Dewatering Impact Assessment of Longwall Coal-Mining on Groundwater Resources in Central Turkey



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OUTLINE

- Study Area
- Conceptual Model
- Numerical Model
- Dewatering Simulations
- Impact Assessment of Longwall Coal-Mining on Groundwater Resources
- Conclusions





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- Pumping wells (9)
- Monitoring wells (65)
- State wells (3)
- ▲ Fountain / Spring (70)
- Surface water monitoring Points (30)



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CONCEPTUAL MODEL





• FEFLOW (v 6.2) software







• Fluid transfer BC



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- 72 observation wells
- RMSE = 16.09 m
- NRMSE = 4.56 %



DEWATERING SIMULATIONS

- According to the preliminary mine plans, open cut mining will end at the 11th year of mine life. Starting from the 12th year of mining, coal seams will be extracted by longwall mining.
- In the simulations, dewatering of the open pit is assumed to be continued with the same discharge rate at the 11th year.
- In order to assess long term impacts of dewatering of longwall panels, simulations are conducted under steady-state conditions.



DEWATERING SIMULATIONS



DEWATERING SIMULATIONS





Panel 2:

- Max drawdown: 340 m
- 6 village water
 supply springs will
 dry up!
- Total decrease of spring discharge rates 7.26 L/s



- Fountain / Spring
- Village water supply springs



Panel 4:

- Max drawdown: 410 m
- 6 village water supply springs will dry up!
- Total decrease of spring discharge rates 7.43 L/s



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Fountain / Spring

Village water supply springs



<u>Panel 8:</u>

- Max drawdown: 380 m
- 6 village water
 supply springs will
 dry up!
- Total decrease of spring discharge rates 8 L/s



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Fountain / Spring

Village water supply springs



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Surface water monitoring point

CONCLUSIONS

- A 3D numerical groundwater flow model was constructed by FEFLOW software in order to simulate dewatering impacts of longwall panels on groundwater resources.
- The dewatering requirements were evaluated at three critical panel locations.
- The preliminary results indicate that groundwater inflow rate to the panels range from 167 L/s to 311 L/s based on the location of the panels.
- The long term impacts of dewatering on groundwater resources were assessed in terms of spring discharge and baseflow rates in the Kirmir stream.
- The results indicate that:
 - Majority of village water supply springs and fountains will dry up.
 - Baseflow rate to the Kirmir stream will be decreased by 20 35 % based on the panel locations.





