NMED

New Mexico Environment Department

PROTECTING NEW MEXICO'S AGRICULTURE FROM HEAVY METAL CONTAMINATION IN THE ANIMAS AND SAN JUAN WATERSHEDS

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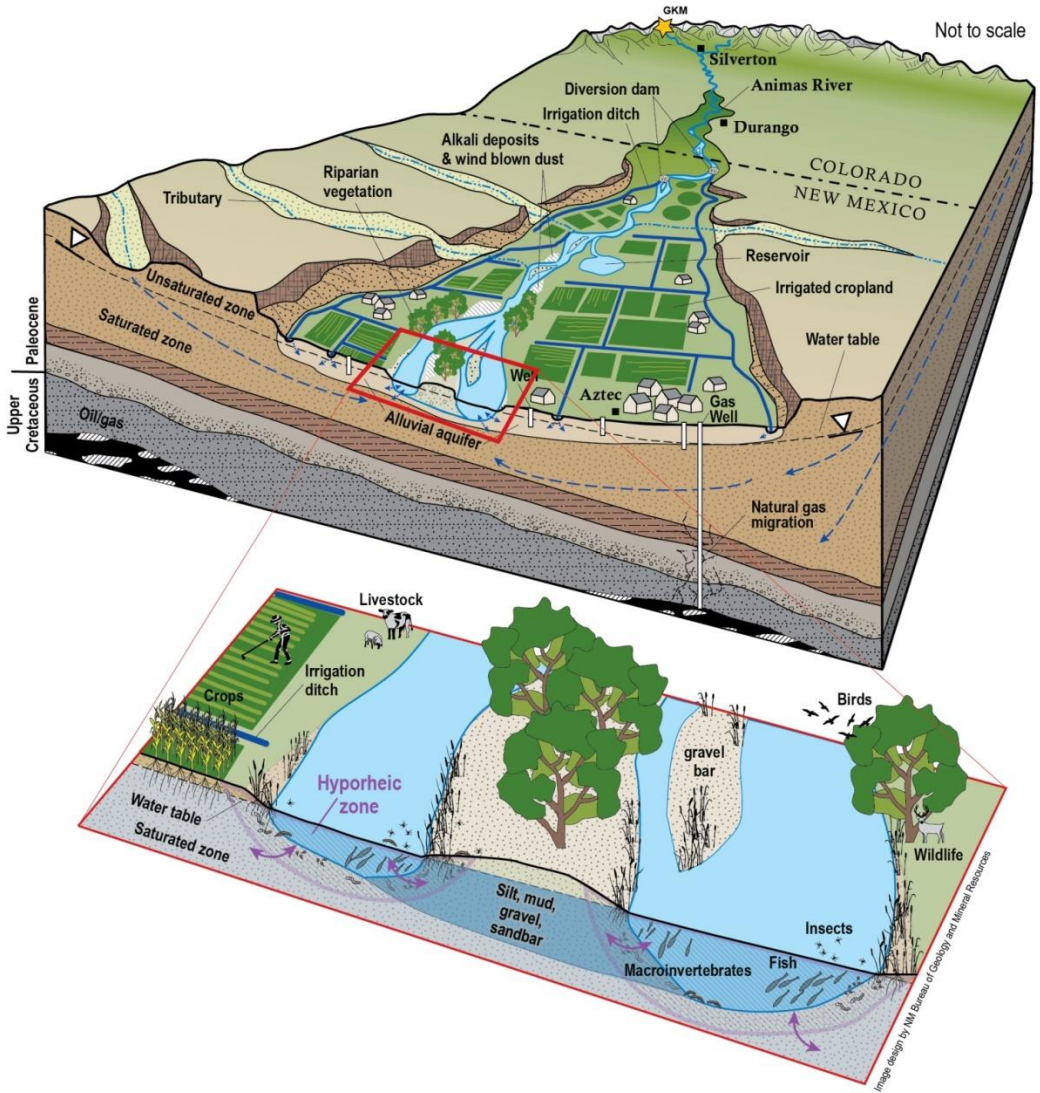
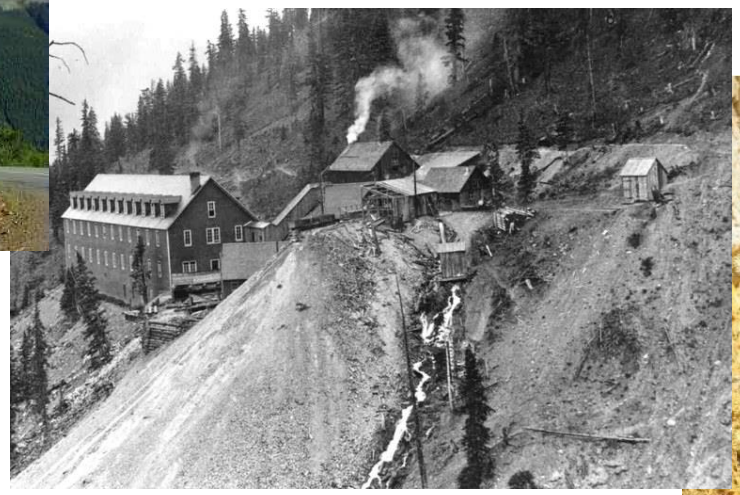
Animas River Watershed System



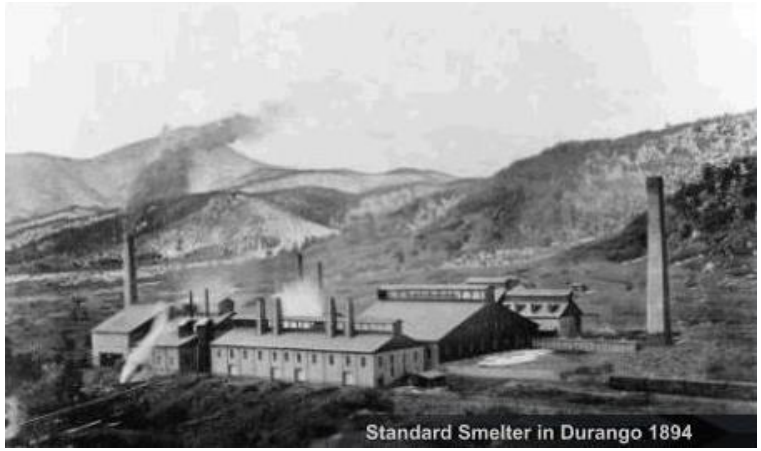
Sources of Contamination

- Natural geologic acid rock drainage
- Legacy mining and milling
- Gold King Mine blowout of August 5, 2015



Durango Smelter/Mill

- Began as a lead smelter, became a vanadium mill, then a uranium mill.
- Significant storage of radionuclides in river sediment; uptake into food web.


Standard Smelter in Durango 1894

- Late 1950's survey of mill effluent, river water, river sediment, aquatic algae, and insects, fish, milk, and drinking water.

TABLE V.—Radioactivity of River Muds

Station	Mileage Below Mill	Radioactivity ($\mu\mu c/g$)*		
		Gross Alpha	Gross Beta	Radium
1	−1.0	18	110	1.7
2	2.0	1,250	1,350	171
3	(Tributary)	17	70	1.5
4	23	395	450	52
5	28	285	430	37
6	59	42	83	7.0

* Dried weight.

GKM Spill Response Summary

- The spill began on August 5, 2015.
- NMED was onsite, began testing water, and issued advisories for public water systems, irrigation, livestock watering, private domestic wells, and fishing before the plume arrived in New Mexico.
- No public water system consumers drank contaminated water or ran out of water.
- NMED tested ~580 private domestic wells; no evidence of impacts from the spill. Groundwater monitoring continues.
- No evidence of unusual mortality of livestock, fish, or wildlife.

Irrigated Agriculture

- Not all irrigation ditches could be closed prior to arrival of the GKM plume.
- Ditches were flushed with river water for 12 hours, during which irrigators were asked not to divert water, to wash GKM spill sediment back into the Animas River.

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Farm and Livestock Issues

- Contaminant levels in river water and well water used for irrigation and livestock watering
- Surface contamination of plants (from irrigation water)
- Phytoextraction and plant uptake of heavy metals from soil and/or soil water
- Injury to plant health (eg. Chlorosis)
- Livestock distress, illness or death

NMED and NMSU Monitoring to Protect Agriculture

- Surface water quality
- River-aquifer hydraulics
- Groundwater quality
- Sediment in rivers, ditches and irrigated fields
- Crops
- Livestock

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River Monitoring

- Sondes in the river for flow rate, turbidity, pH, specific conditions, and temperature
- Grab samples for lab analysis

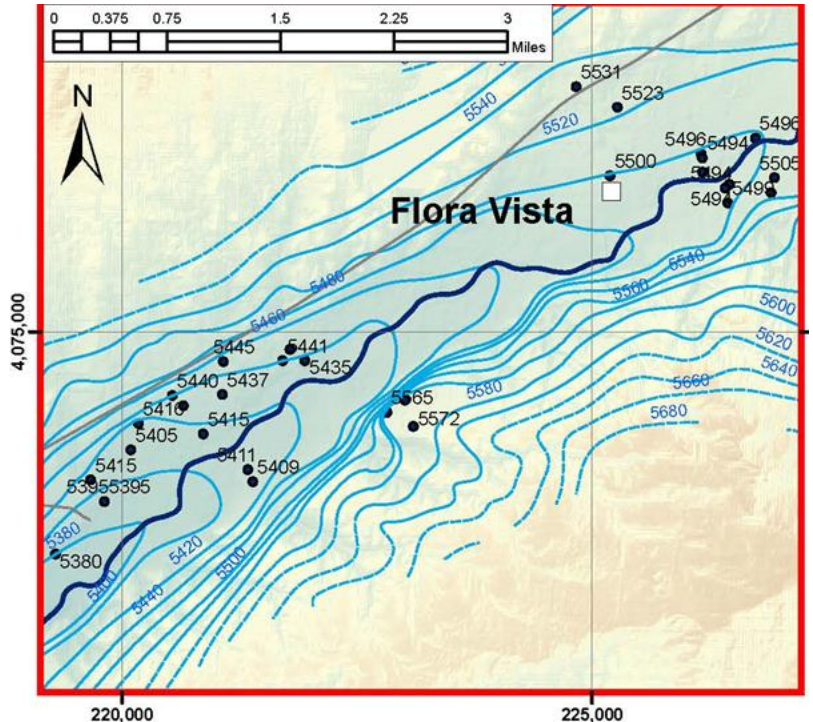
Sediment Monitoring

- Heavily contaminated Animas River sediment near Durango, CO

- XRF testing of Animas River sediment near Cedar Hill, NM

Water Table Mapping

- Define groundwater flow and aquifer-river interactions
- Water levels in 80 wells measured seasonally
- 20 wells sampled seasonally



Sequestration of Metals into Groundwater and Soil

- Evidence that surface water contaminants entered groundwater near the river and sequestered into soil

Livestock Observation

- Look for evidence of unusual livestock distress, illness, or mortality.
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- New Mexico Department of Agriculture

Monitoring Results, So Far

- Heavy metal concentrations in river water comply with N.M. Water Quality Control Commission standards for both irrigation and livestock watering
- No evidence of well water contamination from GKM spill
- Sediment testing is underway in both CO and NM, at least one hot spot on Animas River by Eagle Bend
- Crop tissue testing for 2016 growing season is underway, no high results to date
- No unusual livestock distress, illness, or mortality observed during first year after spill

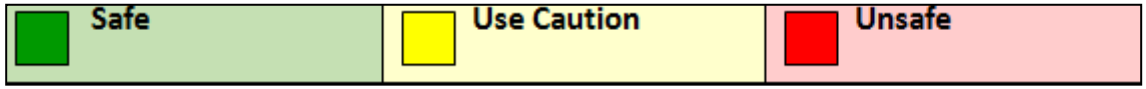
Animas and San Juan Exposure and Risk Dashboard

- The dashboard addresses potential contaminant exposure pathways and risks for the Animas River corridor in New Mexico, and the San Juan River corridor downstream of the Animas confluence to the Navajo Nation border.

- This evaluation is based on current monitoring data and will be updated in the future, if necessary, as new data become available.

- https://www.env.nm.gov/wp-content/uploads/2016/01/Animas-San-Juan-Risk-Dashboard.-2016.09.20.pdf

Animas and San Juan Exposure and Risk Dashboard



Potential Exposure Pathway	Risk Level	Explanation
Public Drinking Water Supplies		Public drinking water supplies in the river corridors covered by this dashboard are subject to multiple protective requirements of the federal Safe Drinking Water Act (SDWA) and are presently safe for all uses. These requirements include infrastructure construction standards, solids settling and treatment, disinfection, testing treated water, and New Mexico Environment Department (NMED) inspections.
Private Domestic Wells		Private domestic wells are not subject to the protective requirements of the federal SDWA. Many private wells were not constructed in a sanitary manner or have deteriorated as the well has aged. These wells are at risk of contamination by bacteria, parasites or viruses. High levels of manganese, iron, sulfate and total dissolved solids existed in some wells prior to the Gold King Mine (GKM) spill. Elevated lead also has been detected in private water systems that have galvanized steel plumbing components or lead solder. Following the GKM spill, NMED tested more than 600 private domestic water wells in San Juan County, NM. There is no evidence that the GKM spill contaminated any water wells in New Mexico. NMED and the New Mexico Bureau of Geology continue to monitor private domestic wells for evidence of mining and milling contamination.
River Water for Domestic Supply		Untreated river water should never be used for domestic supply, even if there are not visible signs of contamination. When you consume untreated water from surface sources, you run the risk of ingesting harmful bacteria, parasites or viruses. Untreated river water also may contain high levels of lead and arsenic during periods of high turbidity such as when storm events stir up contaminated river sediments.

Animas and San Juan Exposure and Risk Dashboard

River Water for Irrigation		River water presently complies with all standards for irrigated agriculture.
Crops		Crops will be tested for heavy metal content by New Mexico State University during the 2016 growing season to ensure that they are safe for consumption by humans and livestock.
River Water for Livestock		River water presently complies with all standards for livestock watering.
Livestock		The New Mexico State Veterinarian, New Mexico Department of Agriculture Veterinary Diagnostic Laboratory, and local veterinarians are on the alert for any signs of unusual animal distress or illness that could result from GKM or other mining and milling contamination.
River and Ditch Sediment		Sediment that is heavily contaminated with heavy metals exists in Colorado, and has the potential to migrate into New Mexico. NMED is monitoring sediment contamination in New Mexico to identify any hot spots that exceed residential risk screening levels. This monitoring is ongoing as contaminated sediment can migrate during times of high river flow. Anyone who observes discolored sediment within or near the Animas or San Juan Rivers in New Mexico should notify NMED immediately by calling 1-800-219-6157.
Fish		Fish tissue test results in the Animas River, and in the San Juan below the confluence with the Animas, show that heavy metals are within guidelines for human consumption. The New Mexico Department of Game and Fish will continue to monitor and test fish to ensure that they remain safe for consumption. The “Quality Waters” of the San Juan River below Navajo Lake are located upstream from the confluence with the Animas River and were not affected by the GKM spill or by other mining and milling waste discharges into the Animas River.
Recreational Activities		Mining and milling contaminants do not presently pose hazards to people enjoying water sports, fishing and other recreational activities in and near the Animas and San Juan Rivers in New Mexico. Both rivers, however, may contain bacteria, parasites or viruses which could pose a health hazard to people who come into contact with river water. It is recommended that people wash thoroughly after going in the river, and avoid swallowing river water when swimming or doing water sports.

Acknowledgement

- The U.S. Environmental Protection Agency, Region 6 Office in Dallas, TX is thanked for funding a portion of the agricultural monitoring.

For More Info

- www.NMEDRiverWaterSafety.org