Animas River GROUNDWATER LEVEL MONITORING after the Gold King Mine 2015 mine-water release

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With funding from NM Environment Department

MENT DEP

GKM spill August 5, 2015

EPA triggered blowout

- More than 3 million gallons of acid mine water discharged into Cement Creek – Animas River
- Orange water containing high concentrations of As, Cd, Fe, Pb, Mn, Hg and Zn
- New Mexico determined that much of the river was a gaining river and quickly lifted the ban on using water after the spill water had passed through



The contaminated pulse of water has flowed through *HOWEVER* it deposited mine waste on streambed which may still leach into groundwater

GKM Spill

August 2015

- EPA and contractors collect 266 samples along Animas River
- We initiate groundwater monitoring network with ~120 wells
 - NMBGMR, USGS, NMOSE collaboration
- Two wells instrumented with pressure transducers

January 2016: NMBGMR

 Repeat measurement of ~70 wells water levels



Regional groundwater flow



NMOSE Water Resource Atlas, 2002

Water Level Change



Water Level Change



>2 feet

- Majority of wells showed declines
 - Average of -2.1 ft
- North of Aztec declines were more pronounced

Hydrographs



Hydrographs

- Pressure transducers installed in two wells:
 - AR-028: north of Farmington, 1475 ft west of river, 20 ft deep
 - Short term spikes in record correlate with spikes in river stage.
 - 3ft rebound in water level starting in mid-October.



Hydrographs

- Pressure transducers installed in two wells:
 - AR-007: 4 miles south of Aztec, 300 ft east of river, 32 ft deep.
 - Short term spikes in record correlate with spikes in river stage.
 - 3 ft decline after irrigation ditches were shut off on November 1st.



Water Table Maps (January 2016)



- 70 steel tape water level measurements
- LiDAR elevation model









Middle Reach

4,080,000



4,090,000



4,090,000

August 2015

5 wells with water level below river stage
Average of 0.6 ft below river
Average of 150 ft from river

January 2016

13 wells with water level below river stage
Average of 1.2 ft below river
Average of 270 ft from river







Preliminary Findings

- Most of Animas shows gaining conditions.
- The irrigation ditch water may be feeding shallow water table supporting groundwater levels during the irrigation season.
- Seasonal fluctuations in river stage and water levels are enough to reverse groundwater/ surface water flow direction.
- The river and the groundwater in the valley are hydrologically connected.

Acknowledgments

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