XXXVIII IAH Congress

Groundwater Quality Sustainability
Krakow, 12–17 September 2010

Extended Abstracts

Editors:
Andrzej Zuber
Jarosław Kania
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University of Silesia Press 2010

abstract id: **347**

topic: **1**
Groundwater quality sustainability

1.5
Groundwater quality and mining

title: **Seepage field simulation and contamination characteristics analysis in Xinfeng coal mine, China**

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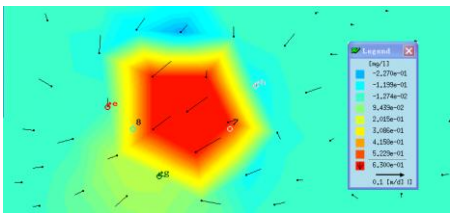
keywords: seepage field, flow model, groundwater, Xinfeng coalmine, contamination

The Feflow software was selected to simulate the behavior of groundwater flow and pollution transport of Hanhui aquifer and Taihui aquifer in the Xinfeng coalmine. This model simulates three-dimensional groundwater flows by using finite-element techniques and contamination concertration trend. The model domain is divided into 9480 nodes, making a total of 15 417 cells in each layer and covering 10 km^2 of the model area.

ANALYSIS OF GROUNDWATER FLOW

The effect on pollutants dispersion is of real significance, analyzing of groundwater flow under different pump rate in aquifer. Under different pump rate of 1200m^3/d, 1700 m^3/d, 2200 m^3/d in limestone of upper Taiyuan Formation ,the groundwater flow of aquifer are shown in Figure 1 and 2. The results indicate that the flow of water is gradually centralized towards wells. The phenomenon is due to the variety of water table caused by different water outflow.



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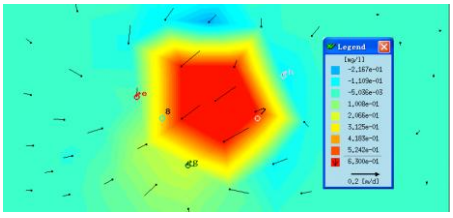

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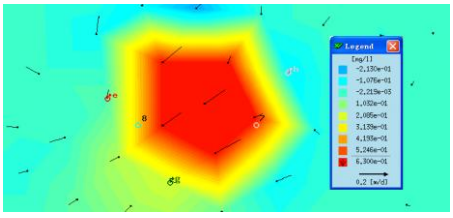

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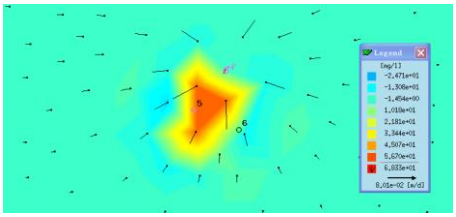
Figure 1. Ranges of Fe dispersion at pump rate of 1200 m^3/d (a), 1700 m^3/d (b)and 2200 m^3/d (c).



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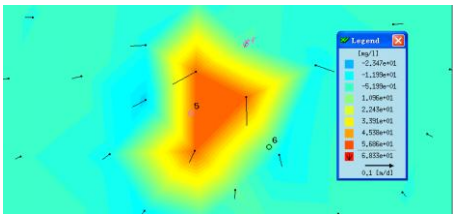

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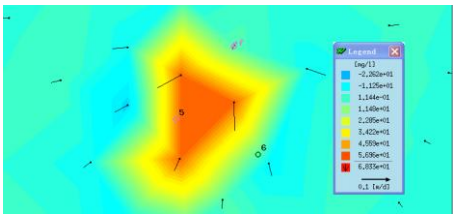

c

Figure 2. Ranges of SO_4^{2-} dispersion at pump rate of 1200 m^3/d (a), 1700 m^3/d (b)and 2200 m^3/d (c).

When the pollutants dissolved in water, it will have a definite range of pollutants dispersion. The range will change when the pollutants dispersion is effected by the outside factors such as time, water pump rate etc. Under different pump rate of 1200m^3/d, 1700 m^3/d, 2200 m^3/d in later five

years, the range of pollutants dispersion of Fe^{3+} and SO_4^{2-} is shown in Figure 1 and 2. The results indicate that the range of pollutants dispersion is enlarged with dispersion speeding, when pump rate increasing. It is also shown that the concentration of pollutant is decreased gradually in the central of contaminative zone, while the pollutants disappear nearby the pump wells. The reason is that the pollutants are diluted by water flush and dispersion with water flow increasing.

The pollutants concentration of Conc. obs well No. 5, 6 and 7 at different rate of pump is simulated. The simulation figure is omitted because of limit of maximum length.

It is shown that concentration of SO_4^{2-} in all observation well is decreasing along with the rate of pump increase. When the rate is 1200 m^3/d, the concentration curves of Conc.obs well 10 and 8 are nearly parallel; when the rate is 1700 m^3/d, the concentration curves of Conc.obs well 10 and 8 are intersectional on 1374^{th} day, and the concentration of SO_4^{2-} in Conc.obs well 10 decreases more rapidly than in Conc. obs well 8; when the rate is 2200 m^3/d, the concentration curves of Conc. obs well 10 and 8 are intersectional on 1240^{th} day, and the concentration of SO_4^{2-} in Conc. obs well 10 decreases much more rapidly than at the pump rate of 2200 m^3/d.

Anyhow, the concentration of SO_4^{2-} in Conc. obs well 10 and 8 are lower than the initial concentration. The decrease is due to water outflow. The pollutants are discharged largely in the aquifer, although a lot of them are dissolved in the water. So a small quantity of pollutants can disperse in the aquifer. In addition, it is possible that the pollutants are diluted by water with pollutants dispersion. Therefore, the real reason is needed a long term of observations to certificate.

ACKNOWLEDGEMENTS

This work has been supported by national basic research program of China, Research on basic theory about the mechanism of water in rush and its prevention in coal mines.

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International Association of Hydrogeologists

AGH University of Science and Technology

2-vol. set + CD
ISSN 0208-6336
ISBN 978-83-226-1979-0