensland. More recently urban stormwater and reclaimed water resources have been used in MAR , via injection wells in South Australia and infiltration projects utilising soil aquifer treatment in Western Australia and Northern Territory.

The China-Australia Managed Aquifer Recharge (MAR) Training Workshop held in Jinan October 27 ~ 31 , 2008 , was supported by the AusAID Public Sector Linkages Program , the National Natural Science Foundation of China , Shandong Institute of Geological Survey and Jinan Water Resources Bureau in order to facilitate the exchange of information and experience on MAR among Australian researchers and Chinese researchers and water resource managers. In large parts of both countries groundwater is a resource under stress , and in urban areas the possibilities of urban runoff and treated sewage for augmenting groundwater supplies are being trialled or used. This workshop proceedings documents the way MAR is being used or could be developed to address some of China's water resource management challenges. It provides a guide to developing MAR schemes based on Australian and Chinese experience. The material presented takes account of technical , health or environmental risks and the methods used to manage those risks.

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内容概要

本书精选了中国—澳大利亚含水层补给管理研讨会论文，其主要内容包括可管理含水层补给的地址的选择、设计，有关水力学知识，地球化学特征及水质变化，风险评估，数学模型及模拟、指南，中国和澳大利亚有关可管理含水层补给的案例研究等。

本书适合从事地下水科研、教学、管理及相关部门人员参考使用。

书籍目录

Preface前言中方论文 ReInjection of Geothermal Water in Beijing and Tianjin Areas of China Study on Quality Change of Roof Rainwater and Sand Filter Column Effect Groundwater Recharge with Municipal Effluent in China 山东省地下水开采存在问题与对策 济南泉域回灌补源潜力研究 王河地下水库水资源分析及工程建设状况 某炼油厂地下水系统石油烃污染物运移预测研究 基于ANN与GIS的含水层石油烃污染防治性能研究——以某炼油厂岩溶裂隙水系统为例 城市屋面雨水水质及处理方法探讨澳方论文(英文版) 1 Introduction to Managed Aquifer Recharge 2 How to Establish a MAR Project Using a Risk Assessment Framework 3 Hydraulic Considerations 4 Water Quality Considerations Appendix澳方论文(中文版) 1可管理的含水层补给介绍 2怎样用风险评估框架构建MAR项目 3水力因素 4水质因素附录

章节摘录

The cooling of produced geothermal fluid caused by injection of colder fluid has been reported in a few high-enthalpy geothermal fields. For low-enthalpy geothermal fields, there has not been any such report, even in the cases where the distance between the production well and injection well is rather small. Therefore, it may be concluded that for production-reinjection doublets in low-enthalpy geothermal fields, one does not have to fear about the cooling of the production water, if the distance between production well and injection well is greater than a few hundred meters, and the amount of reinjection is not very huge. In designing the distance of reinjection and production wells of a doublet system, a few factors should be considered, including the type of geothermal reservoir, the geological structure of the geothermal field, the permeability and thickness of the reservoir, the direction of fluid flow, the temperature difference between the reservoir and reinjection water, the flow rate of reinjection etc. But in the cases that a large number of reinjection wells and production wells will be placed among a rather small area, care has to be taken, and proper tests have to be carried out and proper modeling has to be done before any such injection project is started, so as to avoid premature thermal breakthrough.

5.2 Tracer test Tracer breakthrough can be a very good precaution for thermal breakthrough. Tracer testing is one of the most important aspects of geothermal reinjection, which has become a routine for reinjection experiments. Tracer tests can provide information about the flow paths and the flow velocity of the geothermal fluids between the injection and production wells. For fractured reservoirs, the volume of the aperture can be deduced from the tests. This information can be used to predict the cooling due to reinjection (Axelsson and Stefansson, 1999). For reinjection projects that are large-scale or a number of production and reinjection wells in a relatively small area, it is strongly proposed that a tracer test be carried out.

5.3 Monitoring Monitoring is one of the most important elements for geothermal management. For a geothermal field with reinjection, a proper monitoring program is even more important. Besides the monitoring of reservoir pressure, temperature, amount of production, chemical composition of geothermal fluid etc, the water level in the injection wells, temperature of injection water, amount of injection and chemical composition of injection water should also be monitored. The purpose is to find out the changes of the geothermal system caused by reinjection, especially the cooling of the produced geothermal water.

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