Workshop nº 7
By Prof. Dr. Pieter J. Stuyfzand (KWR and Technical University Delft, Netherlands)

Theme: 16. MAR water quality & related hydrogeochemistry aspects

Title: Water quality aspects of Managed Aquifer Recharge systems

Themes
Water quality aspects play a central role in practically all 20 themes and topics addressed during ISMAR-10. They include for instance: MAR site selection (looking for an optimum between beneficial contaminant removal and adverse reactions with aquifer components), water reuse potential and water quality requirements, chemical indicators of clogging, multitracing to validate hydrological models independently, environmental impact assessment, and health.

Objectives
The objectives are to learn about typical water quality issues connected with MAR, from practical matters such as site selection, monitoring and clogging, to the prediction of (i) pollutant behavior in basins and aquifer system, (ii) the accumulation of pollutants in basins and aquifer, and (iii) the leaching of constituents such as arsenic, iron and manganese from the aquifer.
The additional scope is to get an understanding of the complex interrelations between water quality and the many factors impacting on it, while learning that relatively simple models can supply good answers to complex questions.

Description
The course is intended for water managers, regulators, engineers, geologists and hydrologists interested in water quality aspects of Managed Aquifer Recharge (MAR). You will learn about:
- water quality issues (priority pollutants, self-purification, accumulation, leaching, recovery efficiency, quality standards, pretreatment, intake problems)
- water quality monitoring and hydrochemical data management (key parameters, wells, frequency, error detection, missing values, data mining, process identification)
- mapping and dating of infiltrated surface water in the underground (multitracing, hydrochemical zones, interaction with groundwater flow modeling)
- hydrogeochemical processes and patterns in basins, around injection wells and in the aquifer

- clogging of basins, injection wells and recovery wells
- simple analytical models to predict water quality changes in basins and aquifers.

PROGRAM. The workshop program includes:

1 Instructor:
Prof. Dr. Pieter J. Stuyfzand
Technical University Delft + KWR Watercycle Research Institute, Nieuwegein, Netherlands, pieter.stuyfzand@kwrwater.nl, Mob: 0031-6-10945021

2 Presentations in power point, on the topics listed above (see description)
3 Explanation of useful 'pollutant transport software' in EXCEL spread sheet
4 The course participants will receive: Handouts of all power point presentations, pdf's of various papers on specific aspects, and very useful software in EXCEL spread sheet

n. Discussion – All attendees

m. Questions. Collective summary & photo. All attendees

Proposer CV:

Pieter is hydrogeologist (MSc and PhD at VU University Amsterdam) with 40 years of professional experience in hydrogeochemistry and hydrogeology, with focus on Managed Aquifer Recharge and on systems analysis of coastal aquifers.
Pieter is full professor with a chair in (chemical) hydrogeology at Technical Univeristy Delft (TUD). He is also employed at KWR (formerly part of Kiwa) in Nieuwegein (Netherlands), where he connects scientific work at TUD to applied research at KWR.
Pieter participated to all ISMAR symposia to date, was invited key-note speaker at ISMAR-8 in Beijing, and has given many courses and lectures on MAR related topics.